

WORKER ADJUSTMENT TO
LIBERALIZED TRADE:
COSTS AND ASSISTANCE POLICIES

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Worker Adjustment to Liberalized Trade:

Costs and Assistance Policies

1. Introduction

The issues which confront governments concerning the choice between trade or protection are related to three distinct yet inter-connected policy problems, namely: international trade policy, national industrial development policy, and political platform policy. The theoretical economics literature as well as most policy analysis tends to approach each of these problems in a slightly different manner. As a result policies which might provide partial solutions to all three problems tend to be overlooked or dismissed because they do not provide a complete answer to any one. Worker adjustment assistance policies are of this type. The purposes of this paper are to indicate the potential usefulness of properly designed worker adjustment policies, to define the measurement and empirical issues which much be addressed in designing specific programmes, and to point out critical considerations regarding their implementation. Estimates of the government financial assistance required for worker adjustment assistance are provided for one region in Canada in order to illustrate the magnitudes involved.

Before proceeding into the main body of the paper it may prove useful to sketch briefly the policy problems mentioned above. The chief problems addressed by international trade policy are how to promote an efficient allocation of production and consumption between countries so as to make the best use of the world's scarce resources and how to promote a more equitable international distribution of income between developed and developing countries. The traditional policy recommendation of trade liberalization has been based on the potential for long-run benefits from increasing trade according to

comparative advantage. Industrialized countries of the north have to some extent also recognized their responsibility to assist developing countries of the south through foreign aid and related programmes which foster improved health, education and technical training. More recently the third-world countries have demanded more trade, and policies which promote trade are considered good while those which impede or restrict trade are considered bad. It is interesting to note, however, that the theoretical arguments in favour of increased trade have until fairly recently overlooked the adjustment problems faced by workers and the owners of productive facilities in trade-impacted industries in developed countries. Trade liberalization, for example, will not lead to an actual Pareto improvement in world wellbeing unless displaced workers in developed countries are compensated to leave them as well off as they would have been under continued protection. At the same time, from the perspective of the developed country as a whole the complete or rapid removal of trade barriers may reduce economic efficiency because the short-run dislocation of factors of production inflicts a cost on the economy. In a second-best economy with price-distorted markets, furthermore, although welfare gains are captured through the lower consumer prices associated with freer trade, it is still possible that long-run economic efficiency considerations would argue for maintaining production levels higher than those that would prevail under freer trade.¹

The second policy problem which influences a government's choice between trade and protection is its national industrial development strategy. Over recent years governments in market-oriented economies have tried to develop a broad range of industrial adjustment assistance programmes not only in order to cope with changing trade patterns but also in order to achieve domestic economic and social objectives.² Among other objectives these

programmes usually endeavour to create or to maintain employment opportunities by means of capital grants to firms which expand in slow-growth regions, financial assistance to troubled firms in declining industries, subsidies to encourage research, development and innovation in expanding sectors, government procurement policies, and last, but by no means least, a plethora of protectionist measures including tariffs, quotas, and other non-tariff barriers. Although industrial development policy and trade policy both create adjustment problems, there are fundamental differences between them. First, industrial development policy is decidedly nationalistic, not internationalistic, in its orientation. Second, trade policy is designed to promote international development through increased trade. Industrial development policy is intended to foster the economic opportunities available to domestic residents, and consideration is given to its impact on trade volumes only as international agreements constrain the use of protective measures or as certain policies might invite foreign retaliation.³ Third, whereas trade policies have tended to neglect the domestic economic costs of adjusting to any realignment of trade patterns, industrial development policy must face the issue head-on.

If some industrial sectors in the country have excellent growth potential while others are declining, the key adjustment problems which must be tackled are how to decide which firms in the declining sectors ought to receive government financial assistance, how to determine the magnitude of that assistance so as to avoid wasting resources, how to compensate any displaced workers for their expected income loss, and how to reduce the overall economic costs of adjustment by encouraging the re-employment of displaced workers in an economically efficient manner. The trouble with most adjustment assistance programmes, and where they run into conflict with trade policy, is that they are seldom designed to promote an economically efficient use of the country's

resources. In the Canadian context, for example, there is not one government programme which alters the amount of its financial assistance to take into account the extra economic cost of using domestically produced goods which are protected from international competition when less expensive imports may be available.⁴ Nor do these programmes recognize that Canadians as a whole can be made worse off from industrial financial assistance intended to delay layoffs if the economic benefits from retaining jobs in place are less than the economic costs of the continued operation of the firm.

Industrial adjustment and worker adjustment assistance can improve the wellbeing of all Canadians, and can avoid interfering with trade policy, only if the magnitude of the assistance is geared to the economic costs and benefits of the actions taken. The largest component of the economic benefits of delaying layoffs, for example, is usually the saving in economic costs from postponing worker displacement. When the latter is accurately estimated, it provides a benchmark for the amount of financial assistance the government should consider offering the firm to keep it in business. By the same token whatever subsidy or assistance is paid to encourage the re-employment of displaced workers should be based on the net economic benefits derived therefrom. These benefits will obviously be greater if re-employment occurs in expanding industrial sectors rather than in declining sectors which are reliant upon various protective measures for their continued survival, and an economically efficient re-employment programme ought to vary its incentives accordingly.

The third policy problem mentioned above was labelled political platform policy. Elected governments need to retain office in order to implement their objectives, and to this end they pursue policies which are likely to improve the probability of re-election. The simple fact is that workers and the owners of capital all vote, and no elected politician can ignore the

adjustment problems caused by trade policy or industrial development policy for his constituents. In order to foster international trade or to achieve other socially desired objectives, therefore, politicians must adopt policies designed to mollify the lobbying efforts of organized labour groups and business associations who generally favour protectionist policies.⁵

Political strategists ought to recognize that well-designed worker adjustment assistance programmes can be a useful plank in the party's platform. A problem can arise, however, if only a veneer rather than a solid plank is utilized. The U.S. Trade Expansion Act of 1962 encountered difficulty, for example, because the eligibility criteria for worker adjustment assistance were made so strict that "in the first eight years of its life no workers or firms were found to be eligible."⁶ Some programmes in Canada serve to forestall layoffs, but without regard to economic cost, while others, which are supposed to compensate laid-off workers, provide assistance in an efficiency-negative manner. Work disincentives are frequently built into these programmes as a result of taxing back the compensation payments from employment earnings which are received while displaced workers are on the programme.

Trade liberalization offers long-run benefits for consumers and workers in general at the short-run cost of higher unemployment for displaced workers and capital. It is evident that the degree of trade liberalization a politician is willing to recommend is constrained by the potential income losses that workers and capital owners in his constituency perceive they will suffer. For any given degree of trade liberalization already undertaken by a country, adjustment assistance programmes can be designed to reduce the private and economic costs of adjusting to changing trade patterns. In addition, the availability of well designed programmes makes the further

lowering of trade barriers by a country both politically feasible and economically attractive. As developing countries and consumers continue to press the developed countries for increased trade in addition to foreign aid, adjustment assistance programmes will serve to enhance the ability of countries like Canada to adjust to changes in the international economic order.⁷

The focus of this paper is exclusively on the adjustment process to which workers are exposed and on the private and economic costs of that adjustment.⁸ Worker adjustment assistance programmes should aim to reduce the overall economic costs of adjustment and to compensate individuals for the private costs of being laid off. To design such programmes estimates are required both of the costs borne by the economy as a result of worker adjustment and of the expected private income losses of workers directly displaced. The magnitude of government financial assistance either to support troubled firms or to encourage re-employment should be based on the reduction in the economic costs of worker adjustment. "Positive" adjustment assistance of this kind is consistent with an efficient use of the country's resources and with a rational international trade policy. The appropriate magnitude of government financial assistance to compensate workers for being laid off is a separate calculation and relates to considerations of both equity and efficiency.

There are a number of important reasons for focusing on worker adjustment assistance. Foremost among them is the fact that workers are more numerous than capitalists and can create more serious political opposition to government policy changes. The likely costs of worker dislocation as a result of increased foreign competition, trade liberalization or industrial development is frequently used as an effective political lever not only by organized labour but also by business firms and business associations which have become dependent on protection and government largesse. A second reason for exploring worker

adjustment assistance in particular is that the economic benefits derived from delaying layoffs or encouraging earlier re-employment have not been well defined empirically in the economics literature. Nor has the distinction between the private and the economic costs of laying off workers been made clear; this, of course, is crucial for defining considerations of equity versus efficiency. These issues pose challenging conceptual and empirical problems. If these problems are not solved satisfactorily, then the term worker adjustment assistance will remain an interesting, but not a very practical, means of furthering the objectives of both trade and industrial development policies.

In June, 1978 the Council of the Organization for Economic Cooperation and Development, meeting at a Ministerial level, approved a number of resolutions pertaining to "positive" adjustment policies. Several of these resolutions relate precisely to the problems addressed in this paper. Eight of the points which are directly related to this work are summarized as follows:

- (1) There is a need for well-designed short-term, selective policies to cushion the impact on labour of industrial adjustment.
- (2) These policies should be designed to achieve their goals while minimizing the loss in reduced economic efficiency.
- (3) Adjustment assistance policies for labour must be short-term in nature and must not permanently preserve unviable industries or impede trade.
- (4) The emphases of any special employment policies should be to assist those directly affected and prepare them for new types of employment.
- (5) Policies should be carefully designed to ensure that over time, they do not unduly affect attitudes to work and willingness to accept necessary change.⁹
- (6) Policies should facilitate movement of labour and capital from inefficient productive activities to those which possess a comparative advantage.

- (7) In the absence of such policies externalities may exist in the labour market which could lead to a divergence between private and social costs and benefits and thus create distortions in resource allocation.
- (8) Adjustment assistance programmes should operate to promote marginal firms in growth industries rather than support declining industries.¹⁰

These resolutions indicate a clear set of objectives for a positive adjustment policy and the general direction of policy formulation. However, it is also clear that most discussions of adjustment policy do not contain operational definitions for terms like welfare efficient, economic externalities, economic distortions, economic costs or economic benefits. Most economists, generally speaking, have a good theoretical idea of the meaning of such terms, but making them operational is essential if positive adjustment assistance is to become a reality. The remainder of this paper is directed at achieving this end.

Section 2 of this paper begins with an examination of the adjustment problem facing displaced workers. A distinction is made between the private and economic costs of laying off workers, this distinction being essential to the subsequent policy discussion. Estimates of the durations of unemployment, employment and the long-run equilibrium probability of laid-off workers being subsequently at work are provided for one region in Canada to indicate the seriousness of the adjustment problem. Section 3 is concerned with the decision process the government should follow in choosing between alternative policies for providing worker adjustment assistance. A framework is also established for determining the appropriate magnitude of government assistance under specific programmes. In Section 4 estimates are provided of the economic and private costs of workers' losing their jobs and of the gross economic benefits of the alternative worker adjustment assistance programmes discussed in section 3.

2. The Private and Economic Costs of Worker Adjustment

(a) The Private Costs of Adjustment

When workers are permanently laid off for whatever reason, some retire and the rest are usually unemployed for a spell before finding subsequent employment. Their next job may be less permanent, may offer less favourable working conditions and may pay less than their previous employment. There may also be a loss of pension benefits. If their subsequent employment is temporary, then there will be another spell of unemployment, another job, and so on such that the probability of their being at work following layoff may be less than before layoff. The reduced probability of being at work plus any reduction in wage rates combine to create expected income losses for displaced workers. These income losses constitute part of the private costs of being laid off, and their magnitude is specific to the workers directly affected.

The expected income losses can be estimated as follows. 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 the time spent on non-market activities. This combination of net-of-tax earnings from employment, unemployment insurance benefits, and value of leisure is referred to as the workers' full private income before layoff. As the proportion of time spent employed and unemployed, and the wage rate earned, are altered after layoff, the expected full income also changes. The difference between the two full income streams before and after layoff measures the expected income loss over time.

The factors affecting the change in wage rates and in the proportion of time at work relate to the characteristics of the job lost, to the characteristics

of the workers, to the region, and to the economic conditions at the time of layoff. The permanent workers in these firms are often in quasi-fixed supply. That is to say, they have become specialized in their jobs through lengthy and specific on-the-job training, and their productivity and wage rates are often higher in their current employment than in alternative employment. Because they are often older, moreover, their geographical and occupational mobility is limited. The costs of adjustment for such displaced workers are likely to be positively related to their age. Other socio-economic characteristics like sex, marital status, the number of dependents, and skill level also influence the speed and extent of adjustment and should be taken into account when estimating expected income losses.

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 if a firm is forced to shut down and to lay off 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.

The private 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. If a major firm in the community shuts down, the number of alternative job opportunities is more limited, and workers may have to migrate in order to find employment. They then also incur the costs of moving. Potential migrants might suffer such a sizeable capital loss on their homes as a result of the decrease in the demand for housing, 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 community, discourage migration to other labour markets and raise the costs of adjustment for both workers and the economy.

Not every displaced worker need be worse off. Some workers who have been employed in declining firms might find more lucrative employment in expanding sectors elsewhere. It remains an empirical problem to determine the magnitude of the expected income loss. Even in more isolated communities not everyone need be worse off as a result of the decline in the demand for housing services. Individuals who rent their accommodations, on the one hand, are better off if rental prices fall or do not rise as quickly; their landlords, on the other hand, suffer a capital loss. The timing of capital losses also varies from one home owner to another. Those who decide to move out of the community soon after a firm shuts down must bear an immediate capital loss; their job prospects must be sufficiently good to offset the relatively more expensive housing costs which they will encounter elsewhere. Older workers who lack marketable skills are more likely to remain in the community. They do not bear an immediate capital loss, nevertheless at a future date they, or their heirs, will be worse off by the decrease in the value of their estates.

The private adjustment costs are also closely related to economic conditions in the region and the economy at large. If the unemployment rate is initially low and the demand for labour is growing rapidly, displaced workers can expect to experience a shorter duration of unemployment, a longer duration of subsequent employment, and to have a smaller income loss.

(b) The Economic Costs of Worker Displacement

The economic cost of permanently laying off workers is equal to the difference between the expected economic value of labour in the economy with and without the layoff. The economic value of employed time can be approximated

by the gross-of-tax wage rate which in turn should be roughly equal to the marginal productivity of labour. The economic value of unemployed time is the value of time spent on non-market activities. While unemployment insurance payments are included in the private income of workers, these payments are considered transfers from an economic point of view, and hence are not included in the economic value of unemployed time. By the same token personal income taxes are excluded from the private income of workers, but are included in the economic value of employed time. The consistent treatment of taxes and transfers is an essential element of the methodology developed in this paper and is crucial to the distinction between private and economic costs.

In a later section two models are used for the estimation of the economic costs of displacing workers and of the corresponding economic benefits from delaying that displacement. The models are described more fully in Appendix A. One is a partial equilibrium model which focuses on the change in the economic value of time of only the workers directly affected. When workers are permanently laid off, some will retire, others may find employment straight away, but most will experience some unemployment. As was indicated previously, it is possible to estimate the probability that displaced workers will be at work at any point in time following layoff. The changes in their employed and unemployed time can then be multiplied by their respective economic values to estimate the change over time in the economic value of the workers' time. In most cases the lower probability of being at work and decreases in labour's productivity and wage rates after layoff will combine to reduce the economic value of labour below its value before layoff and thus to create a negative labour externality which is the economic cost of worker adjustment.

The central weakness with the partial equilibrium model is its implicit assumption that there are no other externalities created in the rest of the

labour market when these workers are laid off. This will occur only if the displaced workers do not affect the job prospects of other workers. Although such situations could arise, it is more likely that laid-off workers would compete with other members of the labour force and would thus increase their duration of unemployment as well. Even if all the displaced workers were immediately to find alternative employment, therefore, the private costs of adjustment would be borne by others and the economic costs of adjustment would still exist.

In order to capture the overall response of the regional labour market to a disturbance like worker layoffs and to estimate the associated negative labour externality, a general equilibrium model has been constructed. This model simulates the changes in unemployment, net outmigration, labour force participation, new job creation, and secondary employment in the region compared to what would otherwise have happened without the disturbance.¹¹ The economic value of the time of those workers who are finally induced to adjust their supply of labour to the region, thereby bringing the labour market back to equilibrium, determines the negative labour externality created by the layoffs and the economic cost of adjustment.

Although any decrease in housing prices as a result of shutting down a firm in a more isolated part of the country may create a financial loss for home-owners, it does not create an economic resource loss. Because the stock of housing is fixed in the short run there is no release of resources into the economy. The only economic cost from a regional perspective would be the forgone labour externality which might have been generated in new housing construction, and this forgone externality would be captured by the induced change in secondary employment in the general equilibrium model.

(c) The Expected Durations of Unemployment and Employment and the Probability of Being at Work

In the estimation of both the expected private income loss to laid-off

workers and the economic costs of adjustment using the partial equilibrium model, the expected durations of unemployment and employment in other jobs, as well as the long-run equilibrium probability of displaced workers subsequently being at work, are important variables. Besides their use in estimating the private and economic costs of adjustment, these variables also indicate the seriousness of the adjustment problem. Organized labour groups and businessmen seem to get considerable political leverage from arguments which stress the dire consequences of worker layoffs. The estimates presented below suggest that although displaced workers certainly suffer some hardship, the adjustment problem is manageable.

Since the major concern of this monograph is with the choice facing the Canadian government between trade or protection, a region in Canada has been chosen for analysis is one which is especially susceptible to foreign competition from less developed countries. The rate of growth and development in these countries is very sensitive to their level of exports so from the point of view of international trade policy the decision to permit increased trade or to protect trade-impacted industries is crucial. These same industries also pose problems for industrial development in Canada. This is particularly true for the weaker, more labour-intensive manufacturing sectors such as clothing, footwear, knitting and textiles, not only because they face increasing import competition from less developed countries but also because they frequently request financial assistance from the Canadian government to maintain or to modernize their operations. These industries are highly concentrated in Quebec which accounts for 50 per cent or more of Canadian employment in these sectors.¹² This concentration also creates an obvious political problem. The Sherbrooke region can be taken as typical of those more vulnerable to import competition.¹³ This region lies within the "eastern townships" of Quebec

and is centred about 100 Km to the east and south-east of Montreal. It has an overall population of approximately 330,000 and a labour force of about 142,000.¹⁴

In examining the re-employment experience of individual workers, estimates are made of the duration of unemployment for four typical workers from two types of data.¹⁵ The types of workers using data from the labour force tracking survey (LFTS) were classified as follows:

- Type I L: 40 year-old, married male.
- Type II L: 25 year-old, single male.
- Type III L: 25 year-old single female.
- Type IV L: 40 year-old, married female.

The types of worker for the Sherbrooke regional unemployment insurance (ROE-UIC) data base estimates are:

- Type I U: 40 year-old male with dependents.
- Type II U: 25 year-old male with no dependents.
- Type III U: 25 year-old female with no dependents.
- Type IV U: 40 year-old female with dependents.

The labour force tracking survey covered workers who had suffered a permanent job loss, while the unemployment insurance data include both permanent and temporary lay offs. In order to estimate the re-employment characteristics of only permanently displaced workers from the unemployment insurance data, therefore, the probability of a worker's resigning or being recalled was set at zero. The differences between the types of workers for which estimates are made arise out of the different socio-economic characteristics available for the workers in each data base.

Table 1 presents the re-employment characteristics, the estimated mean and median durations of unemployment and employment and the long-run

equilibrium proportion of time at work, (PEQ), for the four types of workers in the labour tracking data. First, notice that median durations of unemployment are considerably less than mean durations. The mean duration of unemployment measures the average length of unemployment spells experienced by all workers, whereas the median duration of unemployment measures the length of unemployment experienced by at least half of the workers who become unemployed. The median duration is thus a better estimate of the unemployment experience of the average worker. Because the mean is greater than the median duration, furthermore, it implies that the percentage of those laid off who find a job before the mean duration is much greater than 50 percent. Second, females tend to have worse re-employment experiences than males. Although females take longer to become re-employed on average, their job stability once re-employed is better than that of males.

Table 1: Re-employment Characteristics for Four Types of Sherbrooke Workers Based on the LFTS Estimates

Type of Worker	<u>Duration of Unemployment</u>		<u>Duration of Employment</u>	PEQ
	Mean (months)	Median (months)	Mean(a) (months)	
I L: male, 40, married	6.2	1.6	17.6	.728
II L: male, 25, single	6.0	2.0	13.6	.681
III L: female, 25 single	14.4	12.8	14.8	.505
IV L: female, 40 married	17.5	12.0	19.5	.524

(a) Only the mean duration of employment is given as it deviates from the median by insignificantly small amounts.

Table 2 presents the re-employment characteristics for the four types of workers in the unemployment insurance data. These results show large gaps not only between the mean and median durations of unemployment similar to the

results for the labour tracking data, but also a relative probability distribution of durations of employment that is skewed to the right. This is not surprising given that most of the workers on the unemployment insurance data base tend to have temporary jobs, and hence, high job instability.

Table 2: Re-employment Characteristics for Four Types
of Workers Based on the Sherbrooke ROE-UIC
Data Base Estimates

Type of Worker	Duration of Unemployment		Duration of Employment		PEQ
	Mean (months)	Median (months)	Mean (months)	Median (months)	
<u>Permanent Layoff Cases</u> ^(a)					
I U: male, 40, dependents	6.7	2.6	15.4	4.2	.687
II U: male, 25, no dependents	6.6	3.5	10.7	3.4	.611
III U: female, 25, no dependents	12.0	5.3	11.3	4.2	.485
IV U: female, 40, dependents	15.7	5.7	15.4	4.4	.472

(a) Permanent layoff cases are estimated by setting the probabilities of being recalled to the same firm and resigning at zero.

These two data bases indicate that the process of adjusting to being laid off is more difficult for some types of workers than others and it becomes more difficult under adverse labour-market conditions. At the same time, however, the data also indicate that the average displaced worker can expect to find subsequent employment and to retain that employment for a reasonable time period as well.

Having defined the private and economic costs of worker adjustment, and having a preliminary indication of the likely magnitude of the adjustment problem, attention can now be turned to developing a framework within which alternative policies can be analyzed.

3. Alternative Policies for Worker Adjustment Assistance

(a) A Framework for Government Decisions regarding Worker Adjustment Assistance

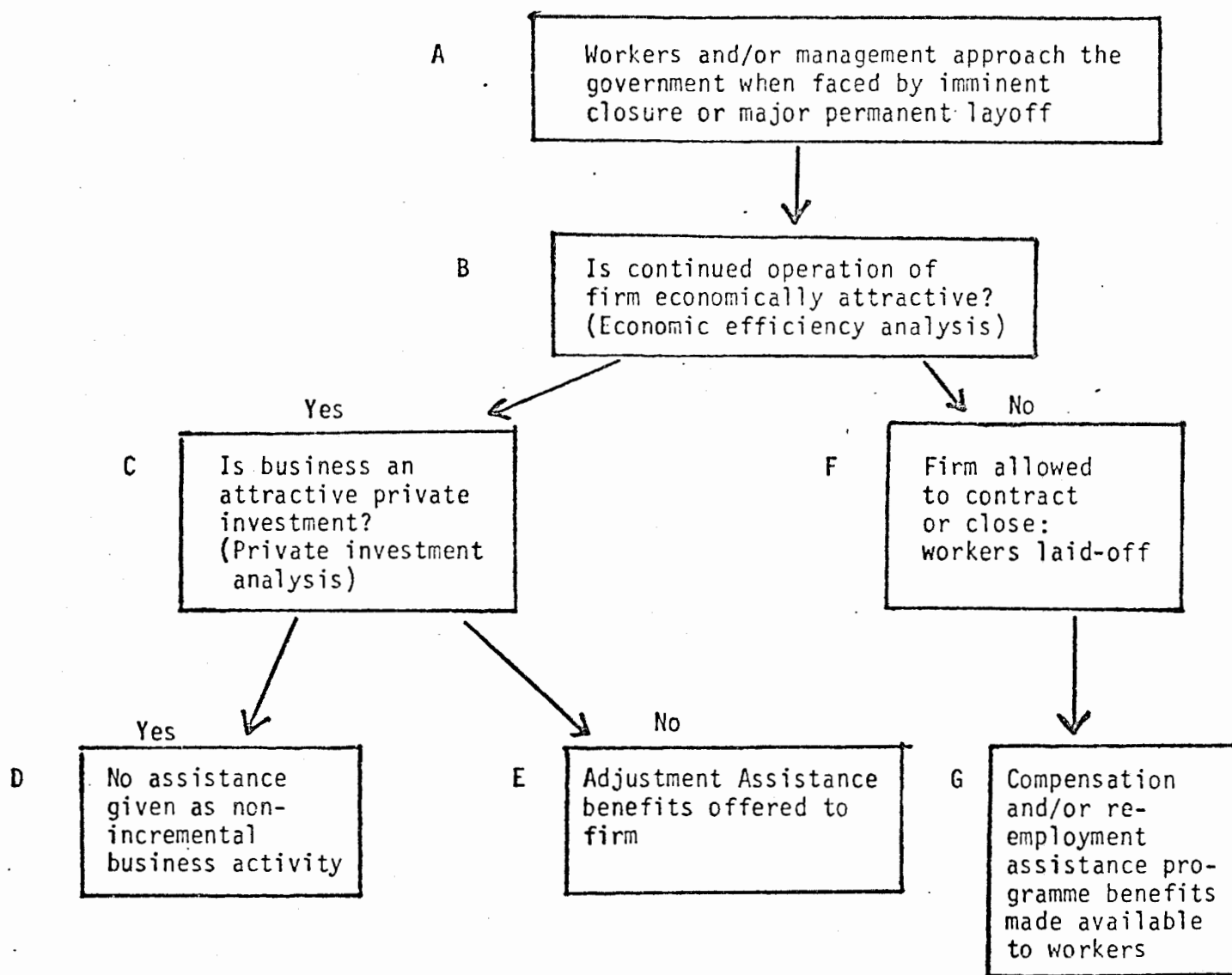
Increased foreign competition, a reduction in trade barriers, or industrial restructuring can reduce the profit margins of domestic producers, and accordingly, marginal firms may close down. Even if they continue to operate, however, a general contraction of employment in that sector is likely to take place. It is important to understand both the nature of the government decision to assist a firm affected by changes in trade or industrial development policy and how such a programme could be integrated with others to form a consistent and mutually reinforcing package. Refer to Figure 1. When the workers, management, or owners of a firm approach the government for assistance in order to avoid a major permanent layoff (Step A), the government should be concerned about two major questions: (i) whether the incremental employment of resources (labour, capital and material inputs) achieved by the continued operation of the firm (with or without any re-tooling or new investments) is expected to be economically beneficial to the country (Step B), and (ii) whether the proposed business activity is an attractive investment from a private-sector perspective (C). Step (B) requires an economic efficiency analysis whereas step (C) involves a financial analysis from the point of view of the private investors. The government should be interested only in achieving incremental economic benefits (Step D). Such incrementality depends upon avoiding the subsidization of firms, the continued profitability of which is not jeopardized by the changing market circumstances brought about by trade liberalization, but rather by some other cause like poor financial or business management.¹⁶ If a firm closes down through bad management in an otherwise privately profitable industrial sector, then more technically efficient domestic producers can be expected to expand their output to supply the market.¹⁷

The workers laid-off in such circumstances, however, should not be precluded from any worker adjustment assistance (Steps F and G).

If the government evaluation of the firm concludes that its continued operation would expand output and employment and that this would be economically beneficial, then an appropriate level of financial assistance could be offered (Step E). All possible economic externalities should ideally be included in such an evaluation. If, however, the focus is only on the added labour employment created, then a reasonable rule is to award assistance equal to the net labour externality. Although this term is defined more precisely in Appendix B, it is still worthwhile to distinguish here between gross and net labour externalities. The gross labour externality, on the one hand, was defined as the change in the economic value of workers' time, as a result of a disturbance like a layoff, without regard for the level of trade protection or other distortions in product markets where the workers' output is sold. The net labour externality, on the other hand, is lower the higher is the level of trade protection in the product markets, and any government financial assistance intended to promote economic efficiency should be reduced accordingly.

If continued operation of the firm is not expected to be economically attractive to the country, then allowing the firm to close is the preferable path (Step F). In such a situation, or if no adjustment assistance programme for firms exists, the laid-off workers would still be eligible for compensation and/or benefits available from a re-employment promotion programme (Step G). The latter type of programme helps to improve the income and re-employment prospects of workers, and as such, it helps to alleviate any political pressure the government might face when it decides not to offer assistance to a declining firm on general economic grounds but where the workers, nevertheless, face potential hardships.

Figure 1. Government Decisions and Programme Responses to Adjustment Situations



(b) The Design of Worker Adjustment Assistance Programmes

In this section three types of worker adjustment assistance programmes are considered:

- (i) Adjustment Assistance Programmes to provide financial assistance to specific firms to prevent or delay major permanent layoffs or plant closures, with the amount of assistance to be based on the combined short and long-run economic efficiency costs of the layoffs;
- (ii) Worker Compensation Programmes to cover the private income losses of workers directly affected by any layoffs;
- (iii) Re-employment Promotion Programmes to facilitate the finding of employment and improving the quality of new jobs for workers laid off following trade liberalization or a change in government policy, and hence reducing the private and short-run economic costs of worker adjustment.

Any one, or all, of these programmes could be implemented by a country to deal with the different problems of worker adjustment. Even though they can be implemented separately, it is worth emphasizing that they can also be structured as a consistent and mutually reinforcing package of programmes as described above. Although each programme focuses on either the private losses or the economic costs of adjustment, each has both distributional and efficiency effects which should be taken into account.

Although the empirical estimates which are relevant to these programmes are discussed in some detail in section 4, the important findings can be summarized as follows: (a) The estimated magnitudes of the positive labour externality from delaying layoffs (shown later in Tables 3 and 4) are larger than the expected income losses to displaced workers. The relative labour externality from delaying layoffs varies from a negative figure to 20 percent

of the wage bill before lay off for male workers and from 20 to 40 percent of the previous wage bill for female workers. The relative labour externality varies according to the quality of the jobs saved by postponing layoffs and to the characteristics of the workers. Although a number of other factors, like the extent of trade protection, should be taken into account before deciding on the appropriate magnitude of government financial assistance to a declining firm, these results indicate that financial assistance intended to postpone layoffs can improve overall economic wellbeing; the magnitude of this assistance could exceed the amount which would be necessary to compensate laid-off workers for their expected income losses. (b) As is evident from the empirical estimates reported in Tables 9 and 10, the magnitude of the private income losses of displaced workers can vary from negative (i.e., a private income gain) to positive depending upon the characteristics of the jobs lost and the characteristics of the workers. The loss of permanent, high wage jobs which require skills that are firm-specific will create larger income losses than forgone temporary jobs. Female workers suffer relative income losses which can amount to 15 percent of their full incomes before layoff, while male workers generally suffer smaller losses. The evidence presented for the Sherbrooke region regarding the effect of the age of the workers on the expected income losses is somewhat conflicting, but nevertheless suggests that older workers suffer larger income losses (or smaller income gains) following layoff than younger workers. (c) If it were not economically efficient to delay layoffs and if workers were displaced, then the private costs of their adjustment (and the economic benefits from promoting their earlier re-employment) can usefully be divided into transitional and permanent losses (and gains). The transitional losses relate mainly to the costs of the increased unemployed time experienced by laid-off workers

before they establish their long-run, equilibrium proportion of time employed. By the same token only transitional economic gains arise from re-employment promotion programmes which assist workers in finding an initial job after layoff, but which do not alter the workers' long-run probability of being at work or increase their productive skills. These transitional gains are generally small. The permanent income losses to displaced workers relate more to the change in the workers' long-run expected income stream. Such income losses would obviously be higher if workers were to have lost jobs which paid well because they required specialized, firm-specific skills and would be lower if workers were to enjoy an increase in real wages after layoff. Permanent economic gains associated with re-employment promotion occur when laid-off workers acquire new skills which make them eligible for higher quality jobs which offer more stable employment and/or higher wage rates. Such gains can be substantial if the skills acquired are in short supply in the rest of the economy.

(i) Adjustment Assistance Programmes for Specific Firms

Improvements in economic efficiency can be gained through delaying or preventing layoffs. The most likely source of economic benefits is related to the positive labour externalities generated by the incremental employment created through keeping a firm in business. Government assistance programmes to such firms can take many forms: direct grants or forgiveable loans based on the jobs maintained would be two examples. A firm could either continue operations in the same sector or retool to convert to some more attractive product line, and hence, maintain (or perhaps even expand) its employment level.

The partial equilibrium model for estimating the gross labour externality from saving jobs focuses only on the change in the economic value of time of the workers directly affected by the jobs saved. The model estimates the

labour externality in a period as the economic value of the time of the workers with the added jobs less the economic value of their time in alternative activities (or the economic opportunity cost of employing the workers). This can be estimated from labour tracking data, for example, as the economic value of the workers time before layoff (S^b) minus that after layoff (S^a):

$$S^b = P^b W^b + (1-P^b) V^b \quad (3.1)$$

$$S_t^a = P_t^a W^a + (1-P_t^a) V^a, \quad (3.2)$$

where: P^b, P_t^a = the proportion of time a worker spent employed while in the labour force before and after the layoff date;

$(1-P^b), (1-P_t^a)$ = the proportion of time a worker spent unemployed before and after the layoff date;¹⁸

W^b, W^a = gross-of-income tax wage rate earned before and after layoff (expressed in constant dollars);

V^b, V^a = value of time in non-market activities before and after layoff.¹⁹

The first term in each equation, PW , measures the employer's gross wage bill and the expected economic value of time while employed. Ignoring distortions in the product market, the economic product of employed time is taken in a competitive market to be the gross-of-tax wage rate.²⁰ The second term, $(1-P)V$, gives the expected economic value of time while not employed. The present value of the gross labour externality is estimated as the sum of the discounted difference $(S^b - S_t^a)$ in any period t . The economic externalities are discounted by the social discount rate.

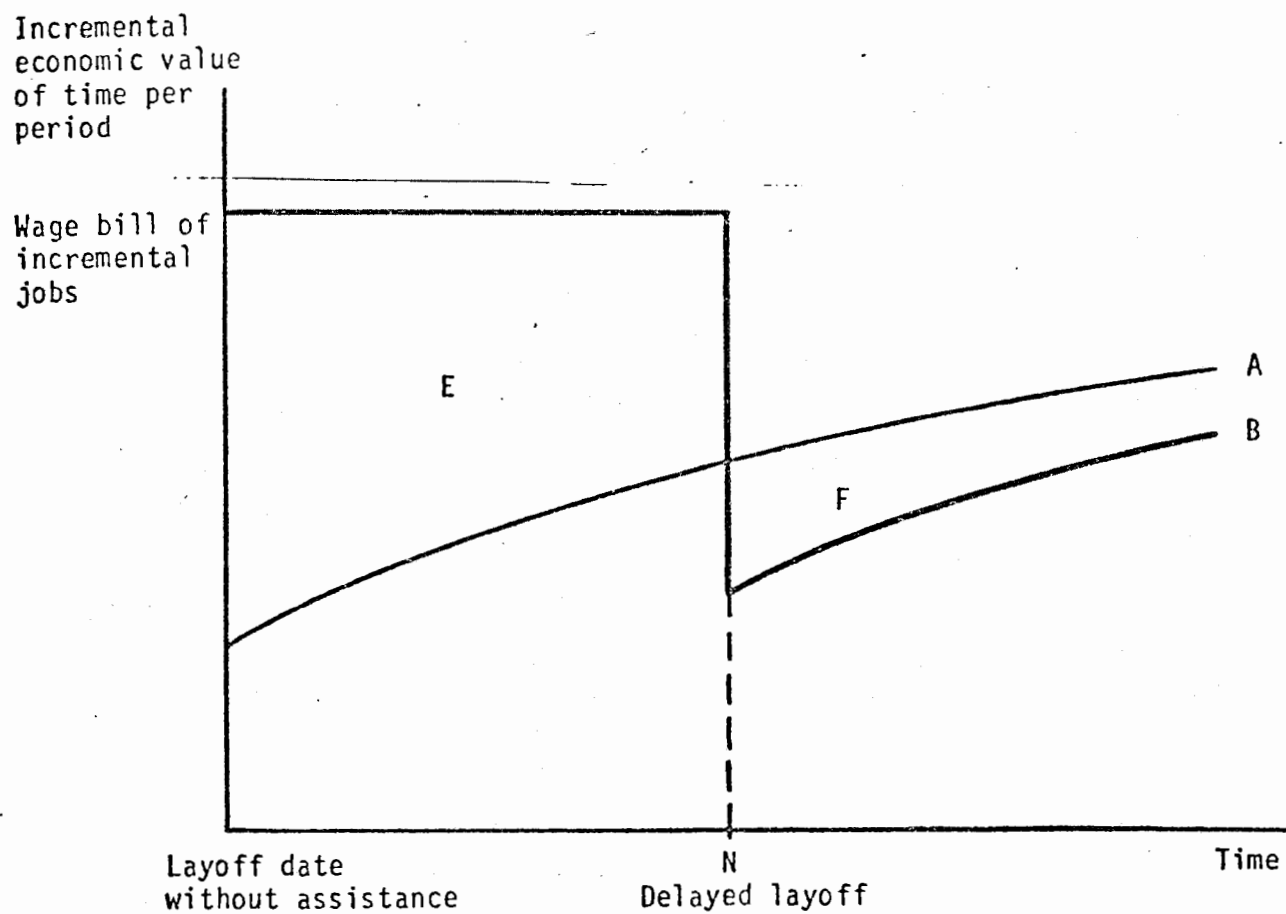
A diagram can be used to depict the economic value of labour without a layoff and the economic opportunity cost of saving these jobs. In general, government assistance to an otherwise struggling firm would be expected to delay layoffs for some finite period depending on the persistence of the market conditions which otherwise would have resulted in the layoff. The

gross labour externality of delaying a layoff for a period of N years is shown in Figure 2. Curve A gives the incremental economic value of labour without the delayed layoff, i.e., it gives the economic opportunity cost of saving the jobs. Curve B gives the incremental economic value of labour with the delayed layoff. For the first N years this equals the wage bill or the gross product of labour in these jobs. After N years these jobs are lost when assistance is discontinued, and the workers seek alternative employment resulting in a new adjustment path for the economic value of labour. The gross labour externality at any point of time is the difference between the values of B and A. The cumulative present value of the gross externality from saving the jobs for N years is the net present value of areas E (positive) and F (negative). The relative externality can be expressed as the ratio of the cumulative present value of the gross labour externality to the cumulative present value of the wages paid over the N years. This turns out to be a very useful summary measure of the gross labour externality as under a number of reasonable assumptions the relative externality is independent of the expected number of years by which the layoff will be delayed.

(ii) Worker Compensation Programmes

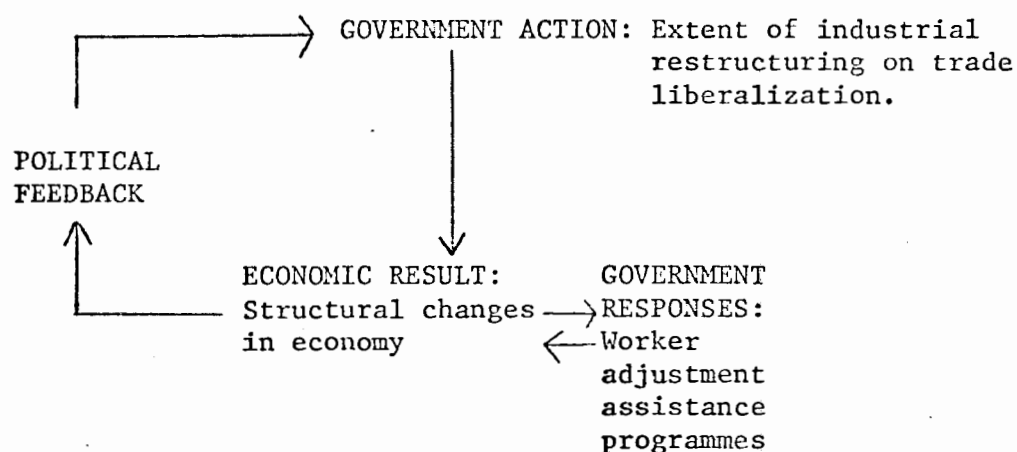
A programme in which payments are made to workers who are laid off can have two motivations. First, on the basis of principles of equity or fairness a government may decide to redistribute some of the expected economic benefits of industrial restructuring or liberalized trade to those workers suffering major income losses as a result of the policy change.²¹ The second motivation is to use compensation payments as a means of reducing political opposition to industrial development or liberalizing trade. Such payments may also make it easier for politicians and bureaucrats to resist increasing the level of protection when competition from foreign imports threatens Canadian jobs. To be politically effective an explicit linkage has to be made between the

Figure 2. The Gross Labour Externality Gained From a Delayed Layoff



policy decision and the availability of compensation payments to those injured by the government action. (See Figure 3.) This requires public announcements prior to the conclusion of any negotiations to inform those at risk of suffering income losses of the compensation programme that would be in place during the adjustment period.

Figure 3. The Domestic Policy Context of Worker Adjustment Assistance



The second argument for a worker compensation programme appears more compelling than the first. A freely elected government usually enters into multinational trade negotiations (MTNs), for example, with a sense of the extent of liberalization the voters would support. With no prior promise of compensation for those injured, a government can be expected to stay within these bounds, and hence, no argument other than a fair redistribution of the benefits exists for a compensation programme.²² It is commonly recognized that MTNs have economic results characterized by diffused benefits, but concentrated costs. This concentration both sectorally and regionally leads to effective political lobby groups opposing tariff reductions on behalf of both the workers and capital owners.²³ The effectiveness of this political pressure is evident in the Canadian context. The more labour-intensive

industrial sectors such as clothing, textiles, knitting and footwear, which are tending to lose their comparative advantage in international trade, were largely exempted from future tariff reductions in the Tokyo Round of GATT.²⁴ Furthermore, the clothing and footwear sectors have been the beneficiaries of global quotas and more recently bilateral quotas.

A compensation programme could offer payments to displaced workers equal to the present value as of the time of being laid-off of the expected change in full income derived from labour-market and non-labour-market activities. This means that the value of the time of a worker while both employed and unemployed enters the full income estimate. When employed a worker is trading his time for net-of-tax monetary wages, but while unemployed a worker has the value of his time in non-market activities and receives any net-of-tax unemployment insurance benefits that he is able to claim.²⁵ The expected loss in full income can be interpreted as an estimate of the amount that the worker would want to receive in compensation for the loss of his job in order to be indifferent between the expected full income stream with and without a job loss.²⁶

The income loss is estimated in present value terms as the difference between the full income stream that the worker would have expected to receive without the layoff and the full income stream that the worker expects with the layoff. The estimation of the full income stream without layoff is based on the employment experience of a sample of workers before a permanent layoff, while that with layoff is based on the re-employment experience of a sample of workers after such a layoff. The private full income a worker expects to receive without layoff in each time period (I^b) and that with layoff in each

period t after job loss (I_t^a) are thus estimated as follows:

$$I_t^b = P_t^b W_t^b (1 - t_{av}^b) + (1 - P_t^b) (f^b UIC^b (1 - t_{av}^b) + V^b) \quad (3.3)$$

$$I_t^a = P_t^a W_t^a (1 - t_{av}^a) + (1 - P_t^a) (f^a UIC^a (1 - t_{av}^a) + V^a), \quad (3.4)$$

where:

$P_t^b, P_t^a, W_t^b, W_t^a, V^b, V^a$ are the same as for equation (3.1) and 3.2);

t_{av}^b, t_{av}^a = average personal income tax paid by a worker on his income (Federal and Provincial income taxes plus payroll taxes) before and after layoff;

UIC^b, UIC^a = unemployment insurance benefit rate received by a worker before and after layoff;

f^b, f^a = proportion of time that a worker expects to receive unemployment insurance benefits while unemployed before and after layoff.

The first terms in equations (3.3) and (3.4) measure the expected employment earnings after taxes during any time period; while the second terms give the sum of the unemployment insurance benefits after taxes plus the value of time in non-market activities while unemployed.

The income loss suffered by a worker is expressed as the present value of the losses that a worker expects to incur in each period over some time horizon. The present value of the full income loss is estimated using the following expression:

$$L(N) = \sum_{t=1}^N (I_t^b - I_t^a) / (1 + d)^t$$

where: $L(N)$ = present value of full-income loss over N periods;

N = time horizon of estimation (expressed in terms of some unit time interval);

d = private discount rate or rate of time preference for consumption.

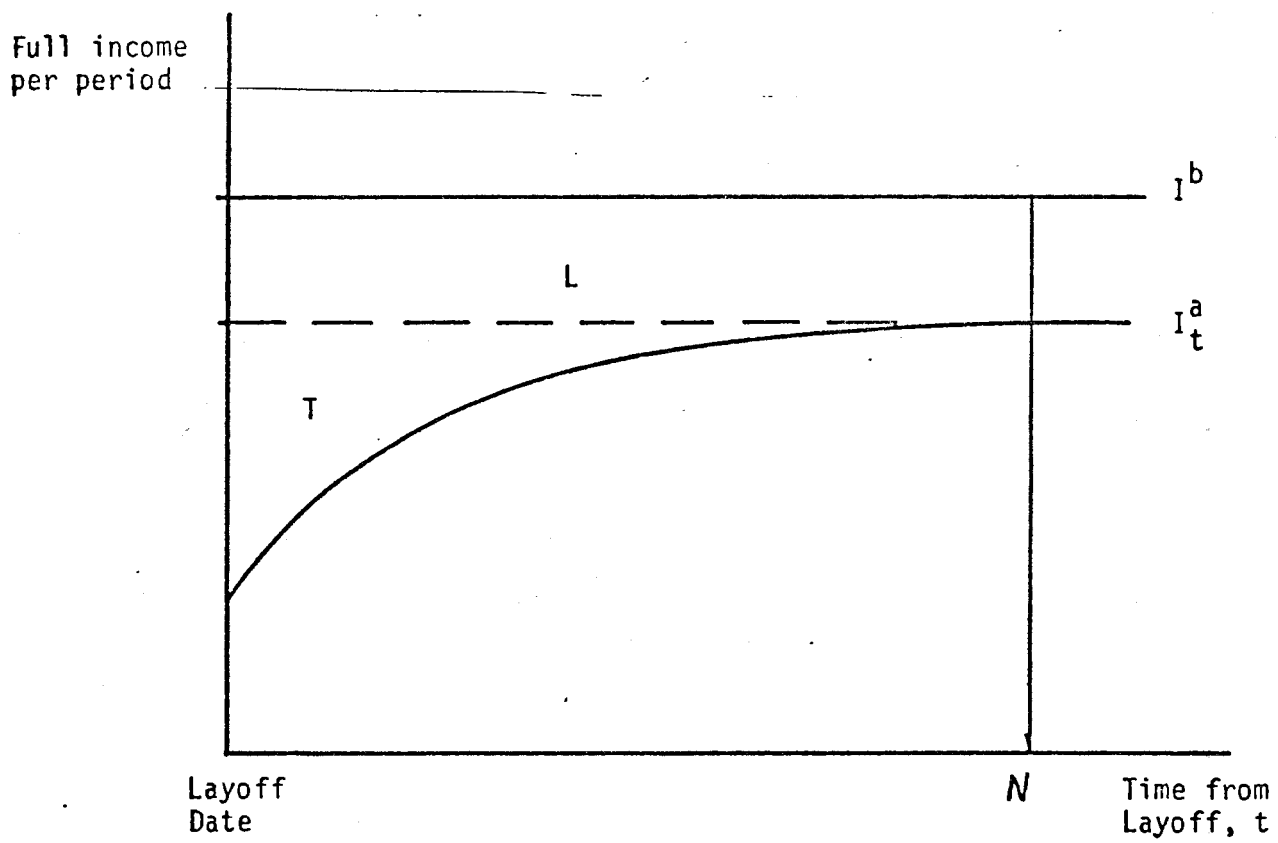
A useful summary measure of the expected income loss of workers is the

relative loss $R(N)$ suffered over some time horizon of N intervals. $R(N)$ gives the cumulative present value of the expected income loss, $L(N)$, relative to the present value of the expected income stream without job loss over these same N intervals. The relative income loss also allows useful summary measures of the sensitivity of the income loss, viz, the elasticity of the income loss with respect to changes in the wage rate or proportion of time working.

This model for estimating income losses can also be presented graphically. See Figure 4. The income loss over some time period t from layoff is measured as the present value of the area between the curves I^b and I_t^a . This area can be divided into two²⁷: area T represents an estimate of the transitional losses arising out of the excess unemployment the worker experiences before he regains some long-run equilibrium proportion of time employed, while area L indicates the change in income due to a new long-run equilibrium income stream being attained. The magnitude of L reflects wage rate changes more than changes in employment permanency. Notice that while L is generally expected to be positive (indicating a loss of income) due to the loss in rents previously earned from specialized firm-specific skills, L can also be negative. For example, a worker laid-off from a firm, which has been struggling to remain cost-competitive, may well experience a wage increase in alternative employment.

As a general rule the manner in which compensation payments are made should be such as to minimize any negative efficiency effects arising from the payment. A lump-sum severance payment (or its equivalent in installment payments) meets this requirement. Any attempt to tax-back these transfer payments based on the workers post-layoff re-employment experience (as is commonly done in many government welfare or income-maintenance programmes) provides work disincentives for the beneficiary, and hence, efficiency losses for the economy as a whole.²⁷ In fact, rather than attempt to limit a

Figure 4. The Expected Income Loss of Laid-off Workers



programme beneficiary,s post-layoff employment earnings with tax-back provisions, in order to improve the political acceptability of a compensation programme, it may be preferable to over- rather than under-compensate workers as long as the programme is efficiency neutral.²⁸

(iii) Worker Re-employment Promotion Programmes

In the event of a major layoff most manpower programmes aim at reducing the private and economic costs of the short-run increment in unemployment which follows. Such programmes cover a broad spectrum from job search and counselling to retraining and income maintenance programmes. The impact of these programmes is usually measured by the change in the speed of re-employment, or by changes in the duration of unemployment. Most of these programmes unfortunately fail to deal with some of the longer-run costs of worker displacement.

Analysis of the long-run effects of a programme requires not only an examination of the speed of re-employment, but also an appraisal of the variables that indicate the quality of subsequent employment, such as wage rates and permanency of subsequent jobs. In addition the second-round effects on the employment prospects of other workers as a result of assisting a limited number of displaced workers should be taken into account in an analysis of the programme from an economic perspective.

An example of these wider ranging effects can be found in the so-called "portable wage subsidy" programme that has been suggested for inclusion in a trade adjustment assistance package in Canada.²⁹ In this type of programme subsequent employers of laid-off workers, who have been designated as trade-affected, would receive wage subsidies for each week of employment provided over a three-year period (say) following layoff. From the perspective of

the designated workers, the programme can be expected to have positive effects on his employment and income prospects in both the short and long runs. The worker achieves a competitive edge in finding a new job, and he also can anticipate greater job security because the subsidy payments would be conditional on continued employment. Employment stability is further reinforced if the subsidy payments are used to cover on-the-job training for the worker which increases his or her value to the firm.

From an economic perspective, however, a number of indirect effects have to be considered in designing such a programme to ensure that it leads to long-run net economic benefits while still assisting those who lose their jobs. The first concern is the extent to which assisting some workers adversely affects the employment prospects of other workers. As long as the trade-affected workers are not close substitutes for other workers, the wage-subsidy programme can lead to increased employment for all workers through its expansionary effects. If they are close substitutes, however, then the adverse indirect effects are proportional to the relative size of the programme.³⁰ A second concern would be the differential in the net labour externality that can be expected to occur in other sectors which offer alternative job opportunities. The higher the remaining level of trade protection available to other sectors, for example, the lower is the marginal economic product of labour in those sectors, and the lower is the net labour externality. (See Appendix B.) This would justify making the level of the wage subsidy inversely related to the degree of remaining trade protection received by potential new employers. Such provisions would thus not encourage employment expansion in the weaker import-competing sectors.

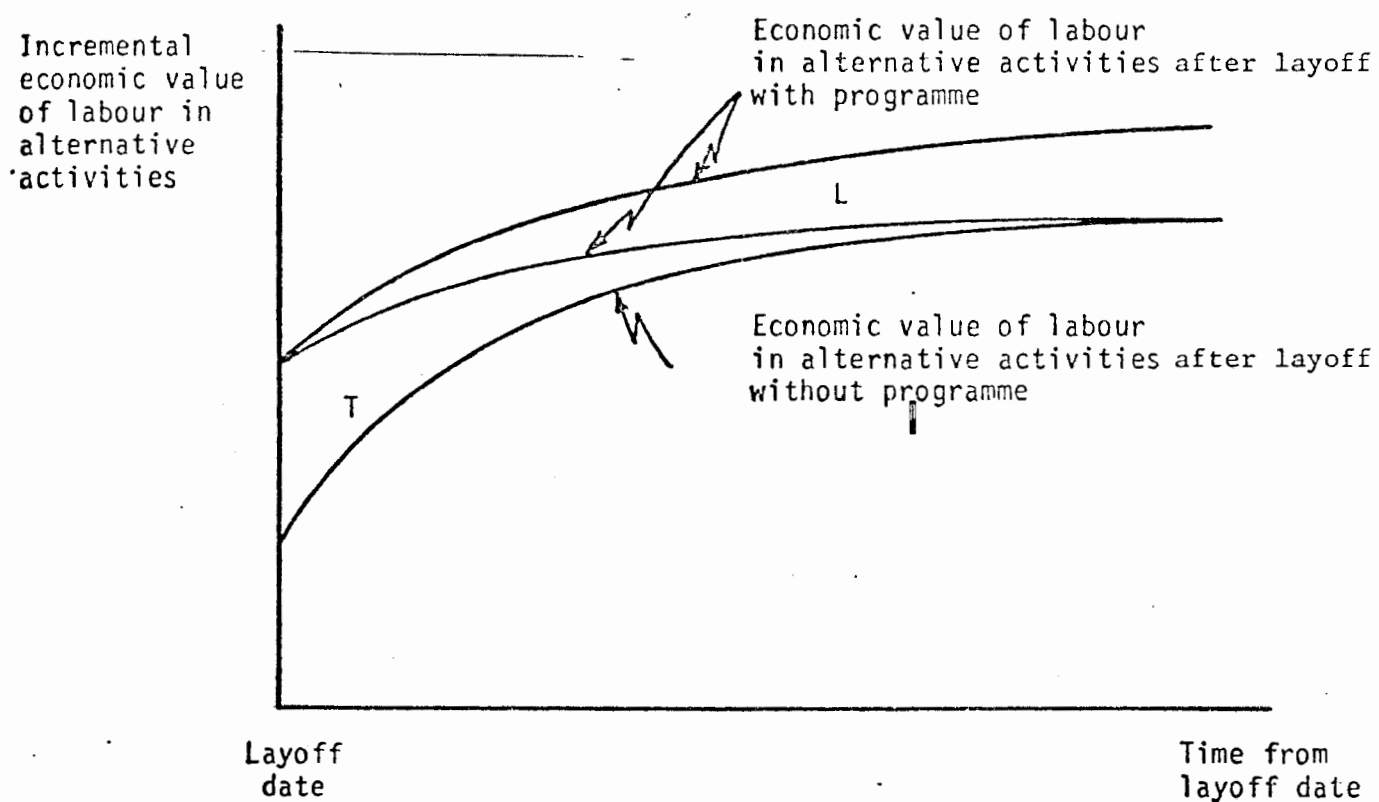
The gross economic benefits from re-employment promotion programmes can, in general, be measured as the cumulative present value of the increase in

the economic value of the laid-off workers' time in alternative activities (i.e., by the increase in the economic opportunity cost of labour to the cancelled jobs). The increase is estimated by the difference between the incremental economic value of labour in alternative activities with and without the re-employment promotion programme. See Figure 5. This incremental labour externality can be divided into short-run or transitional gains (present value of area T in Figure 5) and the long-run gains (present value of area L) that result from changing the structure of employment compared to what otherwise would have existed. Such labour benefits could be estimated using either the general or partial equilibrium model depending upon the nature of the expected programme effects.

Job counselling and search-assistance programmes tend to speed up the re-employment of displaced workers. If the programme being analyzed is an added effort directed only at displaced workers, then the transitional gains could be measured with the partial equilibrium model. Notice that such a programme would provide additional assistance to the laid-off workers to find jobs in their first unemployment spell; their long-run equilibrium employment prospects depend upon their ability to find and retain employment beyond this first job. If the job counselling and search assistance programmes increase the efforts of all unemployed workers, then the benefits could be captured in the general equilibrium model as a faster adjustment to a new labour-market equilibrium as a result of a layoff. Empirical evidence of the actual behavioural effect of such programmes on the rates of re-employment is required for realistic estimates of the economic benefits. Sensitivity analysis can be used as a short-run solution to show the range of the magnitudes of the potential gains.

Relocation assistance programmes can be analyzed in an analogous manner

Figure 5. Gross Labour Externality Gains from Re-employment Promotion Programmes



depending upon the extent of the coverage of the new programme: i.e., only displaced or all workers. In the general equilibrium model the effects of a relocation programme could be captured by faster migration response rates to labour-market disturbances. Although migration forms the major mechanism by which regional labour markets regain their equilibrium relationships with other regional labour markets in the model, it is important to notice that there are limitations to the beneficial effects of relocation programmes that merely provide assistance to defray moving expenses. These limitations arise because at any point in time there is only a limited number of workers both inside and outside of a region who are marginal suppliers of labour to a particular region, and relocation programmes can be expected to affect the job-location decisions of only those at the margin. The inframarginal workers feel themselves better off in their home region given the perceived differentials in wages, employment prospects, costs of living and environmental attributes (physical and social) among regions. The key thing to notice is that these features that determine the indifference or otherwise of workers between regions are all recurrent costs or benefits, whereas mobility grants affect the fixed one-time costs of moving. For many, if not most workers, the present value of these one-time costs can be expected to be relatively small compared to the perceived differential in recurrent costs and benefits that results in their regional attachment. Mobility grants have to exceed the fixed costs of moving in order to encourage many inframarginal workers to move, and hence, substantially increase the net flows of migrants.^{31, 32}

A portable wage subsidy programme is expected to result in both short-run and long-run labour externalities. The expected short-run externalities arise from a more rapid initial re-employment of the subsidized workers. These benefits would be measured in the same manner as the transitional gains of the

counselling and job-search-assistance programmes using the partial equilibrium model. An additional expected benefit of the programme is the creation of a net increment in the man-years of employment offered.³³ These new jobs are expected to be spread across all types of employment and to last the duration of the programme (three years per subsidized worker, say). The long-run effects on the employment of the subsidized worker himself would be implicit in the general equilibrium estimates of the overall gross labour externality from the programme.

Institutional or on-the-job training programmes can generate long-run social externalities by improving the quality of jobs (the wage rate and permanency of jobs) that trainees can expect. In order to be beneficial, the improvements in the marginal productivity of labour in subsequent jobs has to offset the forgone product of labour during a training period plus the economic costs of the resources devoted to the training programme. The largest potential gains from training programmes can be captured by directing the training towards increasing the supply of labour categories that are in short-run shortage.³⁴ Increasing the supply of labour in a specific skill category which is in excess demand, is equivalent to effectively creating a new job in all future periods during which the job vacancies requiring this specific skill are expected to remain unfilled. The general equilibrium model can be used to estimate the benefits of such "new jobs." Notice that no labour externality can be credited to the saving of a job that is filled by a worker with skills which are in excess demand because if he were laid-off he would move immediately into an otherwise unfilled job at the same wage.

(c) Eligibility Criteria and Certification Process for Worker Adjustment

Assistance Programmes

Labour and capital are continually having to adjust to changing market conditions which may be the result either of government policy (changes in taxes, regulations, etc.) or of private actions (technological innovation or changes in tastes). Cost-effective government interventions in the labour market are, after all, justifiable to speed and direct displaced workers into more efficient allocations no matter what the reason for their being unexpectedly unemployed. Why is there a need then for special worker adjustment assistance programmes? The reason is that the economic and political constraints to more rapid industrial restructuring and trade liberalization are usually sufficiently strong to justify the advocacy of limited and well-directed worker adjustment assistance programmes. Increased managerial and administrative efficiency also argue for special rather than general programmes.

While it is justifiable to have special worker adjustment assistance programmes to enhance the efficiency gains from industrial development and trade liberalization, a common fault with such programmes has been their attempts at excessive exclusiveness. It is difficult, if not impossible, to isolate tariff and other policy changes as the only cause for a layoff or plant closure. Eligibility criteria and certification procedures for a programme should aim at ensuring that affected workers are not excluded even if the target efficiency is lowered by including cases that are not genuinely "policy-affected." Compensation programmes, for example, can be expected to be more politically effective if they throw their nets wider rather than being narrowly targetted and overly selective (as long as they are designed to be at worst efficiency-neutral). With regard to assisting specific firms and to worker re-employment assistance programmes, as long as the incremental

activity they generate produces positive net economic benefits, it is of lesser importance whether or not a policy-affected worker or firm is being assisted. Careful programme design is the key to ensuring that these measures are economically beneficial.

The potential dangers of overly stringent eligibility criteria can best be illustrated from the experience with the U.S. Trade Expansion Act of 1962. The provisions of this Act required firms or workers to prove that increased imports were the major cause of their unemployment and that the increased imports were primarily the result of prior trade concessions.³⁵ Because such "proof" is difficult to obtain, very few firms and workers were declared eligible. It is interesting to note that in the U.S. Trade Act of 1974, the eligibility criteria were relaxed somewhat to require that the firm or its workers demonstrate that "increases in imports . . . contributed importantly to the separation or threat of separation of the workers and to a decline in sales or production. ('Contributed importantly' is defined . . . as a cause which is important but not necessarily more important than any other cause.)"³⁶ By 1977, 161,000 workers had been declared eligible for adjustment assistance under the 1974 Act whereas during the entire fourteen year life of the 1962 Act only 47,000 workers received any assistance.³⁷ It is very probable that workers and firms that were in fact eligible were excluded.

The certification process for determining eligibility also plays an important role in the overall effectiveness of worker adjustment assistance programmes. There are definite advantages, for example, to an ex ante over a post hoc certification process. First, the prior designation of workers in policy-affected industries limits the number who could potentially benefit from the programme and puts a lid on the programme budget. Second, the potential gains from re-employment promotion programmes will be greater the

more quickly certification takes place. Even though ex ante certification will increase the probability of paying compensation to workers who do not in fact lose their jobs as a result of a change in government policy, it is felt that this is the lesser error both because of its favourable income distributional effects and because a more liberal compensation policy is more likely to reduce political opposition to the government action.³⁸

The bureaucratic machinery for delivering adjustment assistance benefits should also be operational before government policy changes are announced. Besides the problems of the eligibility criteria and post hoc certification process of the U.S. Trade Expansion Act of 1962, there was an average delay of fifty-five weeks between layoff and receipt of adjustment benefits.³⁹ A quick glance at the expected durations of unemployment of laid-off workers in Tables 1 and 2 reveals that practically all the displaced workers in the Sherbrooke region, if the provisions of the U.S. 1962 Act were applied in Canada, would have found subsequent employment before the first adjustment assistance cheque would have arrived! As a means of mitigating political opposition and of compensating disadvantaged workers, the adjustment assistance provisions of the 1962 Trade Expansion Act must be judged a notable failure.

4. Empirical Estimates of Private and Economic Adjustment Costs

Empirical estimates of private income losses and gross labour externalities discussed in this section are based on the models discussed in Appendix A and are pertinent to the adjustment assistance programmes outlined in Section 3. The estimates presented refer to workers who lose their jobs in the Sherbrooke region of Quebec. The basic characteristics of the labour market in this region and the expected durations of unemployment and employment of permanently displaced workers were discussed in section 2. LFTS data refer to the data

from the Labour Force Tracing Survey conducted by Industry Trade and Commerce. ROE-UIC data refer to record-of-employment-unemployment-insurance-claim data obtained from Employment and Immigration. These data bases were also discussed in section 2.

(a) Gross Labour Externalities

In this section estimates are presented of the gross economic benefits that can be achieved through delaying layoffs, creating new jobs and promoting the re-employment of laid-off workers in the Sherbrooke region. A series of estimates based on the partial equilibrium model is given first; these are followed by estimates from the general equilibrium model.

Tables 3 and 4 give the partial equilibrium model estimates of the gross absolute and relative labour externalities that can be gained by delaying the layoff of the four types of workers for a period of five years by assisting the firms that are about to lay off these workers. In Table 3 the estimates are based on the LFTS data while those in Table 4 give the ROE-UIC data results. The former are uniformly higher than the latter which is consistent with the findings in Table 2 that most of the workers on the ROE-UIC data base tended to have temporary jobs and high job instability. The laid-off workers in the LFTS data base not only had greater job stability but also were more likely to lose firm-specific rents and to suffer a decrease in wage rates.⁴⁰ Further evidence of this is available in Table 4. Note first that the permanent layoff of 25 year-old males with no dependents actually created a positive labour externality because these workers found jobs with higher wage rates. This could easily occur if their previous employment had been with a firm which had been struggling to remain competitive and as a result had been paying below average wages; a worker thus experiences a wage rate increase when he

Table 3: Partial Equilibrium Estimates of Gross Labour Externalities from Delaying the Layoff of the Four Types of Sherbrooke Workers Based on the LFTS Estimates

Type of Worker	Gross Labour Externality per Worker (a) (Constant 1978 \$)	Relative Labour Externality (b) (percentage)
I L: male, 40, married	6068	14.7
II L: male, 25, single	7200	19.5
III L: female, 25, single	14153	45.9
IV L: female, 40, married	14067	40.0

- (a) The gross labour externality per worker is the cumulative present value of the labour externality generated for 5 years of added employment. A growth in real wages of 2% p.a. is assumed.
- (b) The relative labour externality is the gross labour externality per worker expressed as a percentage of the cumulative present value of the wages of the worker over the 5 years of added employment.

Table 4: Partial Equilibrium Estimates of Gross Labour Externalities from Delaying the Layoff of the Four Types of Workers Based on the Sherbrooke ROE-UIC Data Base Estimates

Types of Worker	Gross Labour Externality per Worker (a) (Constant 1978 \$)	Relative Labour Externality (b) (percentage)
<u>Base Cases</u>		
I U	1315	3.1
II U	-4058	-12.1
III U	339	1.6
IV U	4565	15.1
<u>Permanent Layoff Cases</u> (c)		
I U: male, 40, dependents	2084	4.9
II U: male, 25, no dependents	-3773	-11.2
III U: female, 25, no dependents	1567	7.0
IV U: female, 40, dependents	7073	23.1
<u>No Change in Wages, $\Delta W = 0$</u> (d)		
I U	4872	11.1
II U	3506	10.7
III U	4452	19.5
IV U	6265	20.5

(a), (b) See Table 3 footnotes

(c) See Table 2 footnote (a)

(d) All variables have the same values as the base cases except the wage rates in alternative employment are the same as in the job before layoff.

finds new employment.⁴¹ Second, to control for the effect of wage rate changes, estimates of the gross labour externalities are given in Table 4 with the wage change set at zero. These estimates are higher than those for a base case which has both temporary and permanent layoffs, but still below those for the LFTS data base. In any case it is clear that the economic benefits from delaying layoffs are generally greater for females than for males, and for older than for younger workers.

As will become evident from examining Tables 9 and 10, the magnitudes of the gross labour externalities are considerably larger than the estimates of the expected private income losses. The reason for this is that income transfers among Canadians do not affect economic costs and benefits; therefore, the exclusion of the unemployment insurance payments received during the added unemployed time of the laid-off worker and the exclusion of the saving in income taxes from the reduction in his or her employed time increases the magnitudes of the gross labour externalities compared to the private income losses.

Now consider a re-employment promotion programme which is immediately able to find another job for laid-off workers. The likely upper bounds of the gross economic benefits gained from a re-employment promotion programme can be measured as the difference in the gross labour externality with and without the re-employment promotion programme. Table 5 gives the maximum absolute and relative economic gains available from such a programme for the four types of workers in the LFTS and ROE-UIC data base. These gains appear to be limited to about \$2,000 through \$4,000 in constant (1978) dollars per worker assisted. These estimates indicate that only minimal gains can be obtained through programmes which aim only to reduce the period between layoff and the next job.

Estimates of the gross labour externalities are next derived using the

Table 5: Upper Bound Estimates of the Gross Economic Benefits from Immediate Re-employment for Four Types of Sherbrooke Workers based on Partial Equilibrium Estimates

Type of Worker	Gross Economic Benefit Over 5 years	
	Absolute Gain ^(a) per Worker (Constant 1978 \$)	Relative Gain ^(b) (percentage)
<u>LFTS Cases</u>		
I L: male, 40 married	2423	6.1
II L: male, 25, single	2136	15.8
III L: female, 25, single	2736	9.7
IV L: female, 40, married	3781	11.0
<u>ROE-UIC Permanent Layoff Cases</u>		
I U: male, 40, dependents	2798	6.5
II U: male, 25, no dependents	2414	7.5
III U: female, 25, no dependents	2494	11.2
IV U: female, 40 dependents	3370	11.2

(a) Absolute gain equals the cumulative present value of the labour externality with no re-employment assistance minus that with re-employment assistance. This equals the increment in the cumulative present value of the value of the time of the worker in alternative activities. A growth rate in real wages of 2% p.a. is assumed.

(b) The relative gain is the difference in the relative labour externalities with no programme and with the programme. See Table 3, footnote (c).

general equilibrium model. These estimates are expected to be the more appropriate ones in most situations because in the long run an incremental loss or addition of jobs can be expected to affect the employment prospects of the marginal suppliers of labour to the region, not just of the workers directly laid off.

The gross relative labour externality from delaying layoffs in the Sherbrooke region has been estimated for an average permanent job and an average temporary job in the region. (See Appendix A for a definition of permanent and temporary jobs.)⁴² The relative labour externality generated by preserving an incremental man-year of average permanent employment is estimated to be 44.8% of the cumulative present value of the wages earned by the worker, while that for the average temporary employment is only 3.1%. Saving more productive, higher paying, permanent employment naturally will generate a larger labour externality.

These results can be compared to the effects of a re-employment promotion programme that generally increases the geographic mobility of workers in and out of a region. This increased mobility can be captured as the increased rate of the migration response of a regional labour market to a layoff. In a base-case simulation, for example, it is estimated that annually 50 percent of the excess unemployment in the Sherbrooke region is reduced by net outmigration. If this were increased to 75 percent by a mobility programme, then the labour benefit would be a 3.2 percentage point increase in the relative labour externality for the average permanent job. If the migration response were increased to 80% and the new job filling rate to 20% (from 10%) by means of a general geographic and occupational mobility programme, then the relative labour benefits would be only an additional 6.9 percentage points above the

base-case level. These examples illustrate once again the limited economic effectiveness of programmes that impact only on the transitional costs of labour adjustment.

If a firm seeking adjustment assistance employs workers with specialized skills that are in excess demand, then preserving employment in declining sectors results in jobs in other firms remaining unfilled during this time. In other words, the economic opportunity cost of retaining employment in the declining firm is the value of the time of these workers in the other available jobs in each year their skills would be in excess demand. Table 6 illustrates the reduction in the relative labour externality of delaying the layoff of workers in average permanent jobs in the Sherbrooke region if these workers have skills that are in excess demand in the economy. These reductions in the relative labour externality can be as much as 18 percentage points if the excess demand is expected to persist for 5 years, which may well be the time required to train additional workers with such skills. To the extent that sectors that are likely to be affected by policy changes employ workers in short supply, the economic costs of displacing labour are significantly reduced.

Worker adjustment assistance programmes may also be designed to increase the demand for the specific labour services of those workers directly affected by policy changes. The portable wage subsidy programme described in Section 2 falls into this category. Using the "new job creation" version of the general equilibrium model, (as described briefly in Appendix A), estimates of the relative labour externality can be made for incremental jobs lasting different lengths of time depending upon the period over which wage subsidies are to be paid.

Table 6: Effect on Relative Labour Externality of
Excess Demand for Specific Skills Required by
Average Permanent Job Saved in Sherbrooke Region

	Expected Duration of Excess Demand (years)			
	0	1	5	10
Relative Labour Externality (percentage)	44.8	43.6	26.7	10.1
Change in Relative Labour Externality	0	-1.2	-18.1	-34.7

Table 7 gives estimates of the relative labour externality gained from incremental average employment in the Sherbrooke region lasting for varying durations.⁴³ These results indicate that the relative benefits increase rapidly over the first five years, but at a slower rate for additional years. Recall, however, that the absolute gross labour externality is the cumulative present value of the externalities in each year (i.e., the relative externality times the wage bill in each year) for which the incremental employment lasts.

As with job preservation, the creation of new jobs that require skills that are in excess demand reduces the economic benefits attributable to this new employment programme. Such jobs would have to be filled by bidding workers with the necessary skills away from other activities where jobs are available.⁴⁴

Table 7 : Relative Labour Externality Gained from Incremental Average New Jobs of Various Durations in Sherbrooke Region

	Length of Job (years)				
	1	3	5	10	Indefinite
Relative Labour Externality (percentage)	17.5	25.7	29.2	33.2	36.0

Table 8 : Effect on Relative Labour Externality of Excess Demand for Specific Skills Required by Average New Job of Indefinite Duration in Sherbrooke Region

	Expected Duration of Excess Demand (years)				
	0	1	5	10	Indefinite
Relative Labour Externality (percentage)	36.0	35.4	22.0	8.5	-12.9
Change in Relative Labour Externality	0	-.6	-14.0	-27.5	-48.9

Table 8 illustrates the considerable decrease in the relative labour externality associated with an increase in the duration of the period of excess demand. These reductions in labour externalities also indicate the potential labour benefits that can be achieved by training programmes that are aimed at reducing the excess demand in these skill categories by increasing the supply of labour with these skills to fill the otherwise vacant positions. It is evident that the gross economic benefits can be considerable.

(b) Expected Private Income Losses of Laid-off Workers

Tables 9 and 10 present estimates of the expected private income losses of permanently laid-off workers from the LFTS and ROE-UIC data bases, respectively. These estimates have been calculated using equations (3.3) and (3.4) and the methodology discussed in section 3. The characteristics of the income loss are divided into percentage changes in the time spent employed ($\% \Delta P$) and in wage rates ($\% \Delta W$), the relative income losses ($R(N)$) within a given time period (N) from job loss, and the absolute maximum income loss ($L(M)$) and the time taken to reach this maximum (M).

The magnitude of the relative income loss, i.e., of the net present value of the absolute income loss expressed as a percentage of the net present value of the worker's full income before layoff, depends on both the percentage change in the proportion of time employed and the percentage change in wage rates after layoff. Both data bases indicate that female workers suffer roughly twice the percentage decreases in the proportion of time at work of male workers. Age appears to be a less important factor in this regard. The results using the LFTS data base suggest that females suffer wage losses whereas male workers enjoy wage gains, but from the ROE-UIC data base it would appear that all the laid-off workers enjoy wage rate increases (see

Table 9: Income Loss Characteristics of the Four
Types of Worker in Sherbrooke based on
the LFTS Estimates

Type of Worker	%ΔP ^(a)	%ΔW ^(b)	Relative Income Loss ^(c) (percentage) within:			Maximum Income Loss (Constant 1978\$)	Time to reach max Loss (months)
			1 yr	3 yr	5 yr		
I L	-22.2	+7.1	4.9	.3	-.5	460	15
II L	-26.1	+4.1	7.5	3.8	3.1	1139	60
III L	-45.8	-9.4	19.3	16.2	15.2	4779	60
IV L	-45.4	-6.8	15.4	13.6	12.9	4790	60

(a) $\% \Delta P = ((PEQ - P^b) / P^b) 100$

(b) $\% \Delta W = ((W^a - W^b) / W^b) 100$

(c) The relative income loss is defined as the cumulative present value of the absolute loss in full income divided by the cumulative present value of the full income that would have been earned if the employment conditions before job loss were maintained. Income losses are defined as positive, gains as negative.

Table 10: Income Loss Characteristics of the Four
Types of Workers Based on the Sherbrooke
ROE-UIC Data Base Estimates

Type of Worker	%ΔP (a)	%ΔW (b)	Relative Income Loss (c) (percentage)			Maximum Income Loss (Constant 1978)	Time to Reach Max. Loss (months)
			within:				
			1 yr	3 yr	5 yr		
<u>Base Cases</u>							
I U	-11.0	+8.3	2.2	-1.2	-2.1	273	2
II U	-10.2	+23.2	-8.3	-12.7	-13.7	18	1
III U	-22.8	+20.6	-6.7	-10.7	-11.7	12	1
IV U	-24.3	+6.0	3.7	1.2	0.5	309	20
<u>Permanent Layoff Cases</u> (d)							
I U	-10.1	+9.5	3.6	-0.5	-2.0	396	9
II U	-8.0	+24.2	-7.1	-12.3	-14.0	26	1
III U	-28.1	+21.9	-5.3	-9.3	-10.7	16	1
IV U	-39.1	+7.5	5.4	3.1	2.6	940	60
<u>No change in wages, ΔW = 0</u> (e)							
I U	-11.0	0.0	8.0	5.1	4.3	2230	60
II U	-10.2	0.0	5.7	2.9	2.2	815	60
III U	-22.8	0.0	7.7	5.3	4.6	1300	60
IV U	-24.3	0.0	8.6	6.5	5.9	2136	60

(a), (b), (c) See Table 9, footnotes (a), (b), (c).

(d) See Table 2, Footnote (a).

(e) All variables have the same values as base cases except wage rates in alternative employment are the same as in job before layoff.

footnote 41), but younger workers tend to benefit more than older workers.

The combined effects of percentage changes in the proportions of time employed and in wage rates can be seen in some cases to produce relative income gains instead of losses. This is especially true for workers in the ROE-UIC data base (Table 10). In general, the relative income loss is approximately 2 to 5 percent when no wage change occurs after layoff, 10 to 25 percent when there is a decrease in wages and a loss of firm-specific rents, and about -10 to 1 percent when there is an increase in wage rates. Female workers generally suffer larger relative income losses, or enjoy smaller relative gains, because their expected full income before layoff is lower than that of male workers. To control for the effect of wage rate changes, the income-loss estimates are given in Table 10 with the wage change set at zero. Comparison of this type of simulation with the base case reveals the sensitivity of the income loss to changes in wage rates between jobs. Over the long run the sensitivity of the relative income loss of the Sherbrooke workers to a change in W of one percentage point averages about $-.8$, or in other words, if the wage rate of a laid-off worker drops by one percent then his relative income loss increases by $.8$ percentage points.^{45, 46}

As was mentioned in Section 3, most re-employment promotion programmes aim only at reducing the short-run costs of displaced workers and not on improving their prospects over the rest of the time they are in the labour force. In particular such manpower programmes assist workers to find their first jobs after a permanent layoff. Even without the specific behavioural characteristics of the effects of such programmes, it is possible to simulate the upper bound to the reduction in the relative income loss of workers achieved by means of a re-employment programme which focuses on the period immediately following layoff, but which thereafter relies on generally available assistance. The best

result such a programme can achieve is the immediate re-employment of all laid-off workers.⁴⁷ Table 11 presents estimates of the maximum reductions in the relative income losses of workers in the Sherbrooke region based on both data sets. It appears that in the long run such programmes can only reduce income losses by 2-4 percentage points at the most. The reason for this small effect is that these programmes only concentrate on the immediate problem and not on the longer term employment and earnings experience these workers must now face.

(c) Comparison of the Estimates to Existing Programmes⁴⁸

Worker adjustment assistance programmes in Canada have focused mainly on worker training and manpower mobility grants. No attempt is made in this paper to assess the effectiveness of these programmes or to validate the estimates of the likely economic benefits, which were made in the previous section.

Unemployment insurance benefits assist laid-off workers, but recall that any income compensation based on the expected income losses estimated in the previous section would be in addition to the regular unemployment benefits to which the worker is entitled. As was noted earlier (note 27), the Canadian government did establish a programme to provide supplementary unemployment benefits for older workers released by declining firms in the textile industry. Initiated in 1971, and extended in 1974 to cover the footwear and tanning industry, the Adjustment Assistance Benefit (AAB) programme now provides workers with two-thirds of their former wages after the expiration of unemployment insurance benefits and until the age of 65. The first point to be made concerning this programme is that it appears to be especially generous even after subtracting the unemployment insurance benefits which

Table 11: Upper Bounds on Private Income Gains from
Immediate Re-employment for Four Types of
Sherbrooke Workers

Type of Worker	Reduction in relative income loss ^(a) (percentage) over:		
	1 yr	3 yr	5 yr
<u>LFTS Cases</u>			
I L: male, 40, married	10.0	3.8	2.4
II L: male, 25, single	8.2	3.0	1.9
III L: female, 25, single	11.6	8.2	3.0
IV L: female, 40 married	9.4	5.1	3.1
<u>ROE-UIC Permanent Layoff Cases</u>			
I U: male, 40, dependents	6.9	3.7	2.5
II U: male, 25, no dependents	8.2	3.9	2.5
III U: female, 25, no dependents	10.2	5.2	3.3
IV U: female, 40, dependents	8.1	5.1	3.7

(a) Reduction in relative income loss equals relative income loss with immediate re-employment minus relative income loss with no additional re-employment assistance.

would have been paid during the fraction of the year that these workers would likely have been unemployed. The second point worth noting is that the eligibility criteria are quite restrictive. To be eligible workers in the textile industry had to be employed in the industry for a minimum of ten years out of the last fifteen and the layoff had to be certified by the Textile and Clothing Board as having resulted from import competition. To avoid assisting workers laid-off as part of an industry rationalization, a minimum of 50 employees or 10 percent of the firm's workforce had to be affected for a period exceeding four weeks.⁴⁹ The third problem was mentioned previously (note 27), namely that employment earnings are subject to an effective minimum $2/3$ marginal tax rate because assistance benefits are taxed-back at this rate when the beneficiary has earnings from alternative employment.⁵⁰ The combined effects of the restrictive eligibility criteria and work disincentives created by the tax-back provisions make the AAB programme much less generous than it first appears. The programme does provide a precedent for industry-specific assistance, however, and could be improved considerably by easing the eligibility criteria and reducing both the benefit and tax-back rates.

The U.S. Trade Act of 1974 not only relaxed the eligibility criteria and reduced the certification time but also provided more generous assistance than did the 1962 Trade Expansion Act. Worker adjustment benefits under the 1974 Act include the following:

- a weekly adjustment allowance of 70 percent of the workers' average weekly wage, but not to exceed 70 percent of the average weekly manufacturing wage, for up to 52 weeks with up to 26 weeks extension for workers in training or workers over 60 years old.
- training, testing, counseling, placement services and other services through cooperating state agencies.

- workers who wish to move to another area may receive a relocation allowance of 80 percent of the necessary relocation expenses plus a lump-sum payment of 3 times the worker's average weekly wage, up to \$500.
- job-search allowance of 80 percent of a worker's job-search expenses up to \$500.⁵¹

There are a number of differences between the weekly adjustment allowance of 70 percent of the workers' average weekly wage and the income loss estimates made in this paper. First, the allowance is not paid in addition to state unemployment insurance benefits, but rather is intended either to raise these benefits from their usual rate of about 50 percent to 70 percent or to extend unemployment coverage for an additional time period. The income loss estimates made in this paper were in addition to unemployment insurance payments to workers. Second, unemployment insurance benefits and the "top-up" provided by trade adjustment allowances are not included in taxable income in the United States. Unemployment insurance benefits are counted as taxable income in Canada, hence only net-of-tax unemployment benefits were included in the estimates of the displaced workers' full income before and after layoff in order to calculate their expected income losses; the estimated losses presented in Tables 9 and 10 are also measured net of income tax. Third, like the Canadian Adjustment Assistance Benefits the adjustment allowance creates a work disincentive because the allowance is received only while workers are unemployed.⁵¹ The Worker Compensation Programmes advocated in this paper are careful to keep work disincentives to a minimum.

The relocation allowances of the U.S. 1974 Act may not be cost-effective and may generate relatively small economic benefits compared to the potential benefits from worker re-training programmes. The lump-sum payment is intended to compensate those living in single-industry communities for the unexpected

decline in housing prices, but the ceiling of \$500 is likely to prevent full and adequate compensation from being made.

5. Other Considerations and Conclusions

For years economists have argued in favour of trade liberalization, and individuals and institutions have lobbied governments in developed countries like Canada to assist developing countries by permitting freer trade and encouraging increased trade flows. These efforts have sometimes been successful, but in general the rate of progress has been slow as governments in developed countries are reluctant to dismantle their protectionist machinery. Witness, for example, how quickly the Government of Canada was prepared to adopt protectionist measures during the recent period when the Canadian dollar was overvalued and a number of import-competing industries were increasingly threatened by foreign competition. It is not unreasonable to expect, furthermore, that governments will continue to reach for the tools of protection unless alternative policies are available to deal with the adjustment problems that increased trade can entail.

At the same time governments in developed countries are more actively pursuing social and economic objectives like full-employment, regional growth, and an improved balance of payments. Regional location grants, special government financial assistance and subsidies, along with the standard protectionist devices, are frequently used to maintain employment opportunities in declining industrial sectors. These measures have been dubbed the "new protectionism" because they also discourage trade.

Politicians and appointed government officials in developed countries have a choice between protectionist policies (old or new), which maintain domestic employment opportunities and forestall the private and economic costs of adjustment (albeit at an economic cost of their own to both domestic

residents and the residents of developing countries), and increased trade with its accompanying dislocation for workers and owners of capital in import-competing sectors. Given only this choice, it is not surprising that elected governments have been reluctant to abandon protection. Politicians ought to become informed, however, of another option, namely worker adjustment assistance. Properly designed worker adjustment assistance programmes can be used to mitigate political opposition to changes in government policy and to permit a more efficient use of the country's resources..

Adjustment assistance programmes are sometimes viewed as less desirable than the continued use of protection because they require government expenditures (and implicitly tax increases of uncertain magnitude and incidence) whereas protection generates tax and tariff revenue of certain incidence. At least two arguments can be made in reply. First, the growth of government financial assistance to troubled firms in declining industrial sectors and slow-growth regions is one indicator that continued protection could easily entail a net drain on government revenues, and one which is likely to get larger over time. Second, the amount of government expenditures can be tightly controlled through careful policy formulation and design and can be limited in magnitude to that which will yield incremental net economic benefits.

A major theme of this paper has been that economic welfare both at home and abroad can be improved by means of worker adjustment assistance programmes. To be politically and economically effective, however, careful estimation of the following variables is required:

- (a) the private costs of adjustment of laid-off workers,
- (b) the net economic benefits of delaying layoffs, and
- (c) the net economic benefits of alternative re-employment promotion programmes.

If displaced workers are under-compensated, then their political opposition to changes in government policy will remain unabated. If they are over-compensated, then the government can be made to look inept and irresponsible in its management of the public purse. If failing firms are propped up indiscriminately and indefinitely, then residents of the country are made worse off because other more beneficial activities are forgone elsewhere. Over time the competitive position of countries like Canada deteriorates and their ability to adapt to an ever-changing world environment is reduced. Lastly, the re-employment of laid-off workers can be encouraged in a number of ways, some more economically efficient than others.

In order to demonstrate how "positive" adjustment assistance can be designed, a number of economic models and estimation techniques have been introduced in this paper. The parameters of these models have been statistically tested in previous studies and found to be highly significant. The methodology developed in this paper offers policy analysts a way to analyze the empirical problems which have to be solved before welfare efficient policies can be designed. The next steps must be taken by politicians and bureaucrats who still believe that the world can be made a better place to live.

Notes

1. Tariffs raise the domestic price for a good above its world price (c.i.f.). This tends to dampen domestic demand, but expand domestic production. Welfare gains are therefore available through tariff reduction by lowering the domestic price to consumers. Given the distortions in the factor markets (labour and capital, in particular), the optimal level of domestic production may well be above that which the world price would dictate. In such a case, a country can either not remove a tariff completely or replace the tariff with a production subsidy within a trade adjustment assistance programme. This latter option is preferable to tariff protection because there is a gain in consumer surplus and no loss of efficiency in production.
2. Organization for Economic Co-operation and Development (1976).
3. The U.S. government, for example, imposed countervailing duties on the importation of rubber tires from Canada on account of the capital grants given to Michelin Tire by the Department for Regional Economic Expansion.
4. The term "economic cost" is used in this paper to refer to the economic efficiency or resource cost related to some incremental activity in the economy. The economic resource cost per unit of a domestically produced good, on the one hand, is less than its market price if there are positive labour and other externalities associated with its production. The economic cost of an imported good into Canada, on the other hand, must allow for the economic premium on foreign exchange because the economic cost of foreign exchange is greater than the market foreign exchange rate.
5. So do many editorial writers in the daily newspapers. See, for example, Wayne Chevaldayoff, "Onus is on Ottawa to Spur Faster Growth," Report on Business Globe and Mail (February 25, 1980): B2.
6. Bale (1979): 151.
7. Helleiner (1976).
8. The adjustment costs of workers are considered more important than those of capital and capitalists because any change in the value of capital assets due to trade liberalization is a private, but not an economic loss. The only relevant private loss is due to an unexpected change in trade barriers. To the extent that trade liberalization is anticipated, the change in the expected profitability in a sector is then reflected in the asset purchase price. Although capital losses (unrealized) can be suffered even before the reduction in protection occurs, capital adjustment is expected to precede this date as well, e.g., reinvestment in other sectors or countries, use of rental equipment rather than purchasing new equipment, and so on.
9. Organization for Economic Cooperation and Development (1979): 3-7 .

10. O.E.C.D. (1979): 76-116.

11. Secondary activities in a region are those that are sensitive to changes in local expenditure levels. Base sector activities are not subject to local expenditure fluctuations. Their level is determined through trade with other regions and countries. Changes in jobs opportunities affect the level of local expenditures and hence the supply of secondary jobs.

12. In 1973 Quebec provided the following percentages of total Canadian employment in the following import-vulnerable sectors:

Leather	48.1%
Textiles	52.1%
Knitting	61.9%
Clothing	65.4%
Electrical Products	25.6%

See Matthews (1977), Table 3; Helleiner (1975).

13. Estimates have also been made for worker re-employment experiences in a number of other regions in Quebec and Ontario stretching from Quebec City in the east to Niagara in the west. See Jenkins, Glenday, et al (1978), Glenday (1979) and Jenkins and Montmarquette (1979).

14. The major towns in the Sherbrooke region are Sherbrooke, Granby and Magog. The distributions of their labour forces across the five import-vulnerable industries (see footnote 6) in 1973 was as follows:

Percentage of Labour Force in Industrial Sector					
<u>Town</u>	<u>Clothing</u>	<u>Textiles</u>	<u>Electrical Products</u>	<u>Vulnerable Industries</u>	<u>Manufacturing</u>
Sherbrooke ^(a)		4.2		7.1	33.2
Granby ^(a)	2.5	10.3	3.2	17.0	41.3
Magog ^(b)		10-20			

(a) Matthews (1977), pp. 17-18.

(b) Single textile plant, special survey information.

15. Two data bases are used. The first is the Labour Force Tracking Survey (LFTS) was conducted by the Department of Industry, Trade and Commerce during the summer of 1977. This survey was designed to establish a data base on the reemployment experiences of a sample of workers who suffered permanent job losses from companies undergoing shutdowns or major employment cutbacks. Data were collected on both the time series of the labour force status of a worker as well as on the personal characteristics of each worker.

The survey concentrated on collecting data on workers separated from firms in the weaker and the more labour-intensive industries that have been experiencing problems in maintaining their competitive positions. The vast majority of cutbacks and shut-downs that generated the job losses occurred between January 1974 and December 1976. Data on all employment-unemployment episodes of the worker between January 1972 and the survey date in 1977, however, were also collected so that the labour-market behaviour of the worker both before and after job loss from the firm identified for the survey is available for analysis.

Estimates made in this study are based on a sample of 4,250 workers who resigned or were permanently laid-off from firms in the textiles, knitting, clothing and electrical products sectors. The sectoral distribution of the workers at the time of job loss was textiles and knitting, 56.5%; clothing, 16.5%; and electrical products, 27.1%. The majority of these separations took place in Quebec (58.8%) and Ontario (30.3%) with the remainder in Nova Scotia, New Brunswick and Manitoba. The Sherbrooke region is represented by 376 workers in the overall sample. Most of these workers lost their jobs from firms in the textile and knitting sectors (84.4%) and the remainder from firms in the electrical product sector. Regional dummy variables are included in the estimating equations to isolate any regional differences in the re-employment experience of the Sherbrooke workers compared to the rest of the sample.

The estimating equations (as outlined in Appendix A) that are used with the LFTS data for the predictions in this study are presented in Glenday (1979), Section 5 and Appendices B and C. The levels of the other variables included in the LFTS estimating equations for purposes of comparison are: years of primary and secondary schooling, 11; equivalent-years of specific vocational training, 1; probability of resigning, .3; Canadian prime age male unemployment rate, 4.5%.

The second data source is a regional Record of Employment - Unemployment Insurance Claim (ROE-UIC) data base for the Sherbrooke region. This data base is constructed from the UIC Longitudinal Data Base to give the time series of employment and unemployment episodes for a one-in-ten sample of all workers who established unemployment insurance claims in the Sherbrooke region from 1972 through 1976.

Regional ROE-UIC data bases are useful for a number of reasons. (i) Such data bases are representative of the majority of unemployment experienced in a region. The UI system covers an average 89-90% of the labour force (Statistics Canada, "Statistical Report on the Operation of the Unemployment Insurance Act," Catalogue 73-001, Quarterly, and Statistics Canada, "The Labour Force," Catalogue 71-001, Monthly), and information is generated in these data bases on unemployment spells that contain UI claims as well as those that do not. (ii) Analysis of these data can reveal valuable insights into the structure of regional unemployment, and hence, form the basis for interregional comparisons of unemployment. (iii) These data can be used to analyze the re-employment experience of individual workers.

Unemployment episodes initiated by resignations or lay-offs plus subsequent employment spells form the sample upon which the estimates

are made. The estimating equations that are used with the ROE-UIC data for predictions in Glenday (1979), Section 7 and Appendices E and F. The levels of the other variables included in the Sherbrooke ROE-UIC estimating equations for purposes of comparison are: equivalent-years of specific vocational training, 1; probability of resigning, .3; Quebec Provincial unemployment rate, 8.7%.

16. The government also has to guard against the firm seeking windfall gains from the programme by threatening the government with an imminent but unintended major layoff, unless financial assistance is forthcoming.
17. In such circumstances, the government may try and find a buyer for the struggling firm amongst the successful businesses in the sector. This would prevent the dislocation suffered by its existing labour force. Business mergers can also be encouraged provided they do not violate anti-combines legislation.
18. The model underlying all these estimations focuses on the states of being employed and unemployed. Ideally the model should include the state of being out of the labour force. Workers who are laid-off may decide to enter early retirement or be discouraged at the prospects of finding a subsequent job, and hence, leave the labour force for a spell. It seems reasonable to assume, however, that any worker leaving the labour force either permanently or temporarily, is doing so on the basis that the value of his time in activities outside of the labour force is at least as great as in the labour force. The value of the time of a worker while out of the labour force is taken to be equal to the average value of the full income of the worker while in the labour force, i.e., the value of the time of a non-participant is based on the prospects of that person while in the labour force. Failure to take explicit account of the differential in the value of time while unemployed as opposed to out of the labour force for those who temporarily leave the labour force results in a slight under-estimate in the value of time after job loss. This imparts an upward bias to the labour externality estimates.
19. The value of time in non-market activities is estimated from the trade-off a worker makes between labour-market and non-labour market activities. In a competitive labour market a worker can choose the amount of time he desires to work based on the net-of-tax wage rates he can command and the corresponding UIC benefits he can receive while unemployed. In such a labour market a worker would be expected to forgo his leisure time up to the point his net-of-taxes wages offset his opportunity cost of his marginal time, viz., the value of his leisure time plus the UIC benefits he would receive if unemployed during this marginal time. In some labour markets, however, workers are not able to voluntarily choose the amount of time they wish to work. Minimum wage laws and collective-bargaining agreements tend to raise wage rates above market-clearing rates. In consequence the value of employed time is higher than unemployed time, and hence, the net-of-taxes wage rate equals some multiple of the values of UIC benefits and leisure time while not at work. This relationship

can be expressed as:

$$W(1-t_m) = B(f \text{ UIC } (1-t_m) + V)$$

Solving for V, this expression becomes:

$$V = (W (1-t_m) - Bf \text{ UIC } (1-t_m)) / B$$

where: t_m = marginal personal income tax rate that a worker pays on his incremental income earned from forgoing his marginal leisure time; and

B = coefficient reflecting the ratio of the marginal value of being employed to that of being unemployed. In a competitive market B equals unity otherwise B is greater than unity. The value of B depends on (a) whether workers are unionized and the union-non-union wage differential and/or (b) whether the workers fall into labour categories affected by minimum wage laws and the minimum wage law distortion in the regional labour market. Unionization tends to raise wages by some 20% above non-union wages. See, for example, MacDonald and Evans (1979).

20. The wage bill should include all employer contributions to fringe benefits and payroll taxes.
21. Compensation payments to displaced workers can change trade liberalization from a potential to an actual Pareto improvement for the economy.
22. Even if a government sees no political risk in agreeing to some schedule of tariff changes it is still politically undesirable to be perceived (wrongly or rightly) as the direct cause of a job loss. Therefore, it is not uncommon for a government to blame some other third party for the damage: in the MTNs a government has the option of blaming all other participants for forcing it to accept a given tariff reduction.
23. See Caves (1976) and Helleiner (1979).
24. Government of Canada, "Multilateral Trade Negotiations 1979; Canadian Participation," briefing materials (July 11, 1979).
25. The full income loss estimates made in this study cover changes in only the time-related income of workers (wages, leisure and unemployment insurance). The major sources of private income loss for most workers are considered to be covered by this estimate. A number of other possible sources of income change have not been included:
 - (i) Unexpected decreases in property values resulting from a layoff. Such losses are only expected to be important when a major permanent layoff takes place in a small isolated community.
 - (ii) Loss of fringe benefits. Such losses are most likely to affect salaried workers. Unfunded, non-transferable pensions can result in a loss of past pension contributions and future pension benefits.

- (iii) Moving expenses. Where a worker decides to relocate as a result of a layoff moving expenses are incurred. To the extent that these are not covered by the subsequent employer, mobility grants or tax deductions, they represent a loss of income.
- (iv) Psychological costs. Increased uncertainty concerning future income as well as mental anguish or illness resulting from a layoff add to the total income loss.
- (v) Part-time earnings. No account has been taken of part-time earnings during unemployment spells. Such earnings would reduce estimated income losses.
- (vi) Severance pay and supplementary unemployment benefits. These would naturally reduce expected income losses. In the presence of an income compensation programme employers would be under less pressure to offer generous severance pay settlements. Notice that the older and more experienced workers, who may be earning firm-specific rents and who would suffer larger income losses through layoff, tend to receive the higher severance payments. This tends to reduce some of the expected variance in income losses.

It is implicitly assumed that job search time is valued by the worker at the same rate as the value of his time in non-market activities. The marginal benefit of job search is the present value of the increased time employed or wages received from new employment. The marginal cost is forgone leisure time. At the margin, therefore, job search time has the same value as time in non-market activities.

- 26. To the extent that a layoff increases the uncertainty (or variance) in the expected income streams of the workers, the perceived income loss of risk-averse workers will exceed the expected (or actuarial) income loss. Adjustment assistance programmes can serve both to reduce the expected income loss and the uncertainty in future income streams.
- 27. In Canada the Adjustment Assistance Benefits Programme provides certain workers over the age of 54, who have worked in the clothing, textiles or footwear industries for extended periods, with two-thirds of their former wages until the age of 65. Any employment earnings of beneficiaries, however, are subject to an initial 2/3 marginal tax-back rate so that their total net income with employment is unlikely to exceed their former income unless employment paying higher wages is found. As a result very few of the programme's beneficiaries have ever become re-employed. See Glenday (1978a); Jenkins, Glenday, Evans and Montmarquette (1978), Chapter 1; and Wohlfarth (1977).
- 28. Because it is difficult to predict the full variation in income losses due to trade liberalization as well as the added costs of risk faced by the affected workers (who may have increased variance in their future incomes), compensating workers at levels greater than the estimated

average income losses (see Section 4) may be appropriate in order to leave them indifferent to their prospects before liberalization.

29. See Jenkins, Glenday et al (1978), Chapter 4.

30. The effects of a portable wage subsidy programme on the demand for labour in a region can be investigated in terms of a simple derived demand model. Assume regional output (Q) is produced according to constant returns to scale; capital (K) and labour (L) are substitutes, but their use is independent of the material inputs; and labour and capital are in perfectly elastic supply to the region. Now if L is divided into subsidized labour L_s and unsubsidized labour L_u , then

$$\eta_{L_s w_s} = \alpha_{L_s} \eta_{Qp} - \alpha_{L_u} \sigma_{L_s L_u} - \alpha_K \sigma_{L_s K} \quad (30.1)$$

$$\eta_{L_u w_s} = \alpha_{L_s} (\sigma_{L_s L_u} + \eta_{Qp}) \quad (30.2)$$

where

$\eta_{L_s w_s}$ = elasticity of demand for subsidized labour with respect to the subsidized wage rate (w_s);

$\eta_{L_u w_s}$ = elasticity of demand for unsubsidized labour with respect to the subsidized wage rate (w_s);

η_{Qp} = own-price (p) elasticity of demand for the output (Q);

σ_{XY} = elasticity of substitution between factors X and Y;

α_X = share of total cost attributable to use of factor X.

$$\text{and } L = L_s + L_u \quad (30.3)$$

$$\text{or } \frac{dL}{L} = \frac{L_s}{L} \eta_{L_s w_s} \frac{dw_s}{w_s} + \frac{L_u}{L} \eta_{L_u w_s} \frac{dw_s}{w_s} \quad (30.4)$$

If w_s is not appreciably below w_u , then

$$L_s/L \approx \alpha_{L_s}/\alpha_L, \quad L_u/L \approx \alpha_{L_u}/\alpha_L, \text{ and substituting (30.1) and (30.2)}$$

into (30.4) yields

$$\frac{dL}{L} = \alpha_{L_s} \eta_{Qp} - \left(\frac{\alpha_{L_s} \alpha_K}{\alpha_L} \right) \sigma_{L_s K} \frac{dw_s}{w_s} \quad (30.5)$$

$$\text{i.e. } \eta_{L w_s} = \alpha_{L_s} \eta_{Qp} - \left(\frac{\alpha_{L_s} \sigma_K}{\alpha_L} \right) \sigma_{L_s K}$$

If subsidized workers are substitutes for both unsubsidized labour and capital, then $\sigma_{L_s L_u}$ and $\sigma_{L_s K}$ are both positive, and $\eta_{L_s w_s}$ in (30.1)

is negative; hence, more subsidized labour is employed. Whether or not more unsubsidized labour is also employed as a result of the wage subsidy depends on the magnitude of $\sigma_{L_s L_u}$ compared to that of η_{Qp} , or in other

words, the relative sizes of the substitution and scale (or expansion) effects. The higher the degree of substitutability of the laid-off labour for other unsubsidized unemployed labour, the more adverse are the effects of the wage subsidies on those other workers. Presumably $\sigma_{L_s L_u}$ is small in those situations where the laid-off workers are

expected to have above average difficulty in finding new jobs. If $\eta_{L_u w_s}$ is positive, then the relative impact on other workers is reduced the smaller the size of the programme, i.e., the smaller α_{L_s} . In small

remote regions where a large proportion of the workers are expected to be laid-off and financial assistance to the firm cannot be justified on economic efficiency grounds, then it is better to subsidize all labour in the region rather than the trade-affected workers alone.

The more important result from this analysis is given in (30.5) which shows that a relative increase in the overall demand for labour in the region is the most probable result of the wage subsidy (dw_s/w_s). Given

η_{Qp} is negative, this increase in labour demand occurs when the subsidized labour and capital are substitutes or when the absolute value of η_{Qp} exceeds that of $(\alpha_K/\alpha_L)\sigma_{L_s K}$. Notice α_K/α_L is expected to be less than unity.

31. Moving costs are relatively small for the majority of migrants. Most migrants tend to move to neighbouring regions or regions within the same province, particularly in Quebec and Ontario. For example, in the Sherbrooke region during the 1974-76 period amongst unemployment insurance claimants in this region, at least 15% also established claims outside of the region: two-thirds of these in neighbouring regions, one-quarter in other regions in the same province and the remainder in other provinces. See Glenday (1979), Appendix D. See also "Migration in Canada: Profile Studies," 1971 Census, Statistics Canada, Catalogue 99-705, for evidence of the prevalence of intra-provincial migration. Much of the migration flows is also return migration. (Vanderkamp, 1971). Mobility grants may therefore encourage short-term migration out of a region, but not necessary long-term net outflows to adjust the regional supply of labour.
32. For supra-marginal migrants (those who would have moved anyway) relocation assistance is a windfall gain.
33. See note 30, equation (30.5) which indicates that an increment in the long-run demand for labour is the expected result of a portable wage subsidy.

34. In Canada labour supply problems exist in certain skilled labour categories such as machinists and millwrights. See for example, Industrial Relations Centre, Queen's University, "The Current Industrial Relations Scene in Canada," Annual.
35. Bale (1979): 151-2.
36. Bale and Miller (1977): 15.
37. Bale and Miller (1977): 16. Neumann (1976) estimates the number of workers covered by the 1962 provisions at 51,140. See also Bratt (1974) and Fooks (1971). Because the international competitive position of the United States had also changed in the interim, not all of the increase in the number of eligible workers can be attributed to the relaxing of the eligibility criteria.
38. Jenkins, Glenday et al. (1978), Chapter 4.
39. Bale and Miller (1977): 14.
40. For an example of a case study of laid-off workers losing firm specific rents, see Jenkins, Glenday et al (1978), Chapter 2.
41. Wage rate gains by laid-off workers are especially likely to occur during periods of rapid growth in real wages. In such circumstances wage rates in the struggling firm can fall rapidly behind the average market wage rate. Over the sampling period of 1974-1976, for the LFTS and ROE-UIC data sets, real wages did in fact grow quite rapidly, and hence, the income gains by many workers are not surprising. The following data illustrates the growth rates in constant dollar earnings in the Sherbrooke region.

	Annual Earnings Growth Rates	
	(percentage)	
	Period	
Urban Area	1973-1977	1974-1976
Sherbrooke	1.8	4.3
Granby	3.5	5.3
Magog	1.8	3.7

Statistics Canada, "Employment, Hours and Earnings," Catalogue 72-002.

42. The basic parameters describing the Sherbrooke region labour force have been estimated for 1978 to be: average wage rate, \$215 per week; average temporary sector wage rate, \$187 per week; average permanent sector wage rate, \$224 per week; the proportion of the labour force in the temporary sector, 25%; the equilibrium proportion of time at work in the

temporary sector, 54%. The weighted average wage rate of workers in the textiles, knitting, clothing, leather and electrical products sectors in Quebec in 1978 is estimated to be \$215 per week. (Statistics Canada, "Employment, Hours and Earnings," Catalogue 72-002, Monthly).

43. The average job in the Sherbrooke region consists of 85% permanent employment and 15% temporary employment and pays an average gross wage of \$215 per week.
44. It is assumed that 50% of the workers with skills in excess demand are bid away from jobs in other regions which are estimated to pay wages running an average of 6 percent above those in the Sherbrooke region.
45. The relative income loss of workers tends to be less sensitive to changes in the proportion of time spent working. A one percentage point decrease in ΔP results in only a .2 percentage point increase in the relative income loss.
46. Where the income level following a job loss is expected to exceed that which would be expected without the job loss, the maximum loss then gives the cumulative value of the loss over the period before the income loss starts to decline. This maximum loss is an estimate of the short-run income loss facing the worker about to be laid-off, and hence excludes any long-run gain.
47. In the income loss stimulation programme it is normally assumed that all the laid-off workers initially enter a state of unemployment (even if only very briefly for many) and then pass through a process of finding, keeping, and losing jobs until some equilibrium employment level is reached. To simulate immediate re-employment all workers are assumed initially to enter a state of employment and then go through a process of keeping, losing and finding jobs until the same equilibrium level of employment is reached. See Glenday (1978c).
48. It is also interesting to compare the estimates reported in this paper to others made for the United States. Bale (1976) produces the following results (p. 250):

The cost to a worker and to society of
a trade-displaced worker

	<u>Cost to Worker</u>	<u>Cost to Society</u>
Method 1	\$1,929 to \$9,630	\$2,991
Method 2	\$ -615 to 6,919	\$1,282 to \$7,645

Bale's estimates were made on the basis of a number of simplifying assumptions. His upper-bound estimate of the cost to the worker, using his Method 1, is the net loss to the worker during an initial 31 weeks of

unemployment (\$1,311) plus the net present value of the lost wages over 21 years of subsequent employment (\$8,318), on the assumption that "wages of displaced workers will be permanently below their pre-tariff-removal level." Such figures are misleading for a number of reasons: the private income losses should be estimated net, not gross, of income taxes; if the 31 weeks of unemployment is the mean duration of unemployment, then it is probably an upward-biased estimate of the unemployment experience of the average displaced worker; no account is taken of the proportion of time employed and unemployed before layoff; there is no procedure to estimate a long-run equilibrium probability of being at work after layoff; and there is no value placed on leisure time.

Bale's estimates of the cost to society are equally suspect. The cost is measured relative to a frictionless world, not relative to the forgone economic value of workers' time before layoff. Because it is assumed that workers place no value on their leisure time, furthermore, the negative labour externality during unemployment is set equal to the forgone wage bill. Although this imparts an upward bias to his estimates, his measure of the cost to society is generally biased downward because he assumes in his Method 2 that laid-off workers are unemployed only 9.4 percent of the time to the age of 65. None of the estimates of the long-run equilibrium proportions of time employed (and unemployed) presented in Tables 1 and 2 came close to this figure.

Bale rightly calls his results only a "first estimate in a cost-benefit calculation of tariff removal." His methodology is not sufficiently reliable to provide a basis for designing specific programmes or to determine the appropriate magnitudes of government financial assistance.

Jacobson (1976) estimates earnings losses for prime-age males and finds the losses to be larger for industries with low turnover rates and high wages rates. His estimates do not allow for changes in transfers like unemployment insurance.

Using a basic approach which is similar to that employed in this study, Neumann (1976) finds that the private costs of job loss for workers covered by the trade adjustment assistant provisions of the U.S. 1962 Trade Expansion Act depend to a large extent on the permanency of the wage loss. If the wage loss were only transitory, disappearing in three years, then the average recipient lost about \$3,293 (in 1975 dollars), whereas if the wage loss were permanent, the loss in income amounted to \$11,860 for the average recipient.

49. Wohlfarth (1977).
50. When the AAB programme provided benefits at 50 percent of previous wages and had a tax-back rate of 50 percent, about 12.5 percent of the recipients report other earnings. When the benefit and tax-back rates rose to 66 2/3 percent, this number dropped to 6 percent. Wohlfarth (1977).
51. Bale (1979): Table 2.
52. Neumann (1976) found that the readjustment allowances of the 1962 Trade Expansion Act increased the duration of unemployment. The higher implicit tax-back rate of the 1974 Act would reinforce the work disincentive.

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Appendix A: Models To Estimate Private and Economic Adjustment Costs

In this appendix the models used for estimating the expected income losses of laid-off workers and the gross labour externalities from delayed layoffs or re-employment promotion are outlined.

(a) The Probability of Being at Work

In all the models the key variables are the proportions of time workers spend employed (or unemployed), their wage rates and the distortions they face in the labour market (taxes, unemployment insurance, etc.) that alter with their labour supply incentives. Considerable effort has been focussed on estimating and modelling the proportions of time different types of workers can be expected to be employed under various labour market circumstances. From labour force tracking data it is possible to estimate the probability of a worker's being at work at different points in time following a job loss. In every time interval after a job loss a worker has a certain probability of finding a new job and, once re-employed, a certain probability of losing this job. Estimates are therefore made of the probability of a worker's finding employment in a given interval following a job loss conditional upon (i) a job not being found in the preceding intervals, and (ii) the socioeconomic characteristics of the worker and labour-market circumstances which prevail at that time. Similar estimates are made for the interval probabilities of losing subsequent employment. From these two sets of probabilities a number of interesting results are forthcoming: (See Figures A.1 and A.2.)

- (i) The distribution of the relative and cumulative probabilities of finding work (p^r and p^c and from these the mean and median durations of unemployment^t, (See ^t Figure A.1.)
- (ii) The distributions of the relative and cumulative probabilities of losing a job after finding one (L^r and L^c) or the corresponding probabilities of keeping this job^t (K_t^r and K_t^c) and from these the

mean and median durations of employment.

- (iii) The transition path of the probability of being at work after job loss (P_t) based on the cumulative probabilities of finding (P_t^c) and keeping (K_t^c) employment, and the long-run equilibrium probability of being at work (PEQ) consistent with stable P_t^c and K_t^c distributions. (See Figure A.2.)

While P_t and PEQ are the key variables that have to be estimated for the income loss and labour externality models, the shapes of the distributions of the probabilities of finding and keeping jobs yield important information. Although the mean (or average) durations of unemployment for different groups of workers are commonly estimated to describe their unemployment experience, these statistics are somewhat misleading. The reason is that the relative probability distributions of the duration of unemployment are generally highly skewed to the right, and hence, the mean exceeds the median by a considerable amount. This implies that by the time the mean duration of unemployment is reached an individual has more than a 50 percent probability of having found work. If the relative frequency distribution of the duration of unemployment were given by an exponential distribution, for example, the mean duration would be approximately 1.4 times as large as the median. Furthermore, the cumulative probability of finding work before the mean duration of unemployment has been reached would be 63.2%. Empirical estimates show mean values to be 2 or 3 times as large as median durations of unemployment for laid-off workers. See Glenday (1979).

(b) Labour Externality Models

Two dynamic models have been developed to estimate gross labour externalities. These are referred to as the general and partial equilibrium models. Given the complexity of the general equilibrium model in particular and the existence of descriptions elsewhere, only brief outlines are given here.

Figure A.1. The Relative (P_t^r) and Cumulative (P_t^c) Probabilities of Finding Employment in Different Durations from Job Loss (t)

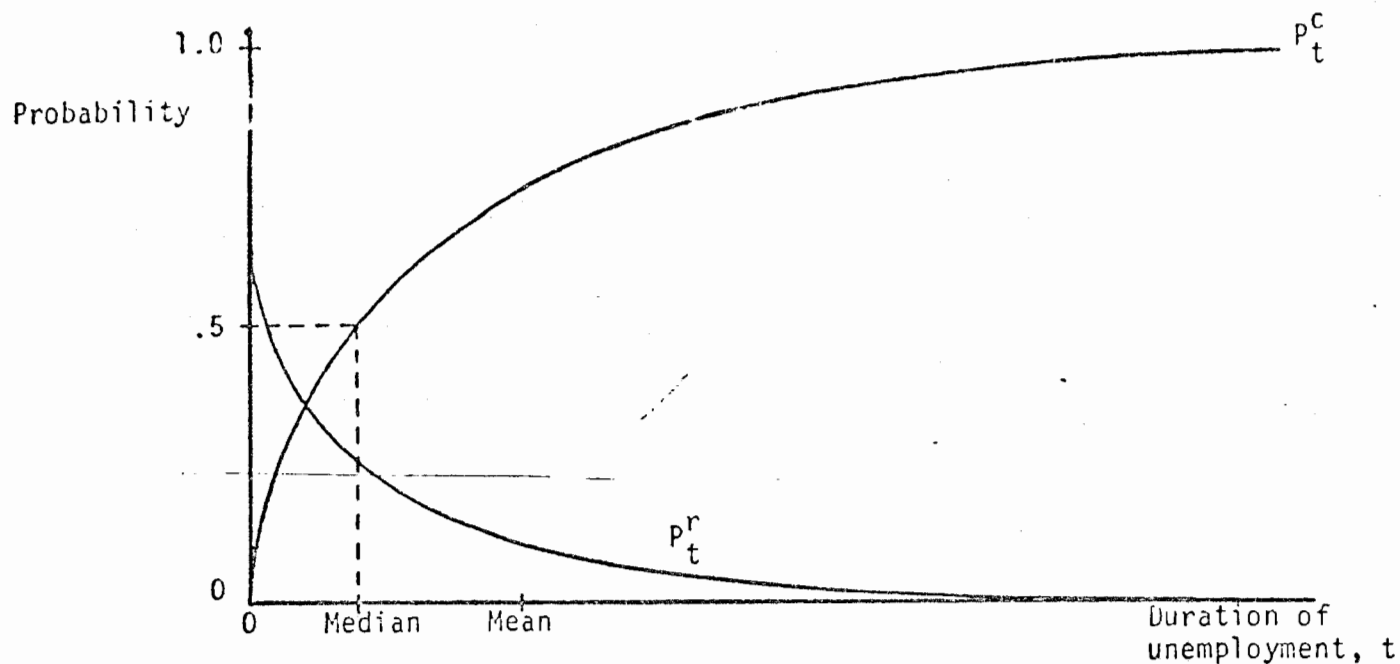
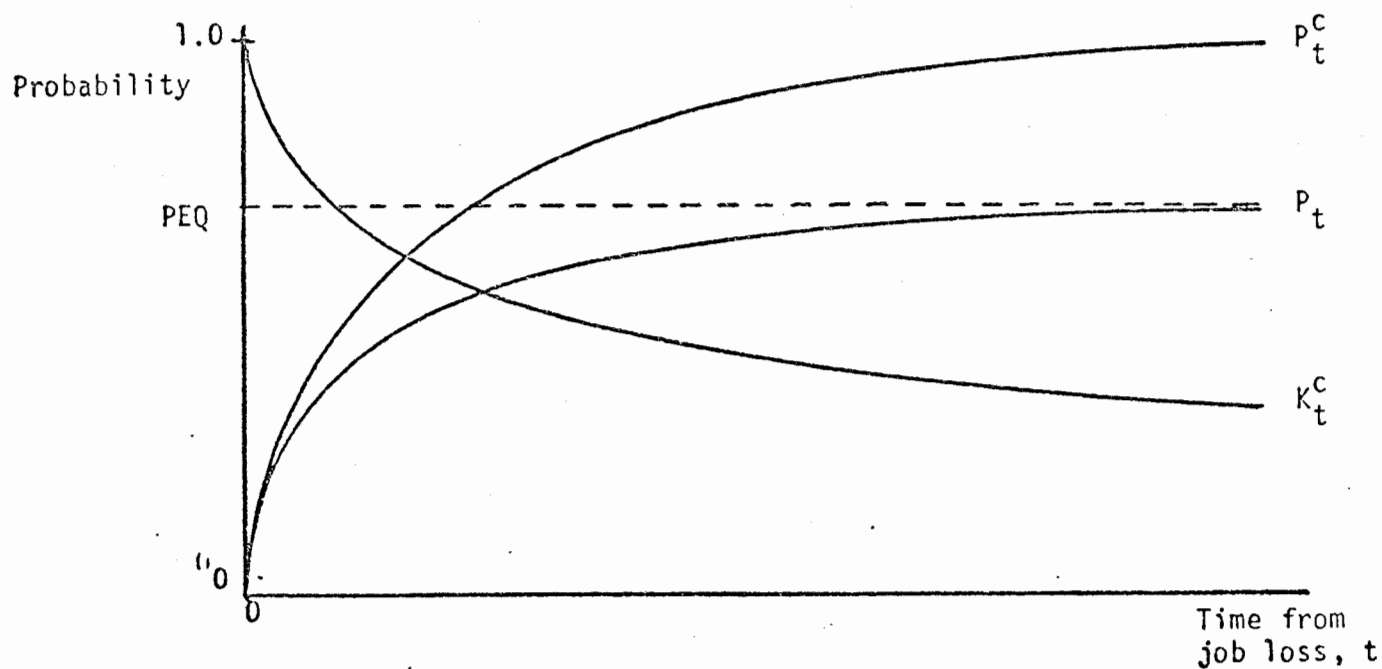


Figure A.2. The Probability of Being Employed at Different Times from Job Loss (P_t)



Two key features of the general equilibrium model are (i) that the economic opportunity cost of any incremental labour is determined by the supply price of those workers who are at the margin of supplying their labour to a specific regional labour market, and (ii) that the regional labour market is divided into permanent and temporary sectors. In the permanent sector workers are employed in jobs that last continuously throughout a number of years, while the temporary sector offers employment lasting less than a year at a stretch. Seasonal and cyclical jobs would be classified as temporary. The marginal labour supply in a region is expected to be found in the temporary sector. Marginal workers--marginal migrants and non-participants--are willing to supply their labour to the region based on the job prospects (the wages and proportions of time spent employed) in the temporary sector. Ultimately it is the changes in labour flows into and out of the temporary sector that brings the regional labour market back to a dynamic equilibrium after a layoff, and hence, determines the economic opportunity cost of employment. The volumes of the net labour flows are not expected to be the same for all types of jobs created or saved. For example, creating a man-year of permanent labour provides a new job for a worker otherwise employed in the temporary sector. The improved temporary sector employment conditions would be expected to attract only one added worker into the region to fill the vacancy in temporary employment. If, however, an additional man-year of temporary employment is created in the region, this absorbs more than one worker of the existing workers in the temporary sector, and hence, can be expected to attract more than one additional worker into the region. (Jenkins and Kuo (1978))

Creating temporary jobs is expected, therefore, to both increase the amount of unemployment in the region and to have a higher economic opportunity cost per man-year of employment (and hence, lower gross labour externality) than

creating permanent jobs, all else being the same.

The concept of the supply price of labour to a region is important in determining the economic opportunity cost of labour in that it allows for wage differentials between regions that reflect differing costs of living and environmental or living conditions. A marginal migrant to a region is a worker who is indifferent to his wage and employment conditions in the region compared to alternative regions after taking into account the cost of living and environmental differences. The supply price of a migrant is therefore equal to the expected value of his time or his expected full income (see equation (3.3)) in that region. The economic opportunity cost of such an additional immigrant equals his supply to that region plus any economic externalities such as changes in tax payments or unemployment insurance receipts due to differences in wages or the proportion of time spent employed between this and other regions.

Two closely related general equilibrium models have been developed for estimating the gross labour externalities of incremental employment: one provides estimates for the creation of new jobs, the other handles delayed layoff cases. For an early version of the new job creation model see Jenkins and Kuo (1978). The layoff model described in Jenkins, Glenday, Evans and Montmarquette (1978) represents an updated version. Over the past year, with the assistance of the Enterprise Development Branch of the Department of Industry, Trade and Commerce, further modifications have been introduced into these models to take into account short-run cyclical effects, specific skill shortages, finite durations for new jobs, and impact of non-average labour-market behaviour of directly-affected workers. Estimates in this study are based on the most recent versions of these models.

(c) An Outline of the Estimating Procedures

In this section the basic steps used in estimating the private income loss of laid-off workers and the partial equilibrium estimate of the labour externality of incremental jobs are outlined. These procedures also generate many of the key parameters required for the general equilibrium model for estimating labour externalities. The procedures are presented in a general form here for some typical sample of labour-force tracking data. In practice different data sources have to be structured according to variations on these procedures depending on the nature of the data set or the demands of the analysis.

Step 1: Establish data base: For each individual in the sample work out the time sequence of labour force experience as a series of episodes of employment followed by unemployment (or non-employed) with all known information concerning reasons for transitions between labour force states, characteristics of the worker, and prevailing labour-market conditions.

Step 2: Estimate major components of the models:

(a) Probability estimates using Probit model:

(i) $P_i = P$ (socio-economic characteristics (SEC), labour-market conditions (LMC), reason for separation from job (RFS), regional dummies (RD), minor components (MC))

where P_i = probability of finding job in the i^{th} interval given that no employment was found in prior intervals.

(ii) $L_i = L$ (SEC, LMC, RFS, RD, MC)

where L_i = probability of losing job in i^{th} interval given that the job was not lost in prior intervals.

(b) Wage rate estimates using single equation ordinary least squares models (or maximum likelihood techniques where wage data is truncated).

(See Glenday (1978b).)

(i) $W^b = W^b$ (SEC, RFS, RD, MC, time (T))

Where W^b = wage rate before job loss

(ii) $W^a = W^a$ (SEC, RFS, RD, MC, T, unemployment duration (UD))

Where W^a = wage rate after job loss in alternative employment.

(c) Proportion of time employed before job loss using OLS"

$P^b = P^b$ (SEC, RD)

Where P^b = proportion of time employed prior to job loss.

Step 3: Estimate minor components of models

Probability estimates using Probit models of following events as a function of SEC, RFS and RD: relocation, temporary non-participation and recall to former employer.

Step 4: Select type of worker, region and labour-market conditions for simulation

Step 5: Calculate Major Component Values

Based on selected SEC, LMC and RD, calculate minor component values and then major component values.

Step 6: Estimate additional model parameters

Estimates are required of the expected levels of UIC benefits, the level of time during which these UIC benefits are expected to be collected; the marginal and average tax rates; the extent of other distortions in labour supply decisions (due to minimum wages or unionization); discount rates (private and social); growth in labour productivity.

Step 7: Enter data and run model

The model estimates the absolute and relative income losses and gross labour externalities over time; durations of employment and unemployment; proportions of time spent at work over time and at the long-run equilibrium. A key feature of this model is the establishment of a Markov chain

transition matrix based on the estimated P_i and L_i values. This transition matrix provides the transition values of the probability of being employed at any time and is also solved to give the long-run equilibrium conditions implied by any set of P_i and L_i values. See Glenday (1978c).

When the above procedures are applied to regional data bases derived from the unemployment insurance records and associated data, the characteristics of the temporary sector of a regional labour market can be estimated. When this information is combined with data from the Census and the Labour Force Survey, the structure of the whole regional labour market can be established. The general equilibrium model combines a number of basic elements upon which to base an estimate of the gross labour externality from a job:

- (i) the structure of the regional labour market;
- (ii) the social opportunity cost of the time of marginal suppliers of labour to the temporary sector of the labour market;
- (iii) the adjustment characteristics of the regional labour market;
- (iv) the characteristics of the incremental jobs; and
- (v) the adjustment characteristics of the types of workers filling these jobs.

APPENDIX B: GROSS AND NET LABOUR EXTERNALITIES AND THE LEVEL OF REMAINING TRADE PROTECTION

Consider a firm or sector which has been induced by means of a subsidy through an Adjustment Assistance Programme to remain in business or expand its output by Q per period using labour (L), capital (K) and materials (M). The domestic market prices for these products and factors are p , w , r and m , respectively. For the sake of simplicity of presentation, constant returns to scale in production are assumed; hence,

$$Q = MPK.K + MPL.L + MPM.M \quad (B.1)$$

$$MPK = r/p; MPL = w/p; MPM = m/p \quad (B.2)$$

and
$$p Q = rK + WL + mM + T \quad (B.3)$$

MPK , MPL and MPM are the marginal physical products of capital, labour and materials, respectively, and T is the net added taxes (corporate, property and other taxes related to doing business less any government grants) paid by the firm. Distortions in the product and factor markets lead to divergences between domestic market prices and the economic opportunity costs for the product and factors. Let p^S , r^S , w^S and m^S be the economic opportunity costs of the output, capital, labour and materials, respectively. The gaps between the economic and market prices lead to the generation of economic externalities from added levels of activity in the distorted markets. In this instance, the long-run aggregate economic externality (E) per period can be expressed as:

$$E = (p^S - p) Q - \{(r^S - r - T/K) K + (w^S - w) L + (m^S - m)M\} \quad (B.4)$$

where $(w - w^S) L$ = gross labour externality generated by the employment (L) in the firm. Here the total economic externality is the sum of the gross externalities in each market. The distortion in the product market $(p^S - p)$ is treated separately and is not included in the factor market gross externalities.

By substituting for Q from (B.1), (B.4) becomes

$$E = \{r + T/K + (p^S - p) MPK - r^S\} K + \{w + (p^S - p) MPL - w^S\} L + \{m + (p^S - p) MPM - m^S\} M \quad (B.5)$$

and from (B.2)

$$E = \{rp^S/p + T/K - r^S\} K + \{wp^S/p - w^S\} L + \{mp^S/p - m^S\} M \quad (B.6)$$

Where $\{wp^S/p - w^S\} L$ = the net labour externality generated by the additional employment (L) in the firm. The distortion in the product market is now reflected in the labour-market externality. The term (wp^S/p) can be interpreted as the economic value of the marginal product of labour. The net labour externality is the increment in value to the economy gained through the employment of additional labour by the firm independent of the additional use of other factors of production.

The effects of tariffs in the product and materials market can now be explicitly introduced into the model. If it is assumed that tariffs τ_Q and τ_M are the only distortions in the product and materials markets, that Q and M are tradeable goods, and that the small country assumptions hold for the markets of Q and M, then

$$p^S = p^W f^S / f \quad (B.7)$$

$$p = p^W (1 + \tau_Q) \quad (B.8)$$

$$\text{hence, } p^S/p = \frac{f^S}{f(1+\tau_Q)} \quad (\text{B.9})$$

$$\text{and } m^S = m^W f^S / f \quad (\text{B.10})$$

$$m = m^W (1 + \tau_M) \quad (\text{B.11})$$

where p^W = world price of Q measured in domestic currency

m^W = world price of M measured in domestic currency

f^S = economic opportunity cost of foreign exchange;

f = market price of foreign exchange; and

f^S/f = factor to take into account the excess economic value of incremental foreign exchange over the market foreign exchange rate. Notice that as the divergence between f^S and f is mainly a function of the degree of distortion of the tradeable goods markets, trade liberalization tends to reduce the gap between f^S and f .

Substituting (B.9), (B.10) and (B.11) into (B.6) gives

$$E = \left\{ \frac{r f^S}{f(1+\tau_Q)} + \frac{T}{K} - r^S \right\} K + \left\{ \frac{w f^S}{f(1+\tau_Q)} - w^S \right\} L \\ + \left\{ \frac{(1+\tau_M)}{(1+\tau_Q)} - 1 \right\} \frac{f^S}{f} m^W M \quad (\text{B.12})$$

$$\text{or } E/pQ = \left\{ \frac{f^S}{f(1+\tau_Q)} + \frac{T}{rK} - \frac{r^S}{r} \right\} \frac{rK}{pQ} + \left\{ \frac{f^S}{f(1+\tau_Q)} - \frac{w^S}{w} \right\} \frac{wL}{pQ} \\ + \left\{ \frac{(1+\tau_M)}{(1+\tau_Q)} - 1 \right\} \frac{f^S}{f} \frac{m^W M}{pQ} \quad (\text{B.13})$$

These expressions for the total economic externality gained from the incremental activity of the firm illustrate two important points for adjustment assistance policy design. First, the net labour externality

decreases, the higher is the level of trade protection in the product market (τ_Q) still remaining after trade liberalization. Second, the higher the remaining level of effective protection (i.e., the higher τ_Q and the lower τ_M), the smaller is the economic externality captured by the economy from inducing the firms about to close to remain in business.

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