

An Economic Critique of Current Technological Change Displacement Techniques

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Article abstract

This study attempts to assess how effective are the present methods employed by private parties for adjusting workers to technological change ; and effective is defined on the basis of the loss that displaced workers are expected to incur. The major conclusion is that if provisions such as advance notice, severance pay, attrition, seniority and bumping, early retirement, reduced work week, joint committees, and retraining are performing effectively it is largely the result of luck and circumstance

An Economic Critique of Current Technological Change Displacement Techniques

David Phillips Ross

This study attempts to assess how effective are the present methods employed by private parties for adjusting workers to technological change ; and effective is defined on the basis of the loss that displaced workers are expected to incur. The major conclusion is that if provisions such as advance notice, severance pay, attrition, seniority and bumping, early retirement, reduced work week, joint committees, and retraining are performing effectively it is largely the result of luck and circumstance.

Technological change may often create economic and, consequently, social problems because of the permanent and frequently abrupt and massive dislocations it causes in labour markets. Unassisted competitive labour markets can generally be expected to adjust to such dislocations, but it takes time for the various prices to signal the required changes, and where necessary for complementary factors to appear. However, the economic and social problems naturally coincide with this adjustment period as many workers become unemployed and/or seriously downgraded. Recognising this problem, the private sector has responded with certain procedures for assisting those workers displaced by technological change, and governments have also been called upon to provide assistance. The present paper attempts to assess how well the private sector provisions actually assist the workers who are displaced.

When assessing the different provisions, emphasis is placed on how *effective* the provisions are in

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assisting those workers who suffer the greatest losses and, hence, pose the greatest economic and social problems¹. Emphasis is not given to indiscriminate and generous offers of assistance paid without regard to the displaced worker's losses. If private assistance provides aid primarily to those who are little harmed by displacement, and gives little or nothing to those who are greatly harmed, then the economic and social problems associated with technological change will persist.

Our contention is that only half the job is completed when we simply take a numerical count of technological change provisions in private sector agreements and then try to evaluate that sector's ability to handle the problems created by technological change. What is also necessary is to evaluate the quality of those provisions with respect to assisting seriously harmed workers.

Many of the specific assistance provisions have been studied elsewhere on a piecemeal basis ; but it is time for all of the information to be brought together so that we can begin to assess the private sector's overall performance in the technological change assistance area. Upon having completed this assessment if it then appears that the private sector provisions have serious shortcomings, then perhaps there is a need to re-think and change them, or to introduce public legislation; and if there is change or public legislation then perhaps this present type of qualitative assessment may be of use in formulating better and more comprehensive private or public assistance policies.

After first setting out a brief definition of technological change in the following section, the remainder of the paper will turn to an assessment of the different private sector provisions.

Definition of Technological Change

Probably the most familiar and commonly accepted definition of technological change would describe it as a qualitative change in the factors

¹ The author has more fully developed and defined a notion of effective provisions elsewhere ; see, David Philips Ross, «The Economics of Privately Negotiated Technological Change Provisions», *I.R.R.A. Proceedings*, 1967, p. 375.

The author would like to acknowledge the helpful discussions and comments of : Professor Alton CRAIG, University of Ottawa ; and George SAUNDERS and Felix QUINET of the Federal Government of Canada. Many of the ideas expressed in this paper were conceived while the author spent the summer of 1969 associated with the Federal Department of Labour in Ottawa, but the Department or the above named are in no way implicated with the results.

of production, or simply a qualitative change in the production function. This is illustrated in familiar two dimensional graphic analysis as a shift in the iso-quant surface towards the origin.² When this type of change occurs there generally is a reduction in demand for some, and occasionally for all of the previously employed factors of production. Examples of this type of change have occurred in the longshoring, and publishing industries.

A broader definition of technological change would encompass the above type of change but would also allow for large and rather sudden changes in consumer tastes that result in shifts in demand for the final output of various firms or industries. This type of change leads to a reduction in demand for all types of previously employed factors of production. Examples of this type of change have occurred in the coal mining, and blacksmithing industries.

It is not important when assessing the effects of assistance provisions which definition of technological change is adopted. A casual survey of collective agreements will reveal references to both types ; although the production function type of change is probably more frequently referred to. It is important, however, to distinguish between technological changes according to whether or not firms are forced from an industry. Firms may be forced from an industry because either the market is shrinking (demand shift), or because new techniques of production, that expand scale, require fewer firms in the market (production function change).

This latter distinction is truly important when evaluating some of the assistance provisions. For example, it certainly affects the usefulness of an attrition, in-plant training, or seniority and bumping clause whether or not the firm shuts down. On the other hand, for a provision like advance notice, post-change survival or shut-down makes virtually no difference to the notice's effectiveness.

In the sections that follow, the reader can assume either the broad or narrow definition of technological change ; but, whenever the death of a firm affects our assessment of provision's effectiveness this will be specifically emphasized.

Current Assistance Provisions

This section contains brief criticisms of some of the popular assistance

² For example see, C. E. FERGUSON, *Microeconomic Theory*, Rev. ed. Homewood, Richard D. IRWIN, 1969, p. 386.

techniques currently being employed by the private sector.³ However, as alluded to in the introduction it would be quite possible for governments to legislate many of these provisions as minimum standards if the private sector were incapable of handling the adjustment problem.

ADVANCE NOTICE

If advance notice were costless to firms, the one might almost expect them to provide notice on a voluntary basis. However, through advance notice a firm may incur costs such as : premature quitting, which means the subsequent necessity of hiring temporary workers ; a decline in morale resulting in decreased productivity, perhaps even sabotage ; and, rival firms may gain important foreknowledge of future plans.

On the positive side, advance notice may provide two benefits. First, it allows the workers time to make personal preparations may involve employment while still being employed. These preparations may involve either searching for work and/or participating in retraining. Second, advance notice gives other bodies a chance to set their programs or procedures in action : in Canada, this may involve the manpower Department's job placement, retraining, or relocation programs ; or, within a company, it may involve a joint committee, or the establishment of a private retraining program. Regardless of the preparations chosen, advance notice should provide a certain benefit by reducing the incidence of unemployment and downgrading at the time the actual displacement occurs.

Unfortunately, the value to the worker of advance notice has never been well documented, and the potential benefits referred to above may in fact never materialize. One of advance notice's possible shortcomings is that workers may simply not believe the notice, and this is especially so when the notice does not single out the individual workers to be displaced or dismissed. However, even when the entire plant is to shut-down, leading to the displacement of all workers, many may still disbelieve an advance notice. A study of a planned steel mill shut-down in Sydney, Nova Scotia found that 38 percent of the work force did not believe the plant would close even after an announcement to this effect had been

³ The frequency of which various provisions appear in collective agreements has been the subject of three separate Canadian surveys, the first of which was carried out by the present writer. Canada, Department of Labour, *Response to Technological Change*, 1967 ; Ontario Department of Labour, *Technological Change Provisions in Ontario Collective Agreements*, 1967 ; and, Nova Scotia, Department of Labour, *Technological Change Provisions in the Manufacturing Industry in Nova Scotia*, no date.

made.⁴ Another study on the closing of a steelwares plant in Toronto also refers to the general atmosphere of disbelief prevailing at the time of the announced shut-down.⁵

Even assuming that workers believe advance notices, there are difficulties that must be recognised and overcome in order to make advance notices effective, and references will be made below to « non-notices » ; that is notices which are planned to be ineffective but nonetheless may fulfil the letter of an advance notice agreement provision.

The reason that advance notice difficulties are given extra treatment in our discussion is that this type of provision is fast becoming a popular minimum standard for legislation by public bodies. For example, in Canada, the Province of Quebec has legislated advance notice, the Province of Ontario is enacting this type of legislation, and it is strongly expected that the Federal Government will include an advance notice provision in its labour legislation program likely to be introduced into the House sometime in 1971. Therefore, it is particularly important to look at the peculiar difficulties that can, if mis-managed, make an advance notice provision little more than gratuitous legislation for public consumption. Of course these difficulties must also be solved by labour and management in their own private contracts as well ; but we are emphasizing legislated advance notice because current governmental concern with it makes advance notice more of a public than a private topic in Canada.

The difficulties associated with advance notice are closely related, but for the purposes of study can be grouped under three separate headings : the length of advance notice, the wording of the notice, and who is to be notified. These difficulties are discussed in turn.

(i) The optimum length of advance notice requires a balancing of the aforementioned costs and benefits. Since advance notice levies costs on the company in proportion to the length of the notice, as the result of premature quits and decreased productivity, it is hypothesized that management's opposition to advance notice will increase with the proposed length of advance notice ; and consequently its co-operation in implementing advance notice will vary inversely with the length. We will emphasize

⁴ CAMPBELL, Douglas and NICHOLSON, John, « The Sydney Steelworkers' Adjustments to Economic Insecurity », a paper read at the Third Annual Meeting of the Canadian Atlantic Provinces' Sociologists and Anthropologists, 1969 (mimeographed).

⁵ BOASE, R. G., *Study of the Closing of a Surplus Plant*, Toronto, United Steelworkers of America, 1966.

below, in connection with particular wording, that it is vital to the success of a notice that management's cooperation be cultivated.

Recognizing then that there are almost certainly some costs to lengthening the advance notice, one should attempt to measure the increased costs against the increased benefits to be gained. As we have stated, the purpose of an advance notice is : first, to allow workers to search for alternative employment ; and second, to allow public and private manpower officials time to prepare their programs. The question therefore is : how much of a gain in benefits can workers and officials achieve with six months' notice as opposed to say three months' notice ? In fact it is quite likely that there is some length at which the benefits of a further lengthening would be zero ; but, yet the burden of uncertainty for the worker would be increased so that on balance all that we may achieve is a lengthening of the period through which workers will fruitlessly worry.

Our survey shows that over 75 percent of the private agreements containing an advance notice provision stipulate lengths of three months or less ; hence this may be some kind of indication of the mutually desirable length, or perhaps the length beyond which management may become quite unco-operative.⁶

In Canada, the recent Prime Minister's Task Force on Labour Relations recommended six months' notice but it gave no basis for this figure.⁷ Six months seems to be a popular round figure but nowhere have I seen its derivation based on any rational cost-benefit approach such as I have suggested. Our survey shows less than 12 percent of the agreements containing advance notice stipulating six months' notice or greater, and only six percent stipulating six months' notice in itself.⁸

Without first examining the benefits or advantages of advance notice there appears to be no rational foundation for a six month figure. Furthermore, the benefits are going to vary according to the size of the displacement, whether the change is in a rural or urban setting, and on the public assistance programs available in that area. It is encouraging to note that the Quebec and Ontario type of legislation at least recognizes the need for variable lengths of notice according to size of displacement, and whether it occurs in a rural or urban setting.

⁶ Response to Technological Change, *op. cit.*, appendix, Table 2.

⁷ *Canadian Industrial Relations — The Report of the Task Force on Labour Relations*, Ottawa, The Queen's Printer, 1969, 195.

⁸ Response to Technological Change, *op. cit.*, appendix, Table 2.

(ii) The second difficulty associated with advance notice evolves from the specific wording or form of any particular notice. Almost certainly, the specific wording of a notice provision and the length of the notice are inversely related and have to be traded off so that the longer the notice, the less specific it will be. In one case study it has been suggested that the wording of the first advance notice was so non-committal that the workers virtually ignored it⁹. Hence, one has to be aware of what I would call the « non-notice ».

What kind of specifics are we talking about? Let us take two hypothetical, but representative notices.¹⁰ In the first case the company states that it : is « reviewing » its organizational policies and that « some changes » may be made in the « near future », but that the company is « intending » to transfer « some » of its operations to another city and that it is also « seriously considering » opening another operation in the present city so that consequently « some » workers may « possibly » be accommodated there. Contrast this notice then with one such as the following : in six months the company is discontinuing its production of zinc grommets only, and fifty positions will be eliminated; however, the firm is opening a new line in a plant to be located in the same city, and will require the services of thirty men there.

Certainly, no person can expect either workers or manpower authorities to act on the first type of notice ; but yet the company can clearly claim that it did give advance notice. Furthermore, we will never know whether in fact the company did act in good faith and truly did not know its plans in any detail at the time it issued its « non-notice ». It will be difficult to incorporate in any agreement or legislation the specific conditions that must be spelled out in an advance at any given time prior to the change.

⁹ BOASE, *op. cit.*, p. 11.

¹⁰ In case the reader thinks that advance notice clauses in collective agreements tend to rigorously specify the format of any particular notice, the following clauses located in a quick reading of advance notice provisions are provided as contrary evidence ; furthermore, these clauses are not atypical.

When it is « anticipated » that there will be . (change), the company will inform the employee or employees concerned and the syndicate at least six months before such layoff will take place, « whenever possible ».

OR :

The employer shall have the right to modify production or introduce mechanization changes or equipment. As « soon as feasible » after any such decision is made, the employer shall notify the union official. (emphasis added).

((iii) Tied in closely with the wording of an advance notice and its length, is the third difficulty of to whom is advance notice given: the union, the work force in general, or the specific workers that are to be displaced? Here again we run into a trade-off problem: generally, the longer the advance notice, the less certain the company can be about the specific workers to be displaced. It is probably expecting too much to assume that the company even knows all the specific positions that are going to be affected by any change, but in the event that it does, positions and men are not the same thing. When there are other assistance provisions in the agreement, even relatively weak but wide-spread ones such as seniority and transfer, the company is absolutely at a loss to determine in advance which workers will ultimately be displaced. This problem is particularly acute in multi-plant firms where multi-plant transfer plans exist. For example, the company cannot foresee that a position designated redundant in say the Montreal plant will lead to the incumbent transferring to the Toronto plant and bumping a worker there for a position that was not designated redundant. While this type of inter-plant bumping may not be frequent, intra-plant bumping which is more frequent presents the same difficulties.

A related type of problem which makes it difficult to specify in advance the workers who are to be displaced occurs when a firm wishes to relocate a limited number of workers to job openings at other plants and is willing to bear all expenses in moving the men. The company begins by estimating that to fill the new jobs it can, for example, offer positions to all workers with 15 years' seniority, but naturally not all will choose to transfer; therefore, in a second round the company offers the remaining unfilled openings to all those with ten years' seniority, and again some will accept and some will reject the opportunity. This process is then repeated until either all openings are filled or all workers have been given the opportunity to transfer. The company will always find it impossible under these conditions to determine which workers are redundant until all transferred positions have been filled, and this can be a lengthy process. Of course it can be said that specific workers have a fairly good knowledge of whether the company is going to offer them a position or not, but nonetheless a good deal of uncertainty is going to be present and especially when the work-force is large, so that consequently it is virtually impossible in advance to specify which workers will be displaced.

These, then, are some of the difficulties that have to be overcome when one considers the effectiveness of an advance notice provision. It will be extremely difficult far in advance to flatly require that in all

instances the company must precisely specify the change, and that it must also notify the specific workers. But nonetheless what should be clearly understood is that there is a trading-off problem, and that if we want greater clarity in all of the specifics of an advance notice then we almost certainly have to reduce the length of the notice. One cannot randomly choose a length and then expect the wording and other contents of the notice to always follow some clear and automatically precise content format. Perhaps recognising this, a series of notices would be appropriate, so that as the length gets shorter the specifics are more sharply defined.

SEVERANCE PAY

Our 1967 survey concluded that almost all (88%) of the severance pay provisions are based on length of service; and this being the case it is not certain, nor likely, that assistance is being given in an effective manner ¹¹

In many cases there is no connection between age or service and displacement losses. This follows because most in-plant training is granted and acquired on a seniority basis so that the older worker, when displaced, possesses the most marketable of skills and the young highschool drop-out two years on his first job possesses no skills. Furthermore, it is small consolation to the drop-out to be told that if he had stayed in school he would not be in such a predicament today.

In circumstances such as these, would it not make more sense to give a larger proportion of any sum designated for severance pay to the young drop-out so that he can acquire some training, and a smaller proportion to the already skilled worker who secures work at the same wage the day following his displacement? This is not to deny that in other cases, especially where emphasis is primarily on physical rather than cerebral skills, age and seniority may be a good proxy for expected loss and, therefore, an application of the usual severance pay – to – service criterion could be an effective means for granting assistance.

Furthermore, we are not suggesting that it is necessarily improper to reward severed senior workers. However, I suggest that it is improper to do this under the guise of a displacement assistance provision; and it is important to recall that all of the severance provisions surveyed referred explicitly to the problem of adjusting to technological change. The indiscriminate granting of displacement assistance tends to blur the fact that the burden of technological change is not automatically borne

¹¹ Response to Technological Change, *op cit.*, appendix, Table 2.

by the oldest, but rather by those that lack education and training; and, unless assistance tends to be scaled to the amount that workers suffer, the economic and consequent social problems associated with displacement will persist under this type of private management. Under the bulk of the agreements surveyed, severance pay today will effectively solve these problems only if seniority and loss are highly correlated. But why should we rely on this chance correlation occurring? It would seem much more logical in those cases where severance pay is granted for assisting displaced workers that it be given in amounts proportionate to the actual loss that will be incurred. And in a later section we will see now a joint committee may be a useful vehicle for assessing these actual losses.

In other instances where it is desired to reward senior workers purely for lengthy and loyal service, or for property rights that they have allegedly built up in the company, a provision can be inserted for this purpose ¹².

A second and closely related shortcoming of private severance provisions is that they are even more frequently scaled to income (96%) than they are to length of service ¹³. Again, viewing this criterion from the standpoint of effectively providing assistance to workers displaced by technological change, I see no reason why expected loss will systematically be positively related to income. In fact, this criterion seems somewhat less defensible than the length of service criterion, since in many cases while one would expect age and expected loss to be positively correlated, one would expect that with few exceptions the reverse would hold for the relationship between present income and expected loss. The normal expectation would be for vice-presidents and professionals to be infrequently harmed by technological change because of their broader knowledge and adaptability.

ATTRITION

This method of assisting workers will create the least amount of featherbedding and cost to the company, and hence be a useful and

¹² The idea of there being an equity or a property right to severance pay has been discussed by Simon ROTTENBERG, «Property in Work», *Industrial and Labor Relations Review*, Ithaca, Vol. 15, April, 1962, 402. See also the interesting article by Vladimir STOIKOV, who attempts to construct an economic rationale for severance pay, «The Allocation of the Cost of Displaced Labor and Severance Pay», *The Journal of Human Resources*, Madison, Vol. IV, Spring, 1969, 192.

¹³ Response to Technological Change, *op. cit.*, appendix, Table 2.

acceptable adjustment technique when : the work force has a high turnover ; the change is planned by the company well in advance of the actual introduction of the new method ; and the skills and workers in the plant are fairly homogeneous. We will deal with these in turn.

Natural turnover may be high if a large percentage of the work force is made up of women or older workers. However, attrition can be artificially increased by providing severance payments or early retirement benefits to older workers.

If the company has planned the technological change some time in advance, then it can « store-up » turnover. It can do this by hiring only temporary workers prior to the actual displacement and by encouraging those eligible to retire to stay on a while longer so that when the displacement occurs, permanent workers, who otherwise would be dismissed, move into the positions formerly held by the temporary workers. This method of « turn-over storage » has been successfully used by a Canadian publishing firm¹⁴. However, one wonders what happens to the temporary workers (normal retirees excepted) ; perhaps to a great extent the cost of technological change is merely being shifted from one group of workers to another. It might be an interesting study in itself to examine the income profiles of temporary workers.

Finally, only if company job openings require skills that are similar to those possessed by the redundant workers will we expect attrition to be a useful adjustment technique. If skills are dis-similar (non-homogeneous), then we get into the problem of retraining, and this raises another distinct assistance technique that we will discuss below. The value of attrition for adjusting to technological change will generally increase with an increase in the number of planned displacements relative to the firm's total employment. Finally, in the case of a plant shut-down attrition will be of no value whatsoever in assisting workers.

SENIORITY AND BUMPING

If one believes that seniority should be a criterion for retention of workers, perhaps on the basis that older workers are the most seriously affected by technological change, then a broad or plant-wide seniority

¹⁴ Pacific Press Limited, Vancouver. This change involved approximately seventy workers, and the total work force numbered in excess of one thousand. See G. K. COWAN, *Proposed Measures to Facilitate Manpower Adjustment to Technology and Other Change : Twelve Selected Case Studies*, a study prepared for the Economic Council of Canada, 1966, p. 47.

rule should be developed ¹⁵. This will be especially so when technological change is of the production function type, because often entire departments or trades are automated out while others remain untouched. This type of technological change does not always cut evenly through all departments or trades, and consequently very senior employees are displaced in some departments although very junior employees are retained in others when a narrow seniority rule is in effect. The classic example of this situation involved that of the fireman on the railroads when dieselization took place.

Given a plant or company-wide seniority rule to protect the senior and aged, it follows that technological change will affect the younger people in disproportionately greater numbers ; and this result may have very serious shortcomings. By using this technique, the costs of technological change are merely shifted from one class of workers to another and there is no guarantee that the one group (the younger) will suffer less loss by being displaced than the other group (the older) since, as we argued in the severance pay section, there is no *a priori* belief that expected loss and age are strongly, or even positively correlated. Therefore, seniority provisions do not automatically protect those workers who will incur the largest losses through displacement. Furthermore, consider what happens if we combine seniority-bumping with severance payments when both are geared to seniority. The younger workers are now doubly disadvantaged since they receive protection from neither provision.

A final observation on narrow seniority units concerns the extent to which they can frustrate attempts to have workers transferred either within a plant or between plants when these transfers are essential for the success of attribution and retraining provisions. According to case studies, the potential effectiveness of transferring workers has been seriously reduced when a worker has had to enter another seniority unit since disagreement has occurred over the extent to which the transferee retained his former seniority rights with respect to promotion and lay-off ¹⁶. The most acceptable solution seems to have been that of placing transferred workers at the bottom of the seniority list in their new unit but to allow them to retain their service rights on such matters as vacations, pensions, and sick-pay.

¹⁵ A broadened seniority provision to be activated only during a technological change was found in 16% of the agreements containing change provisions ; see, Technological Change Provisions in Ontario, *op. cit.*, p. 52.

¹⁶ Arthur KRUGER, *Human Adjustment to Industrial Conversion*, p. 67 : a study prepared for the Prime Minister's Task Force on Labour Relations, *op. cit.* See also, COWAN, *op. cit.*, p. 37.

Yet it is obvious that this solution is not designed to increase the mobility among workers that is so often required to make a firm's assistance policy successful. It is generally the transferred workers who are in direct need of security, since they are giving up all in their home community and casting their future in a foreign one. Generally, it will be much harder for them to endure lay-offs from their new positions than it will be for those workers already settled in the community. In conclusion, there is much to recommend the adoption of the broadest possible seniority unit when dealing with technological change.

EARLY RETIREMENT

Compulsory early retirement is basically a procedure for shifting the cost of technological change from younger to older workers ; and this is more so, the greater the difference is between present earnings and the proposed pension income. Conceptually, early retirement provisions differ little from severance provisions except that in the former it is the older workers who are systematically severed. From a purely economic cost-benefit standpoint one can justify early retirement provisions on the basis that the older worker has fewer working years ahead of him than the younger worker and therefore his expected losses through job discontinuation are smaller. Consequently, if we are granting assistance according to expected losses, the amount of assistance forthcoming will usually be less when the older workers' rather than the younger workers' jobs are discontinued.

On the other hand, if the early retirement pension is made attractive enough it is possible to stimulate a program of voluntary early retirement. This kind of provision is hard to fault on grounds of equity since it is apparent that for workers to volunteer, the compensation (pension) has obviously been made similar in total to the costs that will be incurred by the worker through his displacement.

REDUCED WORK WEEK

This type of provision, sometimes referred to as « employment sharing » could also be aptly renamed « unemployment sharing ». The major shortcoming of this approach is that either all workers must directly suffer through a permanently reduced income as the result of working shorter hours ; or else, by working shorter hours and maintaining the same take-home pay, and hence shifting the cost fully to the company, the reduced hours will almost certainly result in a long-run substitution

of capital for labour and simply aggravate the initial unemployment problem ¹⁷.

The first approach, that of taking reduced income for greater leisure, is a positive solution only if the workers at this particular moment voluntarily desire this trade-off. If they do not, then we have simply spread the cost of technological change among a greater number, which may perhaps be a more equitable solution than letting the cost fall on only a few. A positive feature of reducing hours, at least in the short-run, is that it does permit workers a minimum income during which time some can search for alternative employment.

The limitations of a reduced work week for sharing employment will depend on how flexible a plant's scheduling operations are ¹⁸, and on the adaptability of its capital ¹⁹. A company will not generally be indifferent between ten men working eight hours a day and sixteen men working five hours a day, even though the total daily manhours are eighty in each case. It simply may not be feasible for sixteen workers to be on the floor at one time; and yet to divide up the tasks so that only ten men are on the floor but all sixteen work at least some hours, could lead to complicated scheduling problems that may not satisfy either the workers or the company. Two alternatives are either to buy new machinery for the extra workers, or have extra shifts; but both of these alternatives create extra production costs that will subsequently prompt management to accelerate the substitution of capital for labour.

A reduced work week may be a fairly workable provision for providing workers with a minimum income during short periods caused by a fluctuating demand; but for technological changes involving permanent

¹⁷ For example see: «Repercussions of a Reduction in Hours of Work», *International Labour Review*, Geneva, LXXXIV, July, 1956 p. 23; and Melvin REDER, «The Cost of a Shorter Work Week», *I.R.R.A. Proceedings*, 1956, p. 207. In the long run, reduced hours will only share employment if the elasticity of demand for labour is less than unity. If the elasticity of labour demand is greater than unity, then employment opportunities are destroyed. In both cases we assume that the weekly take home pay remains unchanged after the hourly change.

¹⁸ See for instance, Allan CARTTER, «Discussion of the Economics of the Shorter Work Week», *I.R.R.A. Proceeding*, 1956, p. 224.

¹⁹ For a discussion of adaptability, see; George STIGLER, «Production and Distribution in the Short Run», *Journal of Political Economy*, Chicago, Vol. 47, June, 1939, 305.

large displacements, its usefulness will always be severely limited, and in the case of a plant shut-down this technique is absolutely useless ²⁰.

JOINT COMMITTEES

A joint consultative committee is perhaps more a procedure or a means rather than an end in itself, but its merits are examined here because of the widespread use of this approach ²¹. Almost without exception, the case histories of successful automation adjustments in Canada have included the role played by a joint committee ²².

However, the joint committee approach is only likely to be superior to traditional crisis collective bargaining if the proper attitude is attendant ; this attitude being that summed up by the assistance-for-loss criterion stressed throughout this paper. Given that workers should be compensated according to their income losses, the joint committee method is likely to develop a more effective program than the traditional collective bargaining method because of several advantages. These advantages are : joint committee deliberation is more timely, so that the relevant conditions surrounding the technological change, including expected worker losses, are better known ; a joint committee is able to concentrate its attention on a single problem, and the almost total absence of an atmosphere of trading-off issues may further lead to the co-sponsorship of more objective, impartial, outside research ; and finally, in Canada, only a joint committee can take advantage of the substantial finances and research facilities provided by the Federal Government's Manpower Consultative Service.

It should be stressed however, that a consultative joint committee is only effective when it is a vehicle for transmitting sincere management adjustment intentions. If this sincerity is not present, then a joint committee likely only represents a conspicuous show played out for the benefit of the workers and the public ; that is it is probably part of a highly visible public and employee relations program. Under these latter cir-

²⁰ The relative inefficiency of a reduced hours provision is perhaps the reason why it is seldom employed by the private sector. Each of two surveys only found four agreements containing this type of provision, out of a total of 471 and 1,078 agreements respectively for the two surveys ; Response to Technological Change, *op. cit.*, appendix Table 4, and Technological Change Provisions in Ontario, *op. cit.*, p. 67.

²¹ For example in our Federal study, there were as many agreements containing a joint committee provision (51) as there were containing advance notice, and these were the two provisions most frequently found ; Response to Technological Change, *op. cit.*, appendix, Table 5.

²² For special emphasis see, COWAN, *op. cit.*, p. 48.

cumstances adjustment might as well be relegated, with the other issues, to the regular collective bargaining period when bargaining power determines solutions, since it is very unusual for the union to have any power, other than management's good will, through the joint committee provision itself²³. Because of this, in most cases if not all, where joint committees have been successful, the parties have discussed not only the make-up of a joint committee during prior open period negotiations, but also the types of provisions that would be acceptable and available to make up an effective assistance package in light of the peculiar conditions at the time of the technological change. Without an overall prior understanding of the extent of the firm's commitment to assistance the consultative joint committee may not function well since it will be attempting to play « a trading-off power role » more suited to regular negotiations.

RETRAINING

This subject is too involved for a short note here, and this section contains only a brief listing of some of the possible trouble areas associated with private retraining provisions²⁴.

First, as with most private assistance provisions (the exception being advance notice) retraining will not likely apply in the event of a plant shut-down, since if the firm is bankrupt, the agreement and its provisions become dead.

Second, if the technological change is an overall labour saving type that creates no, or not enough, new jobs for existing workers in a plant, where will the proposed trained workers go? They will obviously have to go to other industries; but then this raises the question of what interest union and management can expect to show in retraining workers that are leaving their employ and jurisdictions. The possibility is surely present that training will be nominal and superficial, and hence ineffective as a means for providing assistance. On the other hand, if the workers are going to be retained by the firm, both it and the union will have a vested interest in the trained workers and training will likely be more substantial and relevant.

²³ In our survey only five of the 51 committees had arbitration (4) or strike (1) as the means for settling any differences; Response to Technological Change, *op. cit.*, appendix, Table 5.

²⁴ For a fuller discussion one may consult a paper the author read at the Third Annual Meeting of the Canadian Economics Association, Toronto, 1969; « Some Analytical Topics in the Economic Theory of Private Retraining, and Their Implications for Government Manpower Policy ». (Mimeographed).

Third, when there are elements of cost-sharing involved, or as is likely, when employees are selected for training on the basis of present education and ability, the workers that are excluded are more likely than not to be those that are in the greatest need of assistance, such as the handicapped and uneducated poor. Hence, these workers may turn out to be neglected completely in the excitement of establishing a training program for the not so unfortunate ; but in any event, retraining is of no use in providing assistance to them.

Finally, a good deal of retraining makes economic sense, just as investment in physical capital and plant does²⁵. However, retraining provides a pay-off that substantially spills over beyond the individual decision making firm to the worker and society in the form of increased productivity and incomes, and lower prices²⁶. But, in such circumstances when social benefits significantly diverge from private benefits we cannot expect individual firms to provide training in optimum quantities.²⁷ Hence, one can argue that training sponsorship should become a ward of the public sector.

In sum, then, a good case can be made for transferring the sponsorship of a considerable amount, or all, of retraining to governments. As illustrated, there are several reasons why private retraining schemes may not provide either the desired quantity or quality of retraining, and hence the effectiveness of retraining as an assistance technique may be seriously reduced if left in the hands of the private parties.

Conclusion

Whatever else private party assistance provisions may do, if they do not significantly solve the economic and consequent social problems

²⁵ There have been numerous studies attempting to measure the rate of return on retraining. Two useful surveys containing many of the results of these studies are : HARDIN « Benefit-Cost Analyses of Occupational Training Programs : A Comparison of Recent Studies », in SOMERS and WOOD (eds.), *Cost-Benefit Analysis of Manpower Policies*, Kingston, Queen's University Industrial Relations Centre, 1969, p. 97 ; and SOMERS (ed.) *Retraining the Unemployed*, Madison, University of Wisconsin Press, 1968.

²⁶ However, as Garry BECKER has demonstrated, firms will voluntarily undertake to sponsor some training if it has a high job-specific content ; or in other words when there is not a significant divergence between social and private benefits. See his *Human Capital*, New York, National Bureau of Economic Research, 1964, chapter 2.

²⁷ See for example, A. P. LERNER, *The Economics of Control*, New York, The Macmillan Company, 1949, chapter 2 ; or R. A. MUSGRAVE, *The Theory of Public Finance*, New York, McGraw-Hill, 1959, chapter 1.

associated with technological change and worker displacement, then something else will have to take their place. This paper has attempted to discuss how well the private sector provisions are likely to alleviate these problems ; and the conclusion is that if the private sector provisions are working effectively then it is largely due to luck and circumstance.

First, this conclusion is reached because assistance is generally not systematically related to a worker's losses incurred through displacement or downgrading, while the economic and social problems are. Instead, assistance is generally systematically related to seniority (severance pay and lay-off procedures), which depending on circumstances may or may not be related to loss.

Second, some provisions do not provide a net benefit but merely shift the displacement costs onto either older (early retirement), younger (seniority), or temporary (turnover storage) workers ; and, again, there is no *a priori* belief that these workers are systematically less harmed by displacement than others.

Third, some provisions such as advance notice are just badly thought out so that no recognition is given to the fact that length of notice and its specific contents are related ; and, there are several instances where advance notice gives workers no meaningful notice or assistance at all.

Fourth, some provisions have been adopted that were plainly designed for other circumstances (reduced hours), and simply are ineffective for granting assistance when a permanent displacement of workers occurs.

Fifth, some provisions (retraining) which may be effective in private hands will almost certainly be enhanced if taken over by the public sector.

Finally, only under unusually mature and far-sighted private party relationships will any of these provisions be of value in the event of a plant shut-down ; yet plant shut-downs are clearly one of the most significant and visible contributors of the economic and social problems associated with technological change, and this is particularly so when the plant is located in a small town or village.

In conclusion, it is suggested that the private sector could rectify most of their provisions' shortcomings by systematically granting assistance according to loss, rather than to other irrelevant criteria. However, there are, as argued above, several shortcomings that it is unlikely the private sector can overcome, and hence there may be a need for public legislation in this increasingly important area of adjusting to technological change.

CHANGEMENTS TECHNOLOGIQUES ET TECHNIQUES DE LICENCIEMENTS

Cet article vise à évaluer l'efficacité des moyens utilisés par les parties contractantes dans le but d'atténuer les effets des changements technologiques pour les travailleurs. Et l'efficacité, il faut ici la considérer en fonction des pertes que les travailleurs licenciés peuvent encourir.

La conclusion ne pourra être que la suivante : si les clauses relatives aux préavis, aux indemnités de licenciement, à l'usure des effectifs, à l'ancienneté, à la supplantation, à la retraite anticipée, à la réduction de la semaine de travail, aux comités mixtes et au recyclage ont quelque valeur, c'est surtout l'effet du hasard ou d'un concours favorable de circonstances.

On peut arriver à pareille conclusion d'abord parce que l'aide qu'on leur apporte est bien loin de toujours équivaloir aux pertes subies par les travailleurs touchés par le déplacement et la rétrogradation. Bien au contraire, elle se rattache presque toujours à l'ancienneté (indemnité de départ et modalités de la mise à pied) qui, au gré des circonstances, peuvent ou non avoir quelque équivalence avec la perte encourue.

En second lieu, certaines clauses ne procurent aucun avantage tangible, mais se contentent de déplacer les coûts, soit sur les travailleurs âgés (retraite anticipée), soit sur les jeunes travailleurs (ancienneté), soit sur les ouvriers temporaires (réserve de main-d'oeuvre), et, au surplus, il n'y a pas le moindre indice que ces travailleurs soient moins lésés que d'autres par le licenciement.

Troisièmement, des dispositions comme le préavis manquent souvent d'imagination au point de n'accorder aucun poids à la relation qui devrait exister entre la longueur du préavis et ses implications concrètes sur les travailleurs. Aussi, y a-t-il nombre de ces préavis qui ne sont d'aucune utilité pratique pour les travailleurs.

Quatrièmement, les dispositions spéciales prévues pour des mises à pied de courte durée (la réduction des heures de travail) manquent totalement d'efficacité lorsqu'il se produit un licenciement permanent.

Cinquièmement, des clauses (le recyclage) qui pourraient avoir de la valeur si elles étaient appliquées par les parties seront renforcées si elles passent au secteur public pour fin d'application.

Enfin, ce n'est que s'il existe entre les parties un régime de relations bien rodé, tourné vers l'avenir, ce qui est inusité, que l'une quelconque de ces dispositions pourra s'avérer de quelque valeur dans l'éventualité de la fermeture d'une usine. Et pourtant, les fermetures d'usines sont sûrement l'un des phénomènes importants et bien visibles d'où surgissent les problèmes sociaux et économiques reliés aux changements technologiques, et la chose est encore plus apparente quand l'usine est installée dans une petite ville ou un village.

En guise de conclusion, qu'il suffise de suggérer au secteur privé de corriger les imperfections de ces dispositions de manière qu'elles puissent apporter une assistance proportionnée à la perte encourue, au lieu de se référer à des critères hors de portée. Toutefois, il y a, tel qu'indiqué ci-dessus, plusieurs failles que le secteur privé est vraiment impuissant à surmonter et, à l'avenir, il faudra que la loi intervienne pour imposer des solutions valables pour contrer les effets malencontreux des changements technologiques.