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Worker Cooperation and Technical Change

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Executive Summary

Worker cooperation with technical change has been linked with economic success in countries such as Germany and Japan. Can Canadian companies achieve this cooperation? Evidence suggests that workers will cooperate for the good of the team if they are allowed to share in the rewards of cooperation.

- Early attempts to achieve economic success by running firms as if they were markets used piece-rate pay systems, whereby workers are paid a fixed amount for each unit produced. Theoretically, under this scheme, workers will cooperate with any technical change that will result in more units produced in the given time, and, thus, higher pay. However, the piece-rate system was generally unsuccessful because of 'rate busting' by management and fear of job loss.
- Several lessons can be learned from the experience with piece rates. First, workers will cooperate if they can share in the rewards of cooperation. Second, management credibility is essential for worker cooperation; promises must be honoured. And finally, there must be trust; workers must know that they will not be harmed (e.g. loss employment) by a technical change.
- Evidence indicates that multi-skilling is the approach that best achieves worker cooperation with technical change while lowering the incidence of costly turnover. There are excellent examples of this route to trust and cooperation. The successful 'Japanese System' involves multi-skilling and, although their labour market has a unique character, their use of job rotation to multi-skill is not unique to their system. Two North American firms, Lincoln Electric and Gulflands, although working in a much different labour market from Japan, have also achieved worker cooperation through multiskilling.
- Lincoln Electric has a piece-rate incentive system, guaranteed employment, and involuntary multi-skilling. Their employees enjoy average wages twice the going rates for similar production work. Their method of sharing the rewards of cooperation has resulted in low turnover rates and has enhanced their ability to keep their technology secret. The company is now one of the most successful in the world.
- Gulflands introduced job rotation and increased wages in a new management system, which they called 'Team Concept'. Although the new system was not popular at first, eventually production levels increased dramatically and there was a precipitous drop in grievances, absenteeism, and lost time accidents.
- Policies need to be developed to move Western economies towards more cooperative labour relations. Although there is no easy way to foster such cooperation, case histories of successful firms indicate that policies should encourage multi-skilling through job rotation and sharing with the workers the benefits of cooperation.

Introduction

The word 'partnership' has begun to appear more and more in studies of Canadian international competitiveness.¹ One reason, surely, is the great economic success of countries like Germany and Japan, where worker cooperation with management seems to be the norm. Another, at the other extreme, is the spectacle of Western firms apparently squandering their geographical advantages in endless labour conflict.

The contrast in labour relations is quite apparent in the statistics. Okuno (1984) reports on a survey of worker suggestions for improving productivity in Japan. Nearly 600,000 workers were involved from 427 Japanese corporations in 1980. Approximately 23 million suggestions were received (more than 38 per worker), of which fully 72 percent were adopted. Figures for Western suggestion plans (Shoenburger 1986) are about one per year for every six workers. Even 'Scanlon' type plans, where the savings from implemented suggestions are placed in a fund and distributed among the employees, do only slightly better — about one suggestion per year for every two workers.

While it is often very hard to create a cooperative attitude, there have been some remarkable success stories.

This essay will explore the relationship between worker cooperation with technical change and international competitiveness. It will outline the reasons why worker cooperation is important, how it is (and is not) obtained, and assess the likelihood that Canadian companies can achieve it. The conclusions are not entirely pessimistic. While it is often very hard to create a cooperative attitude where there was none before, there have been some remarkable success stories. New companies are also in a position to get it right from the very beginning, and many are doing so. However, there are also some aspects of the Canadian labour market, in particular its high turnover rates, that will ultimately make worker cooperation more difficult to achieve here than in some other countries.

The paper will cover first of all some of the history and history of thought about worker cooperation. It then covers some economic concepts which are useful for the subsequent discussion. In particular, economics has a rather precise way of talking about 'trust', something that is clearly necessary for cooperation. We will then build some simple theoretical models to help understand the ways in which worker cooperation can be fostered. Finally, we will study some case histories and other data in an attempt to evaluate the models, and assess their relevance for the Canadian economy.

Background

In the Western economies, ever since the industrial revolution, growth and conflict have come together. Many people tend to blame unions, or union leaders, for this, but unorganized workers also oppose technical change when they fear it will lead to job losses. Bok and Dunlop (1970) cite some examples:

In 1579 the hapless inventor of a weaving machine was ordered strangled by the Council of Danzig on the ground that his device would reduce many workers to beggary. John Fitch, inventor of the steamboat, recorded in his memoirs that when in 1787 he appealed for financial support, he was treated 'more like a slave than a freeman', and was 'obliged to suffer . . . indignities from my landlord, and be henpecked by the women'. When John Kay invented the flying shuttle in 1733 he was forced to leave England; workers invaded Hargreaves' home in 1768 and destroyed his spinning jennies; and Crompton, who invented the spinning mule in 1799, was forced into hiding as a reward for his work.

To this list we could add the first recorded case of sabotage,² when workers in Holland threw their wooden shoes ('sabots') into a mechanical Jacquard loom that had displaced them from their jobs.

Each innovation creates a small group of very big winners, but it also creates a group of losers.

Technical change does not immediately benefit everyone. Each innovation creates a small group of very big winners (the owners of the innovating firm), but it also creates a group of losers (the displaced workers, if any, and the competition). The rest of us benefit from the lower prices that prevail afterwards. As a broad process, technical change is good for all of us for the simple reason that it makes it possible to produce more outputs from the same inputs. But it seems inevitable that each individual step in the process will be opposed by somebody. Noting this, some observers have suggested that the great advantage of the Western capitalist system is that the people who oppose technical change do not normally have the power to stop it.³

This argument seems valid for what are called 'product innovations' — new products or completely new ways of manufacturing old ones. A new company with a better product will usually succeed. But there is another whole category of technical change known as 'process' innovation. This includes the small, incremental improvements to existing machines and techniques that in aggregate can lead to dramatic reductions in the cost of producing a given product. This is the type of innovation for which the Japanese are famous, and for which worker cooperation is essential.

Suppose that a worker at a large firm comes up with an idea for a cost-saving change in techniques, and she is considering whether she should tell anyone about it. There is a suggestion box in the coffee room, but she is aware that if the suggestion is implemented it may lead to a reduction in the demand for her skills or those of her co-workers. The worker might well decide she is better off keeping the idea to herself.

Similarly, the cooperation of workers may be essential for the evaluation of a new labour-saving process instituted by management. For example, a firm may want to increase the productivity of its painting crew by issuing it a newly designed paint sprayer. The workers will discover quite quickly the effectiveness of the new machine. But they may not reveal this information (by using the machine effectively) if they suspect that its adoption will reduce the demand for painters.

If there were a functioning 'market for ideas', then none of these problems would arise. A worker with a good suggestion could just go out and sell it to the highest bidder, and all the good ideas would be implemented. But ideas are pure public goods, and are thus very difficult to sell. In order to convince a buyer that the idea might be useful, the worker would first of all have to reveal it. But at this point the buyer no longer needs to pay for it.

Rewards for good ideas are not automatic — they depend on management. This is the key to the understanding of worker cooperation.

There would also be no real problem if there were a competitive market for the output of each worker. If workers were all autonomous crafts people selling output to each other and to the public, then any innovation made by one would not affect the price of output, and the gains from the improvement would accrue to the innovator.⁴ Needless to say, workers in today's corporations do not fit this description. Often their individual output is not even identifiable, and their remuneration depends on decisions made by a bureaucratic management. It follows that rewards for good ideas are not automatic they depend on management. This, it turns out, is the key to the understanding of worker cooperation.

To see this most clearly, we can consider some early attempts to run firms just as if they were markets. Under this scheme, known usually as piece rates, workers are paid a fixed amount for every unit or piece that they produce. If they discover a way to produce more, or if they just decide to work much harder, they should in principle be paid more. Workers should cooperate with technical change and be willing to initiate the process themselves.

Piece rates have been quite unsuccessful over the years, and have all but disappeared in manufacturing.⁵ They survive only in the apparel industry and in commission sales. It is not that workers do not respond to the incentives inherent in the use of piece rates. Rather, the problem is that the piece rate is not the outcome of some anonymous market

process. The piece rate is set by the firm, and firms seem incapable of keeping the piece rate fixed if workers start earning too much money.

Suppose that management wants workers to start producing a piece that has never been made before. Managers will have to guess the appropriate rate. If the workers discover that the rate is too low for them to make a decent wage, they will surely make the firm aware through complaints and quits. Thus the firm will be forced to revise the rate upwards. However, if it is set too high and workers respond by working extra hard to earn extra money, the firm will want to reduce the rate. This is known as 'busting the rate', or the 'ratchet effect'. Knowing this, workers will deliberately slow their pace so as not to earn too much money. Paradoxically, the higher the rate is set, the slower the workers will work. Individuals who 'break rank' by working too hard may be harassed by their colleagues,⁶ since high output from even one worker will reveal the ease of the job, and lead to all the workers having to work harder when the piece rate is reduced.

In this environment, it is clear that a new idea that occurs to a worker is unlikely to be implemented. If the idea leads to more earnings, the piece rate is just reduced by the firm. If management observes the workers at all, then the idea cannot even be used to give the workers more leisure time on the job. Management will observe the change in techniques, require all other workers to adopt the change, and then reduce the piece rate.

In practice, management often promised never to cut the piece rate. Clawson (1980),⁷ after a discussion of several case histories, states:

Almost all employers claimed they would never cut a price once it was set, yet every employer did cut prices. Unless workers collectively restricted output they were likely to find themselves working much harder, producing much more, and earning only slightly higher wages.

It seems possible that workers could, through collective bargaining, have obtained an explicit commitment from the firm to maintain piece rates. However, in practice it always seemed possible for the firm to avoid this in some way. Clawson again:

Employers could cut rates in dozens of ways other than changing the piece price for a worker who continued to perform the same operation. New workers could be assigned to the job at a lower rate while the old workers were transferred elsewhere, information about output on one job could be used to lower the initial price on new work, and any sort of minor change could be made the excuse for large price cuts.

Workers will cooperate for the good of the team if they are allowed to share in the rewards of cooperation.

There are several lessons to be learned from all of this experience. First, there is no evidence that workers are naturally uncooperative. Workers will cooperate for the good of

the team if they are allowed to share in the rewards of cooperation. They will not cooperate with changes that put them in danger of losing their jobs, or that will make them work harder with no commensurate increase in pay. Neither would any manager.

Second, the experience with piece rates indicates that worker cooperation depends very much on the behaviour of management. This is a useful and even optimistic observation. It means that management should be able to get worker cooperation, if it wants to, by changing its own behaviour.

Finally, this experience highlights the importance of trust. Workers will reveal new ideas and will cooperate more generally with technical change if they believe they will not be harmed by the process. Since their salaries and employment depend on the decisions of management, they must believe the promises of management. Management's problem is to build this trust among workers. We shall see in the next section that trust is a well-defined concept in economics, and the study of some explicit models can suggest precisely what is needed for the building of trust.

Promises and Trust

Freedom of choice is normally thought to be a good thing. There are situations, however, where less freedom is better. This is the case when we make a promise. Often, a promise to restrict one's own behaviour in the future can be exchanged for something today. The ability to limit one's future freedom of choice with a promise therefore has value in exchange. And the value of the promise depends on the credibility of the giver or, alternately, the trust placed in him by the receiver.

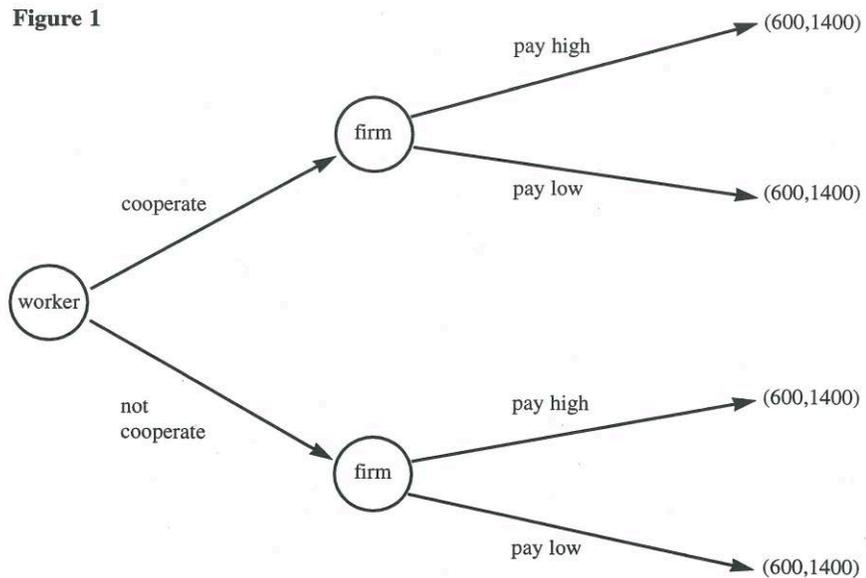
Illustrations of the importance of credibility abound both in and out of the economic context. For example, a union's promise not to go on strike for the duration of the contract can be exchanged, in Canada, for higher wages or other benefits. In Britain, the courts will not enforce a no strike clause, believing it to be an unjustified restriction on the rights of workers. It follows that a British union's promise not to strike cannot be exchanged for anything — even something the workers would find more valuable than their right to strike. In another context, it was often argued during the Cold War that the US submarine fleet was a necessary part of its nuclear deterrent since ground-based missiles could be taken out in a surprise attack. But if you were a submarine commander and a successful attack had just been launched, would you use your missiles to blow up the rest of the world, or would you surrender and learn to speak Russian? The deterrent effect of the submarine fleet is small, although it might have been quite useful in launching a first strike.

Management credibility is essential for worker cooperation because it is management that determines the worker's pay.

Management credibility is essential for worker cooperation (rather than the other way around) because it is management that determines the worker's pay. The worker is asked to provide a commodity (effort, information, cooperation) now, in exchange for a promise of higher pay. But there is no court observing this exchange and no recourse for the worker (except to quit) if the firm does not keep its promise.

These ideas can be expressed more precisely with reference to Figure 1. The diagram is a representation of what is called an extensive form game. It is a collection of 'nodes' connected by arrows. This game has two players — a worker and the owner of his firm. The worker's decision, at the leftmost node, is made first. If this decision is to cooperate, the firm finds itself at the topmost node. If not, the firm is at the bottom-most node. The firm's decision determines the payoffs received by each player. These are represented by the ordered pairs on the right. The first element is the reward received by the worker and the second is received by the firm.

The payoffs as illustrated fit the situation where there is labour-saving technical change. If the worker cooperates, the total payoffs are \$2,000, while if he does not the total is only \$1,000. But the worker's skills are in less demand after the change, so the firm does not have to pay him as much to keep him from quitting.⁸



Suppose the owner makes the following proposition to the worker. 'I want you to cooperate. If you do, I will give you \$600. If you don't, I will pay you the least I can, which is \$500. I am willing to do this because I know that if you cooperate I will get \$1,400, while if you don't, I will get only \$500.' Would you, as the worker, believe this promise?

Your employer might be an honourable person and might keep her word. But if she is only interested in maximizing profits, she will not keep her promise. For if you do cooperate, she will find herself at the topmost node, choosing between \$1,400 and \$1,600. She will choose the latter, giving you \$400. All of the evidence on firms 'busting the rate' is consistent with this behaviour. Your optimal choice is to be uncooperative, receiving \$500, rather than to cooperate and receive \$400. It is management's inability to make a credible promise that dooms it to a return of only \$500. Worker cooperation is the responsibility of management.

Perhaps workers could be trained in such a way that their skills become more valuable if technical change occurs.

Of course if the worker and the manager were to trade places, the same thing would happen. The problem is not one of personalities. Rather, it is simply that the payoffs are wrong, and the way to get cooperation is to change the payoffs. For example, perhaps workers could be trained in such a way that their skills become more valuable if technical change occurs. In this case the firm's promise to pay them more would be credible, and cooperation might be achieved.

Another, slightly more complicated suggestion, would be to recognize that in real life the game does not end after just two decisions. Workers will get more chances to innovate in the future. If the firm at the topmost node pays \$600, workers may respond by cooperating with the next innovation as well. (If the firm pays only \$400 they certainly will not.) Thus to really understand why Western firms fail to reward workers for their past cooperation, we need to know why they do not value the prospect of future cooperation. The next section explores both of these avenues in order to discover the route to worker cooperation.

Multi-Skilling and Worker Turnover⁹

If you make a promise and people do not believe you, what do you do? Sometimes your powers of persuasion will rise to the task, but if they are insufficient you may have to make an explicit commitment. Legal contracts are perhaps the best example of this. A legal contract is a promise with penalties for liars. If you do not follow through, the

courts can impose punishments that will make you wish you had. The knowledge of these penalties makes your promise much more believable.

The legal system is expensive, however, and there are limits to its abilities. It would be very hard to prove, for example, that a worker had a good idea but did not tell anyone about it. Similarly, it would be hard to establish that a worker had been laid off due to labour-saving technical change rather than due to a decline in business conditions, or for disciplinary reasons. Firms also have various ways of inducing workers to quit. The experience with piece rates is again instructive — even a negotiated agreement not to cut rates was ineffective.

Sometimes, when you make your promise, it is possible to take an action that will make your promise more credible. Suppose, for example, that you have promised a friend that you will meet her on Friday night at a concert. You are an unreliable sort of person, and your friend does not believe you will show up because there is another concert on at the same time. One thing you might do, if you really do intend to go, is to buy a ticket and show it to your friend. This is an investment that has value only if you keep your promise.¹⁰ On Friday afternoon when you are deciding whether or not to keep your word, honesty costs you nothing while dishonesty costs you a ticket for the other concert.

Firms can make a commitment to their workers through training and retraining.

Firms can make a similar kind of commitment to their workers by training them in a particular way. One important aspect of process innovation is that it does not always reduce labour demand at all of the jobs within the firm. Some jobs are eliminated, but the overall cost of production falls so that the firm may be able to sell more output. If so, the demand for workers at other jobs will rise.

This brings up the issue of retraining. Surely the firm could get the cooperation of its workers by promising to retrain those workers whose jobs are lost. But this is just another promise, and it may not be a credible one. Suppose the painter from our earlier example had been told she would be retrained for a job as a welder if her job disappeared. Once technical change has occurred, the firm may keep its promise, but it may also let her go instead and hire another welder on the open market. In fact, since the new welder and the former painter will eventually have to be paid the same wage (the going rate for welders), it will always be cheaper for the firm to hire outside. This avoids any retraining cost, and the firm gets a fully skilled welder right away. In general, a promise to retrain workers affected by technical change is not credible when there are ready trained workers available for the new jobs on the outside market.

But now suppose that this firm practices regular job rotation. Workers become multi-skilled — able to perform many different jobs at the firm. This time, when the firm is

considering hiring a new welder from outside, it will have surplus workers from the paint shop who already know how to weld. It will now be in the firm's short-run interest to transfer its own workers (or, since they rotate jobs anyway, just to have them spend more time welding and less painting). Multi-skilling through regular job rotation can make credible the firm's promise to share the benefits of process innovation with cooperative workers. Management has 'bought the ticket already' by paying the training costs beforehand.

Multi-skilling and job rotation have other benefits,¹¹ but there are also costs. Most important is the extra time that must be spent learning new tasks, and the time other employees must spend teaching. Workers can only do one job at a time, even if they are skilled at several. The firm must therefore value cooperation highly if it is going to institute multi-skilling. Many Western firms, it appears, do not.

We have already given workers the benefit of the doubt by arguing that their lack of cooperativeness was not due to mean spirits, and it is only fair to do the same for management. Managers are not by nature more myopic and greedy than other people. They should be aware, by the nature of their business, of the benefits of worker cooperation. Why do they appear so shortsighted, and, even more important, why does management in Japan appear to be so farsighted?

Investing in workers is a risky business.

Investing in workers is a risky business. Suppose you were self-employed with a small business and no employees. Business has grown to the point where you would like to expand by hiring some people. There are three aspects to your work (production, sales, and accounting, say), and you want to hire three people. Should you hire three specialists and assign one to each job, or should you hire three generalists and rotate them from job to job? The latter case will involve more in training costs, but, if our arguments so far are right, should make for more cooperative workers.

Most entrepreneurs would never multi-skill in this case. Indeed, they might break up their production process purposely, so that no employee could ever learn the whole thing. The reason is that once a worker learns the entire process, he becomes a potential competitor. He can leave, set up his own operation, and start to take business away from his former boss.¹²

What about larger firms? Here, even if a worker is competent at several jobs it does not seem likely that he will be able to start up a competing firm. Indeed, in a very large company it is doubtful that anyone knows the entire operation well enough to start up an identical competitor. The same problem still arises, however, in a different way. Again, the experience with piece rates is instructive. Many observers still express disbelief at what they perceive as the stupidity of management during this episode in Western

economic history. Could they not see that cutting a piece rate meant no more cooperation from workers forever? How could they have been so shortsighted? Suppose, however, that a firm had decided to follow the rule that piece rates would only be reduced if management instituted a productivity increasing change in techniques. Worker-initiated change would never lead to a cut in rates. Furthermore, suppose the firm followed its rule wholeheartedly, and workers did cooperate.

However, as always happens, some workers leave the firm for another one, and they bring their knowledge of worker-initiated changes with them. The new firm is not obligated to abide by the old firm's agreement. If the worker is willing to reveal his knowledge to the new firm (in return for a promotion, perhaps, or just the offer of a job in the first place), then the new firm can produce with the same techniques but pay lower rates. It will compete successfully for the first firm's business, and the first firm may find itself having to sell at a loss in order to match prices without 'busting the rate'. Worker turnover, or more precisely the inability to keep knowledge of production techniques within the firm, can account for some of Western management's apparent shortsightedness.¹³

Competing firms, and eventually consumers, get the benefits of worker cooperation, but do not pay all of the costs.

There is a genuine externality here. Competing firms, and eventually consumers, get the benefits of worker cooperation, but do not pay all of the costs. This suggests that there may be a role for welfare improving policy. This potential will be discussed later. Before this, we will cover some of the evidence relating to the ideas covered so far. If our ideas are right, worker cooperation should be found where there is multi-skilling and where knowledge of production techniques is slow to diffuse. The latter condition may be associated with low turnover rates.

The Evidence

We shall study two kinds of evidence to see if it is consistent with our ideas about worker cooperation. The first comes from Japan. The second comes from two case histories of firms in North America which have managed to earn their worker's trust and cooperation.

Japan

Many readers will already have a general impression of the character of the Japanese labour market.¹⁴ Some 30 percent of male workers are 'permanent' employees at larger firms. These workers are hired right out of school and the expectation is that they will

remain with their firm until mandatory retirement at around age 60. Permanent workers receive a great deal of on-the-job training. They practice regular job rotation on the shop floor, and they are also subject to occasional transfer to completely new areas of the firm. These are the workers who are most cooperative with technical change.

The rest of the labour force, including virtually all the women, are to varying degrees designated as 'temporary'. Less is reported about the loyalty of these workers, or their attitudes towards technical change. However, one can probably infer that they do not support change since they have no job security. They are laid off when technical change occurs or business conditions warrant. They form a kind of buffer which makes it possible for the firm to credibly offer steady employment to its permanent workforce.

Japanese workers are not blindly loyal and cooperative by nature.

Japanese workers are not blindly loyal and cooperative by nature. The Japanese have an exceptionally violent history, and the experience in labour relations up until the 1950s was anything but harmonious. To this day the public sector unions are often involved in bitter strikes. The postal system in Japan creates as much public frustration as it does in Canada. Even the permanent workers at the larger firms do not cooperate meekly with all of the decisions that are imposed upon them. Koike (1984) reports that when workers are transferred to remote workshops, for which they have been given no advance training, they will often object. The enterprise union usually gets involved, and the firm may have to pay '*haiten ichijikin*', or lump sum bonuses to the transferred workers.

On the shop floor, however, the picture changes. Workers rotate regularly through different jobs, and this is not a matter of union concern. Pay is related to age and experience, rather than the job being performed, and includes large semi-annual bonuses which depend on the performance of the firm. And the level of cooperation, as outlined in the introduction, is remarkable. In one case study at TDK Electronics,¹⁵ employment on a particular production line fell from 1,200 to 100 and output rose from 60 units per hour to 340 over the period from 1962 to 1979. The improvements were due mostly to design changes made by technical personnel, but the production workers were helpful throughout the process in pointing out problems that needed attention. None of them lost their jobs — they were reassigned to work on other lines.

The origin of the 'Japanese System' is usually placed at the Toyota Automobile Works shortly after the Second World War. In 1947, president Kiichiro Toyoda set the seemingly impossible goal of catching up with the Americans in productivity in only three years. Taiichi Ohno, who went on to introduce the Kanban and Just-in-Time systems, writes:

In 1947 I tried arranging machines ... so that each operator could handle two machines. From 1949 to 1950 we began experimenting with U shaped or

square formations, so that each operator could manage three or even four machines along the manufacturing lines.

Of course resistance within the factory ran high. It was not that the volume of work or the working hours had increased. The skilled workers of that time, for better or worse, were full of artisan's pride... . Under the new system . . . they would be required to do several different jobs — to not just operate a lathe, but also a milling machine or a drill press. (Ohno 1984, 211)

At another point he writes:

It was not at all easy to overcome the conservatism of a factory where the workers' habits were set, where a lathe operator would only operate a lathe, where a welder would only weld. . . . Actually, it was my own struggle against this outmoded structure which marked the beginning of the Toyota production system. (Ohno 1984, 210)

The firm's commitment not to fire workers, made more credible by multi-skilling, has clearly been an important part of the Japanese system from the very beginning. But what about the worker's commitment not to quit? We have seen that this is also necessary if firms are going to value worker cooperation enough to invest in multi-skilling in the first place.

The Japanese labour market has a very unique character.

It is here that the unique character of the Japanese labour market begins to play a role. First, some firms do not consider a resignation to be in effect until it is accepted by the firm. Workers who hand in a resignation letter may find that it spends months on a manager's desk without being read. Meanwhile the worker is pressured by co-workers to remain. By one estimate (Kato 1984, 102), one in five workers who want to resign are unable to do so because of these pressures.

Ultimately, however, there is no legal restriction on quitting in Japan, just as in the West. Workers are not slaves — they have the right to work wherever they can find employment. The biggest barrier they face is finding another firm that will treat them as well as their current one. Wage profiles for permanent workers in Japan are very steep (Hashimoto and Raisian 1985) and even if hired at a new firm, the worker will not be promoted as fast as the firm's own workers. Smaller firms will sometimes hire experienced workers from large firms, but these firms pay lower wages and confer less social status on their employees.

This behaviour by outside firms is hard to explain, particularly since it is in such contrast to the way things are done in the West. Even in the presence of a severe labour shortage, large firms do not 'raid' each other for experienced employees. Aoki (1988) after some discussion, states:

In reality . . . [Japanese firms] will have employees whose skills may be highly useful to other firms . . . and it is not difficult for other firms to identify their true productivity. I submit, however, that Japanese firms, particularly large and established ones, have bound themselves to an implicit code of not hiring former employees of other firms, particularly skilled ones, so that the [internal incentive scheme] at each firm can function effectively . . . to discourage skilled employees from quitting. (Aoki 1988, 58)

High turnover rates were a problem for Japanese firms until the 1950s. Aoki claims that the larger firms were aware of this and realized that the solution was for them all to offer wage profiles which reward workers for length of service, and to stop hiring each other's workers. Smaller firms could not be a part of the deal, but they pay lower wages and, due to the very competitive nature of the hiring process, they confer much less social status upon their employees. Such an agreement could therefore have worked. Over time, as technologies evolved in response to the idiosyncratic suggestions of employees, firms may even have found the knowledge of outsiders less and less useful for their own processes. The arrangement would therefore have become easier and easier to follow.

Western labour markets, needless to say, are organized much differently. The worker's right to quit for a better job is sacrosanct, and exercised often. Firms when hiring normally prefer workers with outside experience. 'Salary commensurate with qualifications and experience' is the usual line found on job advertisements. This does mean that Western firms will have more difficulty getting their worker's cooperation. But in spite of this, some firms have done very well. We will look at two case histories — one from a firm that has never cut a piece rate, and the other from a firm that instituted multiskilling over the objections of its workers, and found after only a few years that the workers do not want to go back.

Lincoln Electric

The Lincoln Electric Company was founded in 1895 to manufacture electric motors and generators. In 1911 it moved into the manufacture of welding equipment. It is now one of the most successful manufacturing companies in the world.

The incentive system at Lincoln is basically unchanged since 1934. Normal wages for most factory jobs are based purely on piece rates. In addition there is a year-end bonus based on a merit-determined share of a pool, the size of which depends on company performance. Merit rankings are made by foremen according to the dependability, quality, output, ideas, and cooperation of the workers. Finally, there is guaranteed employment for all workers. This means that in slack times workers' wages can fall precipitously as output and company earnings fall. Management instituted the employment guarantee because it felt that without it 'employees would be more likely to resist improved production and efficiency for fear of losing their jobs' (Berg and Fast 1975, 6). In return for the employment guarantee, workers had to agree to become multi-skilled and accept any job that was assigned them.

Lincoln Electric has never cut a piece rate. In the words of the chairman, William Irrgang:

When we set a piecework price, the price cannot be changed just because, in management's opinion, the worker is making too much money. Whether he makes two or three times his normal amount makes no difference. Piecework prices can only be changed when management has made a change in the method of doing that particular job ... If this is not carried out 100 percent, piecework cannot work. (Berg and Fast 1975, 4)

Average wages at Lincoln are roughly twice the going rates for similar production work. In good years it goes even higher. How is it able to compete with major suppliers like General Electric? Our analysis suggests we take a look at turnover rates. After the first six months, where many workers decide they do not like working under piece rates, workers are very reluctant to leave. Turnover rates averaged .5 percent through the 1960s as compared to around 4 percent in all manufacturing. This is not surprising given the salaries being earned, and given that the workforce is a self-selected group which likes working under piece rates.

The company has managed to keep much of its technology secret.

It also seems clear that the company has managed to keep much of its technology secret. During World War II the demand for welding equipment was so great that the US government asked all the welding equipment manufacturers to add capacity. The president of Lincoln Electric (Mr. Lincoln) went to Washington and explained that there was plenty of capacity but that it was being inefficiently used. As explained by Lincoln's current president, George Willis:

He offered to share proprietary manufacturing methods and equipment designs with the rest of the industry.... [T]hat solved the problem. As a result ... our competitors had costs which were close to ours for a short period after the war, but we soon were out performing them like before. (Berg and Fast, 2)

The Lincoln Electric case illustrates several of the ideas introduced above. Firms can make a credible promise to share the rewards of cooperation with their workers if they can be sure that the benefits will not be stolen by competitors. Low turnover rates are essential for this. On their part, workers will be happy to cooperate with a firm that can make credible promises.

Gulflands¹⁶

In 1984 the North American Paper Company introduced to its Gulflands plant a new management system called 'Team Concept'. The Gulflands plant had the very latest in capital equipment, but its productivity levels had been falling since the plant was

opened in 1969. Further investment in 1980 had made little difference. Labour relations at the plant were governed by a very complicated set of rules and sidebar agreements which, while valued by the union, contributed to widespread inefficiency in production. The rules were so complicated and contradictory that a literal interpretation might have made it impossible to work altogether.

The 'Team Concept' at Gulflands included multi-skilling, and resulted in increased productivity and low turnover rates.

'Team Concept' involved a reduction in the number of job classifications from 94 down to only 4, a recognition of the right of management to rotate workers from one task to another, and a pledge that no worker would lose his job as a result. (Management retained the right to lay off workers in periods of slack demand.) Wages were increased substantially. All the workers in a new job category were paid the highest wage of all the jobs that had been collapsed into it. This led to an overall increase in labour cost of 29 percent, while some workers got increases of 52 percent. Management had the right to reduce the wages of anyone who was refusing to rotate into new jobs. The new agreement completely replaced the old one with all of its complicated provisions.

Even with the wage increases, these changes were not popular at first. There was a protracted strike during the negotiations. Management prevailed, but production levels fell during the first year. By the second full year, however, production levels were up by enough to outweigh the increase in labour cost. Much of the improvement was due to the workers themselves, who 'implemented ideas for increasing the speed and operating efficiency of the machines' (Ichniowski 1991, part C, 7). More importantly, productivity has continued to increase since 1985, when the 'Team Concept' changes were fully implemented. It has risen from a level of .47 tons per worker per day (.44 in 1983, before the change), to a level of .54 in 1990. This is a level higher than the original engineering specifications for the equipment. The 1990 figures are not the result of a one time change in management techniques. Rather, there has been a process of 'continuous improvement' in the way that existing paper producing equipment, last modified by the firm in 1980, has been utilized.

The use of multi-skilling is clearly consistent with our story, but we have as well to check out turnover rates. The case (Ichniowski 1991) does not report these, but the plant is located in a small town, where it is the only major industry. The wage increases would have raised wages to a level significantly higher than those prevailing elsewhere for similar jobs. 'Team Concept' has also turned out to be very popular with the workers. It has been extended without union opposition twice since 1984. There has been a precipitous drop in grievances, absenteeism, and lost time accidents. All of this is consistent with low turnover rates. Overall, it is a very encouraging (inspiring?) example of a company and its workers who were able to turn a bad situation around for their mutual benefit.

The natural question that follows the study of cases like these is whether every firm can get worker cooperation in the same way. It is clear that a prerequisite is that management and shareholders be willing to share the benefits of cooperation with the workers. But this will not be enough if there are other firms that can steal those benefits for themselves without paying the costs. This requires that turnover be low. These two firms were able to reduce turnover by paying wages significantly higher than those prevailing in their industries. But if all firms tried to do this, turnover rates would rise again. The worker's alternative wage is just the wage he can get at another firm, and if firms continue to pay for outside experience then turnover rates will be high. The next section discusses the potential for public policies to foster cooperation in the North American context.

Policy

The preceding analysis has identified single-skilling and the high rates of worker turnover in the West as the principal underlying causes of low rates of worker cooperation. The remedy would then appear to be obvious. We should undertake policies to encourage multi-skilling and reduce turnover. Unfortunately, nothing is ever that simple.

Traditionally, economists have described their subject in the language of nineteenth century physics. The economy is a deterministic dynamic system, buffeted by exogenous random shocks. It is like a giant and very complicated machine, with many of its working connections obscured in the interior. Left on its own, it would settle into an equilibrium and change no more. Policymakers are therefore like mechanics who, if only they had sufficient knowledge, could change and direct the course of the economy in reliable ways. Most importantly, small changes in policy can be expected to have small effects.

More recently, this mechanistic metaphor has begun to change. More and more, economists are using the language of evolutionary biology. The economy is an ecosystem, and its institutions like the species that inhabit it. Institutions evolve, slowly, in response to the other institutions that surround them. At any point there may be many successful adaptations that could occur, and small changes now can have profound effects many centuries later. There is no expectation that the outcome of such a process should be unique or predetermined. Neither is there any guarantee that the process will stop.

Under the old metaphor, a question such as 'Why is Japan different?' demands an answer. Somewhere, perhaps in geography, there must be an exogenous difference between these two parts of the world which accounts for the difference in institutions. Under the new metaphor, the question is like asking why the grasses of North America were munched by buffaloes, while those of Australia were eaten by kangaroos. Kangaroos just didn't evolve here. Sorry.

There are no levers, buttons, or strings which will move Western economies towards more cooperative labour relations.

If one accepts the more recent view, then the economist's role as policy advisor becomes much more limited. There are no levers, buttons, or strings which, if used correctly, will move Western economies towards more cooperative labour relations. What appear to be small changes in policy can have very large, and unforeseen, effects many years later. If the economy is an ecosystem, then perhaps economists are the naturalists. But policymakers are now the developers, busy draining swamps for the benefit of one species to the detriment of many others.

With this in mind, let us consider the consequences (those we can foresee) of various policy initiatives to reduce turnover and encourage multi-skilling. Perhaps the simplest way to reduce turnover would be to allow the courts to enforce employment contracts which limit the worker's right to quit, or his right to join a competing firm. These contracts would be voluntarily entered into by each party, much like the ones which now limit the union's right to strike for the period of a few years.¹⁷ A firm would be more willing to multi-skill workers who signed a contract like this, and could therefore credibly commit to sharing the benefits of technical change with them.

One suspects, however, that the courts and the legislature would see this as akin to indentured servitude, which is only a step removed from slavery. The potential for exploitation by unscrupulous firms is severe. Once a worker has signed such a contract, there is little to prevent the firm from setting working conditions at intolerable levels. Unemployed workers, desperate for a job, may sign these contracts without fully realizing or investigating the consequences.

The alternative, more politically feasible perhaps, is to restrict the firm's right to fire workers. This would make workers less fearful of job loss due to technical change, and probably make them more cooperative. Many European countries have moved in this direction. Lazear (1986) contends that the level of job security for experienced workers in most European countries is comparable to that of a tenured academic in North America.

The problem here is that when workers are very difficult to fire, firms become equally reluctant to hire them in the first place. They push into the prescreening process all of the information gathering that otherwise would have been done by observing workers on the job. Workers with lower qualifications find themselves excluded altogether they never get the chance to prove themselves.

This difference shows up clearly in the statistics.¹⁸ In August of 1990, for example, the unemployment rates in Canada and in Belgium were about the same — 8.3 percent in Canada and 8.1 percent in Belgium. Canadian workers, however, lose their jobs much more often — about 2 percent per month are new entrants to the unemployed, while in

Belgium the figure is 0.3 percent. The average duration of unemployment in Canada was about four months, therefore, and in Belgium it was over two years. More than three quarters of the unemployed in Belgium had been out of work for over a year in Canada this figure was only 6-7 percent. Job protection legislation creates a new class of people who realistically expect never to get a job in their entire life. The costs of this in social assistance, increased crime, and the polarization of attitudes are hard to quantify, but likely to be severe.

Policies to encourage multi-skilling through job rotation may be the best approach to increasing cooperation.

Another approach would be to design policies that encourage multi-skilling and job rotation among workers. The rationale is that consumers are the ultimate beneficiaries of the gains from technical change, and should therefore be willing to pay some of the costs through a training subsidy, should such a subsidy be effective. The details of such a scheme would have to be worked out, but perhaps firms could apply for the subsidy before implementing job rotation, and agree to allow government officials to check for compliance.

There are two difficulties with this idea, although they may turn out to be minor. The first is that the money may be wasted, in that firms with no intention of ever using worker input nonetheless accept the money. It seems likely, though, that with intelligent design of the program this risk could be minimal.

More serious may be the problem of getting political support for the plan. Wage subsidies have been proposed before as a way to reduce poverty. They have the advantage that they do not discourage recipients from working, as does the current welfare system, and they do not discourage firms from hiring, as does the minimum wage. However, they have run into political opposition, perhaps because unions feel that they allow low-wage non-union firms to put undue competitive pressure on their own high-wage employers. Subsidized job rotation also threatens the strength of craft-based unions, which organize similar workers at many different establishments. The whole point of job rotation is to end the worker's identification with a group of workers who have the same skills, and begin a new identification with all of the people involved with his company. This will inevitably lead to a large reduction in the power and influence of the major, craft-based unions so well established in this country.

As a case in point, we may consider the divergent paths taken by the United Auto Workers Union in the United States and its Canadian counterpart, the CAW.¹⁹ Since the early 1980s the US union has been on the retreat, accepting wage concessions and, following the spectacular success of the NUMMI plant in Fremont, California, major changes in workforce organization.²⁰ The CAW, in contrast, was successful in resisting wage concessions in the early 1980s, and has continued to resist moves towards labour

management cooperation. One legitimate fear is that 'Team Concept'-type changes lead to 'whipsawing', where management extracts concessions from workers by forcing plants to compete for new work. Much of the problem, however, is simple mistrust.

The CAW has laid out its stance in a position paper (CAW 1989). As summarized by Holmes and Kumar (1991),

...the union 'supports efforts to involve and empower workers, to increase worker dignity, to produce quality products with pride, to make jobs more rewarding and workplaces more democratic.' At the same time ... the union opposes language that emphasizes 'competitiveness' and the notion that management and labour now have common rather than adversarial interests. (p. 38)

From the position paper itself, we have

...the new management agenda is a sophisticated drive to combine ideological pressures on working people with new structures in the workplace to dramatically change the way workers think and the way unions respond. More specifically, the objective is to replace worker solidarity with total identification with the goals of the company. (CAW 1989, 23)

The union's fears may or may not be justified, but one hopes it will not take major job losses before both parties see the value in cooperation.

Conclusions

The current Japanese system evolved at the end of World War II, in the face of severe competitive pressures. North American firms are feeling some of that pressure now, and are responding. Public policies have not played a role so far, and it really is not clear that new policy initiatives are what is needed. Firms themselves must find innovative ways to reduce turnover and make credible their promises to share the benefits of change. Multi-skilling, steep wage/tenure profiles, and significant profit-sharing agreements may all be parts of the solution.

All of the firms studied that have achieved high levels of worker cooperation have done so by giving a large share of the benefits, which otherwise would have gone to the shareholders, to the workers.

Legislated solutions have the very real danger of introducing the worst of the Japanese ways along with the best. While we are learning from Japan, there is no one who is advocating a wholesale shift to a Japanese style labour market, complete with its discriminatory treatment of women and temporary workers. Indeed, many Japanese practices would immediately run afoul of our Charter of Rights and Freedoms.

Two things seem clear. First, the efforts of hundreds of motivated firms are far more likely to meet with success than those of a single group of policymakers and academics. Second, firm owners and shareholders must get involved in the search for a solution. All of the firms studied that have achieved high levels of worker cooperation have done so by giving a large share of the benefits, which otherwise would have gone to the shareholders, to the workers. Given the supreme role of shareholders in North American firms, ultimately it is they who must make the leap of faith. They must begin to give, and credibly promise to keep giving, a share of the firm's profits back to the workers. If this means that workers start to get rich, so be it.

This was well understood by James Lincoln.

There will never be enthusiasm for greater efficiency if the resulting profits are not properly distributed. If we continue to give it to the average stockholder, the worker will not cooperate. . . . [Would] any manager? (Berg and Fast 1975, 19)

Notes

¹ Examples range from the comprehensive report of Michael Porter (1991) to the literature surrounding the Ontario NDP's proposed labour legislation (1992).

² That is, all previous events of this nature must have been called something else.

³ Rosenberg and Birdzell have argued (1985) that China did not undergo the industrial revolution because its bureaucracy had the power to prevent the entry of new techniques.

⁴ Adam Smith was no doubt thinking of this case when he stated, in a famous passage, that the division of labour would lead to 'the invention of a great number of machines which facilitate and abridge labour, and enable one man to do the work of many.' Smith (1937, 7).

⁵ An exception is discussed at pp. 13-14.

⁶ There are many examples of this behaviour. See, for example, Dore (1973).

⁷ Both quotes are from page 170.

⁸ The lower payoff could reflect a higher probability of layoff, reduced chances of advancement within the firm, transfer to a job where the worker's skills are less useful, or anything of this kind. It need not be a reduction in wages, in other words.

⁹ The ideas in this section are discussed in more detail in Carmichael and MacLeod (1992, 1993).

¹⁰ We do have to assume that it would be difficult to sell the ticket beforehand.

¹¹ Aoki (1986) suggests that workers will have better ideas for improving the technology and will respond better to unanticipated events if they understand the entire production process.

¹² Marglin in his 1974 paper 'What do Bosses Do' argues this was the main force behind the division of labour during the industrial revolution. Landes, in his 1986 paper 'What Do Bosses Really Do?' argues that the evidence is more supportive of Adam Smith.

¹³ In a sense, the problem is due to a lack of credibility on the workers side. If workers could promise never to quit or reveal secrets, then the firm could fix piece rates. But the worker's promise is not credible.

¹⁴ If not, the books by Dore (1973), Clarke (1979), and Aoki (1988) are a good place to start.

¹⁵ Japanese External Trade Organization (1984).

¹⁶ The name of the company and the plant in this case have been changed.

¹⁷ People who volunteer to join the army clearly enter into a similar contract.

¹⁸ The data are from the OECD and are reported in the *Economist*, Sept, 15, 1990, p. 131.

¹⁹ For a more detailed exposition, see Holmes and Kumar (1991).

²⁰ The New United Motor Manufacturing Incorporated plant is a successful joint GM-Toyota venture inhabiting a former GM plant renowned for its low productivity and confrontational labour relations.

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