WORKER COOPERATIVES

Types of Cooperatives

Financial cooperatives : controlled by those who lend to and borrow from them (credit unions)

Consumer cooperatives : controlled by those who buy from them (food and books)

Sales cooperatives : controlled by producers who use a collectively-owned agent to sell their output (agriculture)

Housing cooperatives : controlled by the tenant occupants of a building or set of buildings

Mutual insurance companies : controlled by those who buy the insurance contracts

The Associated Press (AP) is a cooperative (established in 1846) that is owned by a collection of newspapers, radio and television stations who publish and report on the news items collected by AP reporters.

Community-owned firms are organizations that members of a local community (chosen often by some democratic mechanism) oversee and manage. The Green Bay Packers is such an organization, the only community-owned professional sports team in the U.S.

Worker Cooperatives

Worker or producer cooperatives : firms controlled by those who work in them

Examples of worker co-ops in the U.S. today:

Cooperative Home Care Associates (CHCA) is the largest worker co-op with > 2,000 member-workers in the New York metropolitan area

Rainbow Grocery in San Francisco is the largest retail worker co-op - sells natural and organic foods

Arizmendi Association links together a network of bakeries in the San Francisco Bay Area

Outside of the U.S.:

Mondragon in the Basque country of Spain is a complex of worker co-ops with almost 100,000 workers in various industries including banks

Ownership and Management

Two primary questions may be asked of any firm:

who directs the firm's activities? and

who appropriates the firm's net earnings?

The answers to these questions help to identify the individuals who have property rights over the firm's resources.

The Capitalist Firm

In the conventional firm in the United States, the people who supply the organization's capital appropriate the enterprise's net earnings and, as a consequence, they are designated the firm's owners. These people hire managers who direct the firm's activities. Such a firm is owned and indirectly managed by the people who provide the firm's capital assets: a capitalist firm.

In these firms, the managers, in turn, hire other workers. By this route, capital hires labor: those who supply the capital hire those who provide labor services. Such capital-managed organizations are owned by the capital investor(s) and the workers are called employees whose jobs are at the pleasure of the capital owners. The people who both direct the enterprise's activities and appropriate the organization's net returns are those who have supplied the firm's capital.

In the U.S., many firms are not capitalist in this sense. For instance, many hospitals, schools, universities, and health maintenance organizations are not "for profit" companies and such non-profit firms often lack well-identified owners. Thus, ultimate authority in the typical private university rests with the trustees, but they have usually supplied only a little of the university's capital.

Another exception to capitalist firms is provided by the life insurance and property insurance business where mutual companies are owned by those who hold the insurance policies. Here, by pooling risks, the consumers of the insurance policies effectively provide the capital and indirectly hire individuals to manage and run the companies.

The Worker Co-op

Another exception occurs when a firm is owned and managed by the individuals who provide the labor services. In this instance, the workers use their capital or borrow capital from others. They may hire managers to organize and coordinate production in which case the managers are working at the pleasure of the workers. In this type of firm, labor hires capital.

Such worker-owned and worker-managed firms occur in various guises in some of the professions (law, investment banking, medicine, accounting) and in jobs such as taxi-driving, garbage collection, and trucking.[1] A worker co-op is not synonymous with a commune which is a community of people who not merely work together but also live together and share similar values. The most durable of communes have been those based on religious beliefs.[2]

Ownership

The first distinguishing characteristic of a worker co-op is that the workers in the enterprise appropriate the net returns and, in this sense, the firm is owned by the people who work in it. Complete ownership of a firm by its workers is unusual in modern market economies. However, some firms are <u>partly</u> owned by those who work in them.

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[1] In other countries, worker-owned firms are found in many different industries including construction in Italy and France, retailing in Britain, transport in Sweden and Israel.

[2] For an economic analysis of kibbutzim see Ran Abramitzky.*The Mystery of the Kibbutz* , Princeton, 2018

ESOP

Perhaps the best known in the United States are firms with employee stock ownership plans (ESOPs). These are tax deductible contributions of cash or stock made by a corporation into a trust whose assets are allocated to the employee participants in the trust. The assets of an ESOP must be invested in the firm's stock. Hence, through an ESOP, employees own a part of the assets of the firm they work in. In 2017, about 14 million employees have an ESOP.

An employee receives his or her accumulation of ESOP shares when he or she leaves or retires. The ESOP is an important component of the campaign to reduce the dependence of workers on their labor income and to share with them the profits of the enterprise in which they work.[3]

Management

Another distinctive characteristic of a worker co-op is that the workers actively manage it. Again, in market economies, it is unusual for firms to be managed by the workers or by the representatives of workers and for the representatives of employees to sit on a company's board of directors.

Some companies in the airline, trucking, and steel industries have granted their employees representation on their boards in return for wage concessions, but most workers who have acquired ownership through ESOPs or other compensation programs have not been represented on their companies' boards. This means they are not involved in and consulted on the larger issues of company policy.

[3] See, for instance, Douglas L. Kruse, Richard B. Freeman, and Joseph R. Blasi, eds., Shared Capitalism at Work: Employee Ownership, Profit and Gain Sharing, and Broad-Based Stock Options , NBER, 2010

However, workers are sometimes involved in matters concerning their immediate work environment. The most obvious mechanism for this in the United States has been the labor union which normally engages with management not only in setting wages and hours of work, but also in determining a wide range of activities within the firm. Though the union is not "the management", through collective bargaining it collaborates with the representatives of the firm's owners to shape the work environment. Indeed, where labor relations are harmonious, a unionized workplace is one jointly administered by management and the union.

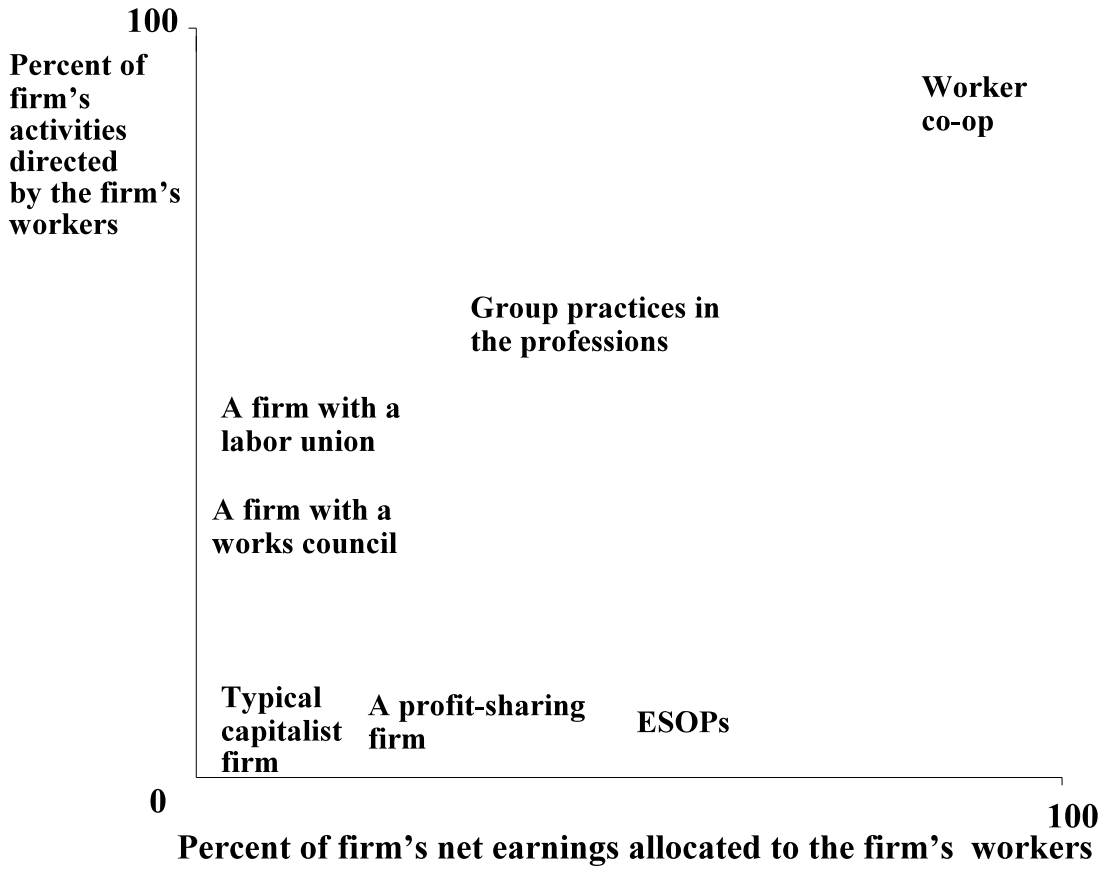
There are other mechanisms to involve workers in managing their workplace. However, it is unusual for workers to combine ownership with management; that is, for the workers to own a significant proportion of the assets of the firm they work in and for these same workers to play a heavy role in managing the company.

An Organizing Framework

The distinction between a firm's ownership and its management lends itself to an organizing framework illustrated on the next page. The horizontal axis of this figure measures the degree to which the firm's net earnings (or profits) are allotted to the firm's workers. The typical capitalist firm where the firm is "owned" by those who supply the capital occupies a point on the far left of this axis because, in such a firm, the workers' pay is dependent on their input of time and is independent of the firm's profits. A workers' co-op occupies a position on the far right of this axis because the firm's net returns are distributed to all the workers. Between these two extremes are firms that engage in some profit-sharing with the workers and firms with ESOPs.

The vertical axis measures the degree to which the firm's workers are involved in managing the company in which they work. In the typical capitalist firm, those who supply the capital select the managers who, in turn, select and direct the workers. Hence the capitalist firm occupies a position close to the graph's origin. By contrast, in a worker co-op, the workers in the firm select the managers and the workers are closely involved in directing the firm's activities so the worker co-op occupies a a high point along the vertical axis of the figure. Intermediate positions on the vertical axis between the typical capitalist firm and the worker co-op are occupied by firms with employee involvement committees, works councils, and labor unions. Partnerships in the professions such as lawyers occupy intermediate positions because the partners share the net returns and assume responsibility for managing the firm. However, control and ownership are typically restricted to the most experienced or skilled workers in the organization only and the organization's remaining workers are conventional employees.

Types of Firms by Worker Ownership and Management



For and Against the Worker Co-op

Against the Worker Co-op

If there are benefits to worker ownership combined with worker control, why haven't such firms become more common?

One claimed defect of the worker co-op is that, although each worker's income depends upon the firm's net earnings, the incentives provided by relating each worker's income to the firm's performance are meager because the firm's net earnings are divided among a large number of people. This means that the benefits to any single individual of harder work are small. Each worker wants others to work hard while he himself slackens off. Soon all individuals think this way and the firm consists of a body of malingerers. This is an example of moral hazard in work effort: workers can underperform without being caught.[4] A supervisor is needed to ensure that incentives are not dulled and, in this way, the firm returns to the character of a capitalist firm where worker effort is carefully monitored.

A second frequently-cited defect with the worker co-op arises from various problems concerning its financial capital. If the workers are to provide the capital, then the firm's capital is constrained by the workers' joint savings which may imply that not enough capital will be available for the firm to reach a size that exploits economies of scale. This capital limitation may induce the co-op to borrow from financial intermediaries, but many banks find co-ops an unfamiliar organization and they fear the co-op's worker-owners will give priority to allocating their returns to paying themselves dividends instead of paying back loans. Hence banks are reluctant to lend to worker-owned organizations.

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[4] More generally, a problem of moral hazard arises when an individual has the opportunity to enhance his well-being at the expense of others who cannot costlessly detect the individual's opportunistic behavior. In this instance, the individual worker enjoys more leisure on the job at the expense of the total output which is shared with others.

A third objection raised against the worker co-op is that it tends to produce not more but less when its product price rises. That is, in the capitalist firm, a rise in product price provides the signal to produce and sell more. In this way, resources in the market are allocated toward producing those commodities for which consumers are willing to pay a higher price. By contrast, it is sometimes argued that, in a worker co-op, when the output price rises, the workers can enjoy the same income by producing less. In this event, even though consumers are willing to pay a higher price for this product and even though this would suggest that more of this product should be produced, the worker co-op responds by producing and selling less. The market signals are not working well, it is argued, if firms produce less when prices rise and produce more when prices fall.

The worker co-op has also been accused of being an inherently unstable type of organization. If the co-op is successful and makes profits, it has been argued, the worker-owners have an incentive to share the organization's capital returns among the original investors only and to use hired labor (employees) to replace departing members. In this way, although the co-op starts out with all workers being owners, over time it changes its character so that an increasing fraction of workers are not members. Ultimately, the organization is indistinguishable from a conventional firm where ownership is concentrated in the hands of a few who select the managers and where most of the workers are employees. This transformation of the co-op has concerned proponents of worker ownership who have described this process as one of "degeneration": the co-op "degenerates" over time into a conventional capitalist organization. Does this process have empirical validity?

For the Worker Coop

There are long-standing arguments to the effect that there are benefits both to workers owning a firm's assets and to workers participating heavily in the firm's management; that is, the effects of worker ownership and management tend to be complementary. The benefits of worker ownership are enhanced when workers are engaged in the management of the organization.

The heart of the argument regarding ownership is that the typical capitalist firm is characterized by a conflict arising from the fact that the firm's income is split between labor and capital. This conflict takes an extreme form when, as is usual, each worker is paid according to his input of time - earnings per hour or per week or per month. With pay related to time at work but unrelated to effort, one of the tasks of supervisors is to monitor workers to ensure at least some minimum level of effort is exerted. The workers see their payments as approximately fixed (their wage and hours of work have usually been specified) so greater work effort on their part appears to benefit not them, but the owners of capital. The workers view the task of the supervisors to be that of hounding the employees to make them work harder. A tension exists between the supervisors and the rank-and-file workers: the supervisors' jobs turn on extracting the most effort out of the workers while the workers resent being monitored and resist attempts to be pushed harder.

There are other sources of conflict in the workplace, but at basis they arise out of a zero-sum game perspective, that one group gains only when the other group loses.

A worker co-op addresses this conflict by making those who supply labor also those who supply capital. Cooperation in the workplace occurs because the interests of capital and labor are aligned: when the workers own the firm's assets, individuals will work with more commitment and diligence because they enjoy the returns to both labor and capital. This same argument is used to explain why self-employed individuals work harder and more effectively than employees who work for someone else. In the worker co-op, all the workers are self-employed.

The notion that there are benefits from relating workers' pay not to their input of time but to the firm's performance is well recognized by those who advocate some form of profit-related pay or sales-related pay for capitalist firms. In this circumstance, work incentives are furthered by relating the workers' pay to the enterprise's product market success. In the capitalist firm, however, profit-related pay schemes distribute to workers only a fraction of profits. If profit-related pay does provide incentives for individuals to work more effectively, then these incentives cannot be any less in a firm (the worker co-op) that distributes all profits in this way than in a firm that distributes only a fraction of profits to its employees.

The argument for worker participation in management rests on the intuitively-appealing notion that participation begets productivity, that individuals will work more effectively toward goals they have helped to define and determine. If workers are uninvolved in determining an organization's goals, they are less dedicated to those goals and will be less motivated to see them succeed. In short, there are productivity gains to an organization in which workers participate meaningfully in decision-making.

A large literature has attempted to quantify the impact of worker participation on productivity although the results of this work have fallen short of being really persuasive. This empirical research has been unconvincing because it can be difficult to obtain a reliable indicator of worker participation: two firms may have the same pattern of Employee Involvement committees and yet one firm's committee may have much greater practical influence than the other firm's. The result is that worker participation can be more apparent than real.

The extreme case of worker participation occurs when workers have full discretionary powers and both manage and own the enterprise they work in. If the productivity consequences of participation are not visible when workers are the firm's owners, they are less likely when workers participate to a much smaller extent. Hence there is good reason to examine a situation in which workers own their own firms and to determine whether the beneficial effects of participation are evident here.

By granting workers authority over decision-making within the organization and by relating workers' pay to the firm's residual earnings, the worker co-op realigns the cardinal rights associated with the ownership of a firm: the right to control the organization's activities and the right to appropriate the organization's net earnings.

The political scientist Robert A. Dahl maintained that "like a state.....a firm can also be viewed as a political system in which relations of power exist between governments and the governed. If so, is it not appropriate to insist that the relationship between governors and the governed should satisfy the criteria of the democratic process - as we properly insist in the domain of the state?" (*A Preface to Economic Democracy 1985, p. 115*)

Who wrote: ".....[worker] cooperation is merely an extension to the industrial life of our people of our great political system of self-government. The government itself is founded upon the great doctrine of the consent of the governed, and has as its corner stone in the memorable principle that men are endowed with inalienable rights. This great principle has a clearly defined place in cooperative organization." ? [5]

How do these arguments for and against worker co-ops compare with the experiences of co-ops? We examine the worker co-ops in the plywood industry in the Pacific Northwest.

For much of the 20th century, the plywood industry was the U.S. manufacturing industry in which worker ownership and management extended most widely. The first plywood co-op, the Olympia Veneer Company, was established in 1921. After a very successful thirty years, Olympia Veneer was sold to the United States Plywood Corporation in 1954.

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[5] See Lee Altenberg, "An End to Capitalism: X's Forgotten Vision", Sandstone and Tile, 14(1),1990, p.12.

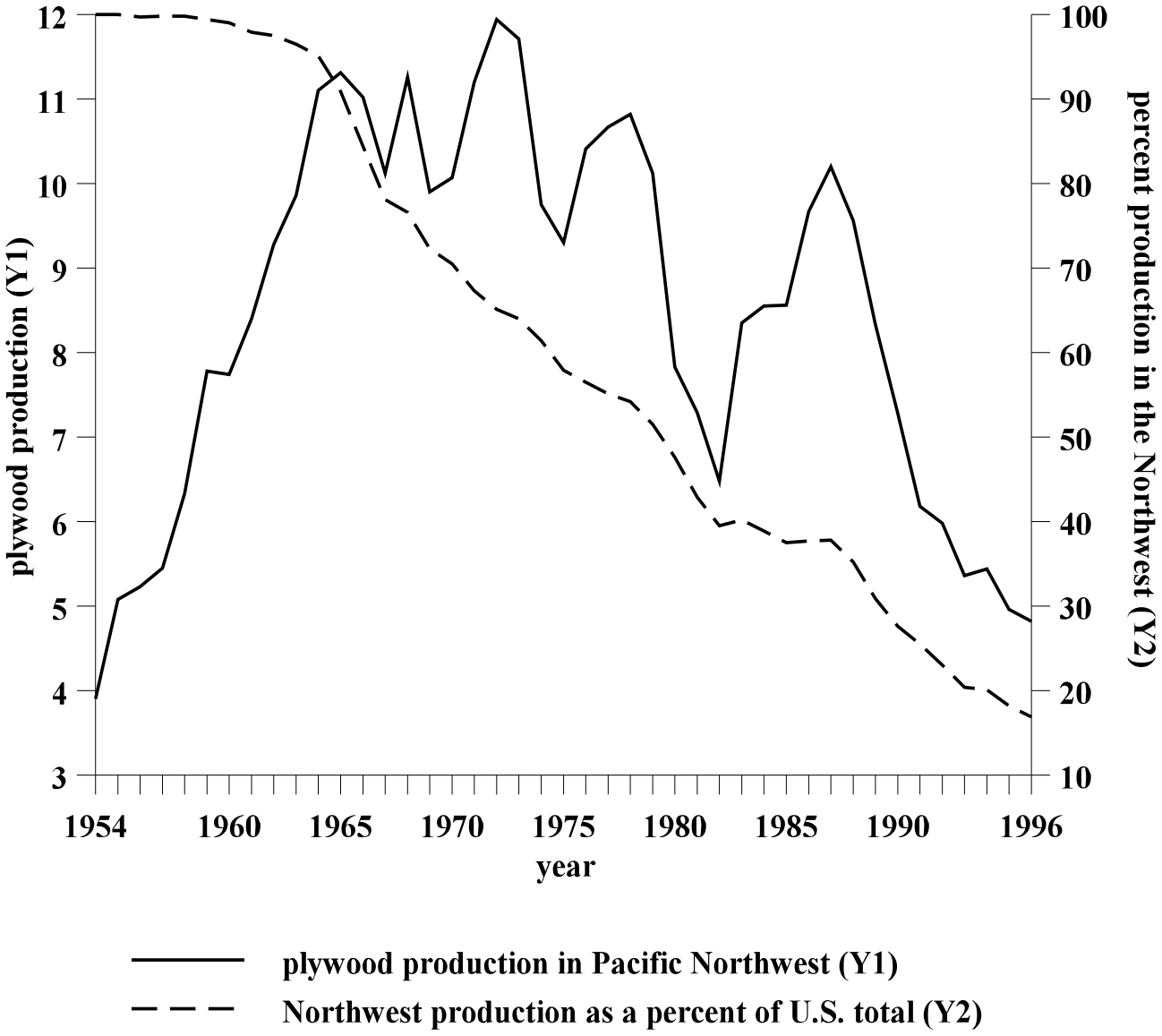
The Production of Plywood in the Pacific North-west

In the 1950s, almost 100% of U.S. softwood plywood was produced in the Pacific Northwest and between one-quarter and one-fifth of that was made in the plywood co-ops. After that time, the importance of the Northwest in U.S. production declined because of the depletion of old timber forests, environmental restrictions on logging, and the subsequent rise in the cost of logs. The use of Southern pine for plywood caused the South to displace the Northwest as the major region for U.S. plywood production. Many plywood co-ops and conventional plywood mills closed in the Pacific Northwest as the center of the industry moved to the South.

Plywood production is highly cyclical moving with the demand for housing and business construction. Plywood prices fluctuate a great deal and the prices of logs are even more variable. For example, in 1979-80 the real prices of logs were about five times their values in 1970 and then, two years later, in 1982, log prices were back to their values in the early 1970s.

Apart from the volatility of prices, the trends in the relative movements of the price of output and the price of raw material input (logs) should be noted. The real price of logs in the mid-1990s in the Pacific Northwest was substantially higher than its values in the mid-1950s. Yet the market for plywood is national and international and the competition in the product market meant that real plywood prices in the mid-1990s differed little from those in the mid-1950s. Hence the price of plywood produced in the Pacific Northwest relative to the price of the input of logs in the region was substantially lower in the 1990s than it was forty years ago. This squeezed profit margins in the region and explains the relative decline of the industry in the Pacific Northwest.

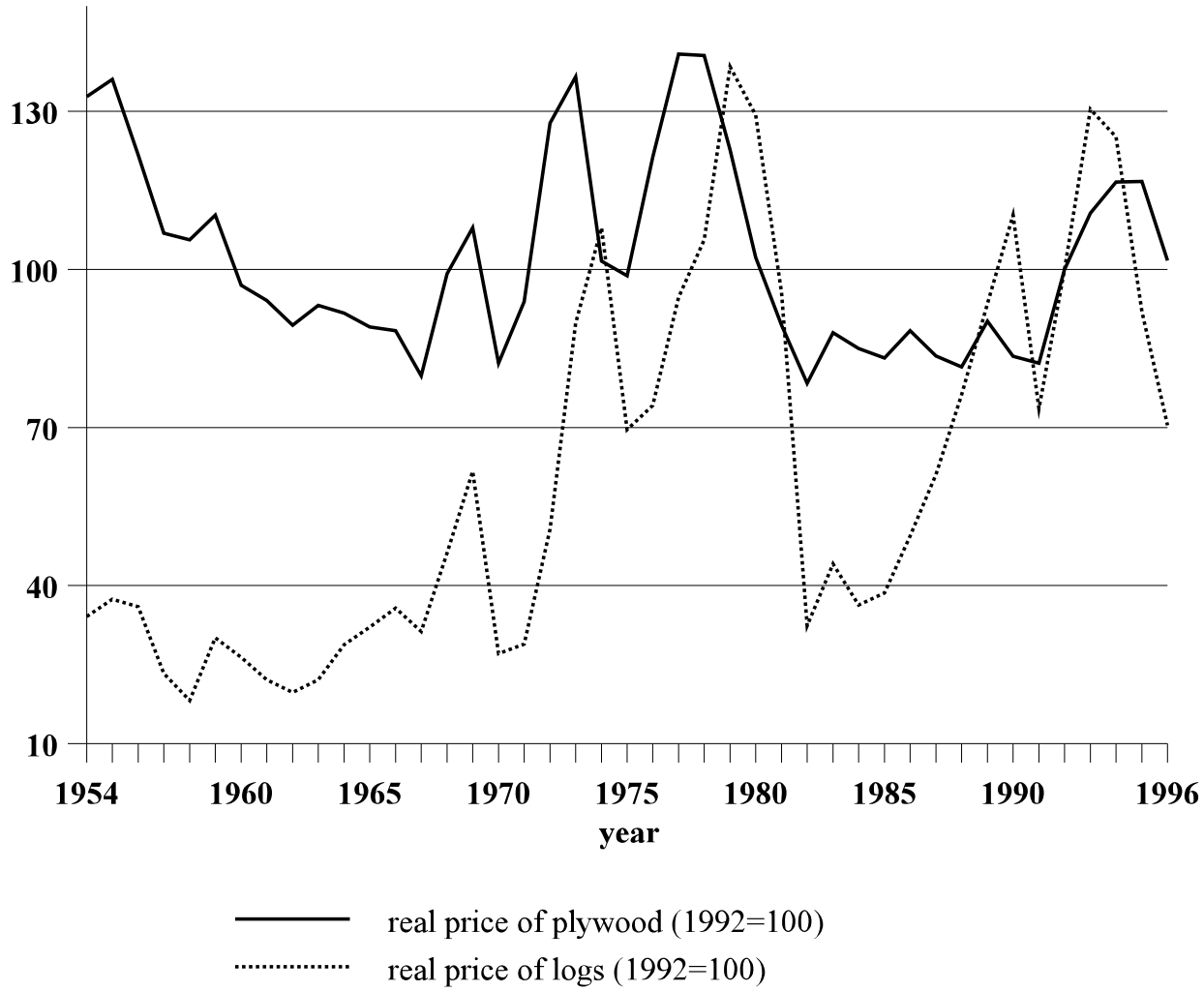
Plywood Production in the Pacific Northwest, 1954-1996



Plywood production in the Pacific Northwest (Y1) is measured in thousand million square feet, 3/8-inch basis. Before 1983, the data relate to plywood only. From 1983, they refer to plywood, waferboard, and oriented strand board. Y2 expresses plywood production in the Pacific Northwest as a percent of total U.S. production.

Data are taken from issues of United States Department of Agriculture, Forest Service, Production, Prices, Employment, and Trade in Northwest Forest Industries, Pacific Northwest Research Station, various issues.

Real Prices of Plywood Output and Log Inputs, 1954-96



The series denoted "real price of plywood" is the price per thousand square feet of sheathing, western exterior, 3/8-inch, CD, net f.o.b. mill divided by the total finished goods producer price index (from Table B-65 of The Economic Report of the President, February 1999). The series denoted "real price of logs" is the average stumpage price for all species of sawtimber sold on National Forests in the Pacific Northwest Region in dollars per thousand board feet also divided by the total finished goods producer price index. Data on plywood and log prices are taken from issues of United States Department of Agriculture, Forest Service, Production, Prices, Employment, and Trade in Northwest Forest Industries, Pacific Northwest Research Station, various issues.

The Plywood Co-ops

The plywood co-ops of the Pacific Northwest provide a perfect case study to examine many of the issues in the research on worker-owned and worker-managed firms.

First, the cooperative mills came close to the ideal of cooperative forms of production. All workers were paid the same hourly rate so divisions among workers on the basis of pay did not exist. All the co-op members were workers and most of the workers were owners. All co-op member-workers worked the same number of hours. A fusion between those who supply labor and those who supply capital was close to being achieved. Virtually all the mills hired workers who were not owners although non-owner workers usually constituted a minority (often a small minority) of all workers. Some of the non-member workers were people who anticipated being owners or who were on probation for membership.

A member owned one share (and usually only one share) in the firm. The shares traded in open markets though co-ops often required a probationary period of employment for any new member. A co-op's workers held regular meetings where the company's general policies were discussed. The board of directors were all member-workers and were selected by a vote of all members. Turnover of board members was high so a small oligarchy of active worker-members was avoided.

These features imply that the plywood co-ops had the qualities often deemed necessary to constitute meaningful cooperative ownership and management: in each co-op, participation in determining the major issues facing the organization was high and divisions among the worker-members were unimportant.

As one close observer wrote, "The producer cooperatives in the American plywood industry are substantially democratized work settings, as close as we have come in the United States to worker self-management in industrial enterprises".[6]

Differences among the Member-Workers of the Plywood Co-ops

Most of the jobs in the plywood mill would be classified as semi-skilled meaning that some training was required before they can be performed well, but the training was easily acquired. Surveys indicate that most of the workers (in both the co-op and the capitalist mills) occupied many jobs in the mill and there were few important distinctions among the workers.

This is consonant with Henry Hansmann's argument that worker co-ops are more likely to flourish where the costs of collective decision-making are not exorbitant. Such decision-making costs rise with the heterogeneity of the work force. Hansmann writes, "Most typically, employee-owners all do extremely similar work and are of essentially equivalent status within the firm. Rarely do they have substantially different types or levels of skills, and rarely is there much hierarchical authority among them".[7]

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[6] Edward S. Greenberg, Workplace Democracy: The Political Effects of Participation, Cornell Univ. Press, 1986, p. 25.

[7] Henry Hansmann, The Ownership of Enterprise, Cambridge, Mass., Harvard University Press. 1996, p. 91.

The Conventional Plywood Mills

A second reason why a study of the Pacific Northwest plywood co-ops is attractive is that conventional capitalist firms as well as co-ops operated in the industry in the same location. Unlike much of the research on worker-owned firms that compares the activities of worker co-ops and capitalist firms operating in different industries, the plywood co-ops afford the opportunity of comparing two types of firms in the same industry at the same time in the same place. We have the occasion to observe how two types of firms with different property rights structures responded to common (price) shocks.

Moreover, although some of the capitalist plywood mills were owned by the large timber corporations, no firm produced more than a small fraction of total industry output. A compelling case can be made that the price of plywood and the prices of logs (the mills' principal raw material input) were outside of the control of (or exogenous to) each plywood firm.

Here is an excellent setting to determine whether co-ops adjust to shocks differently from capitalist firms in the industry. In this way, the structure of the plywood industry makes the study of the cooperative organization in the industry especially appealing.

The capitalist mills themselves were differentiated according to whether the workers were covered by collective bargaining contracts (the unionized mills) or the workers were non-union. The collective bargaining contract for the workers in the unionized mills applied to all unionized lumber workers in the region. In other words, it was and is a broad "industry-wide" agreement where the domain of the contract is much broader than the plywood industry alone.

However, like many industry-wide contracts, it is common for the negotiated agreement to be altered to recognize each mill's particular conditions. So, for instance, even among the unionized plants, there were wage differentials across mills that persisted from contract to contract. The unionized mills and the co-ops tended to be the same size while the non-union (or "classical") capitalist mills were relatively small operations with the typical non-union mill employing about 30 percent of the workers in the typical unionized mill or co-op.

Relations between the co-ops and the unions in the capitalist mills were not friendly. Like most unions, the unions in the Pacific Northwest were reluctant to tolerate lower wages for their members in times of business adversity. By contrast, the co-ops routinely took wage cuts when sales slumped. The volatility of co-op wages meant there were times when co-op wages were above those in the union mills (creating internal political problems for the union leadership as the union rank-and-file ask why they are being paid less) and times when co-op wages were below those in the union mills (generating the concern among workers in the union mills that co-ops were compromising labor standards in the industry and trying to underbid them).

The unions were also unhappy when the co-ops maintained and even increased their production during the strikes of the 1950s and 1960s. There was no sense that the workers in the co-op mills and the employees in the union mills formed a brotherhood of workers.

The Production Environment in the Plywood Co-ops

When the work practices of the capitalist and plywood mills were compared, distinct differences were found. In a capitalist plywood mill, a worker was inclined to keep to his specified task. He avoided meddling in other employees' tasks and tended to resent the involvement of others in his own work. Typically, the outlines of each worker's obligations were defined with some precision and the worker was reluctant to stray beyond those bounds even if the entire production process may be enhanced by so doing.

By contrast, in the co-op mills, the demarcation of jobs was not as firm and workers were willing to go beyond their narrow responsibilities and made suggestions that contributed to the team effort. Production was explicitly recognized in the co-op mills to be a collective process and collaboration was offered and welcomed. This conforms to the long-established belief that a co-op's workers work more as a team than workers in a capitalist firm and this teamwork will show up in superior output.[8]

In the capitalist plywood mills, workers did not set production targets nor determine the organization of the production process. The workers do as they were told. Management set production goals and organized production. This is different from the co-op mills whose members directly or indirectly decided what and how much to produce and they controlled the manufacturing process.

[8] See Greenberg (1986, especially p. 41). Much of this discussion is from Edward Greenberg's surveys of capitalist and co-op mills.

How do the choice variables of the plywood mills respond to changes in their price environment?

Note these important features of the markets in which these mills operated:

1. The market for plywood is highly competitive so that the output price can be considered independent of a single producer's actions.

2. Most logs used by the co-ops came from publicly-owned timber forests and were purchased through auctions. Most of the variation in log prices is not across mills, but over time.

3. As mentioned earlier, the price of plywood and the price of log inputs are volatile which provides a clear opportunity to see how producers respond to relatively large variations in their output price and raw material input price.

4. Members of the plywood co-ops did not have a right to work in the co-op. However, they did have a higher claim on employment than non-member workers. One way for a co-op to effect changes in labor input was to alter its employment of non-member workers. Another way was to vary the number of shifts (or hours of work).

5.There was little change in the technology of making plywood from 1968 to 1986 so it is appropriate to treat each co-op's capital decisions as having been made and then to examine their decisions with respect to their use of labor and log inputs, their output of plywood, and the wages they paid. The mills had different size plants and saws, but these changed little over these two decades.

The equations below use annual observations on 8 individual co-ops and 27 individual conventional firms in various years from 1967 to 1986; in all 173 (mill-year) observations. This is not a balanced data set and observations on some years are missing.

Mean Values of Some Variables

Variable ⇓	Conventional Mills	Co-op Mills
Employment	230	267
Annual Hours per Worker	1,794	2,123
Input of Logs	21.6	21.6
Real Output	9.4	12.9
Real Hourly Earnings	4.38	3.39
Real Annual Earnings	7,773	7,157

Output is measured in thousands of square feet, 5/8 inch basis. The input of logs is measured in millions of board feet, 5/8 basis.

In the table below, the entries in the columns "output prices" are least-squares estimates of α and the entries in the columns "input prices" are least-squares estimates of β from estimating.....

(1) $$log(y_{it}) = \delta_i + \alpha\, log(p_{it}) + \beta\, log(r_{it}) + \varepsilon_{it}$$

where p denotes real output (plywood) prices, r real input (log) prices, δ_i is a fixed effect for mill i, and y_{it} represents in turn output, employment, annual hours per worker, worker-hours, annual real (CPI deflated) earnings per worker, logs, and real (CPI deflated) hourly earnings. ε is a stochastic disturbance.

Equation (1) is fitted to worker co-ops and capitalist mills separately.

Estimated standard errors are in parentheses beneath their estimated coefficients.

y_{it}	Worker coop mills		Capitalist mills	
	output prices	log input prices	output prices	log input prices
Output	0.196 (0.225)	-0.473 (0.215)	0.856 (0.274)	-0.423 (0.219)
Employment	-0.005 (0.084)	-0.065 (0.083)	0.657 (0.133)	-0.200 (0.126)
Annual Hours per Worker	0.101 (0.133)	-0.095 (0.141)	0.443 (0.141)	-0.140 (0.083)
Worker-Hours	0.096 (0.131)	-0.160 (0.171)	1.100 (0.205)	-0.340 (0.151)
Annual Real Earnings per Worker	1.079 (0.145)	-0.320 (0.175)	0.596 (0.187)	-0.184 (0.145)
Logs	1.015 (0.396)	-0.982 (0.373)	0.910 (0.327)	-0.407 (0.296)
Real Hourly Earnings	0.978 (0.160)	-0.225 (0.192)	0.153 (0.151)	-0.044 (0.118)

Compare the coops' responses with the conventional mills' responses of $log(y_{it})$ to proportional changes in input and output prices.

A Behavioral Model of Co-ops?

A plausible model consistent with the broad features of the plywood co-ops' behavior treats a co-op's decisions about the number of member workers as akin to decisions about physical capital and that characterizes the co-op as maximizing the welfare of the typical co-op worker-member. That is, the capacity of the plant and the size and number of lathes, driers, and presses are changed infrequently and may be treated as fixed in the short run.

Similarly, the number of member-workers is determined jointly with these capital decisions and, in the short run, is treated as given. With physical capital and membership determined according to long-run criteria, the short-run goal of the co-op is to select work hours and the purchase of raw materials to maximize the welfare of the typical co-op member.

In an environment where output and raw material prices are volatile, (almost) fixed employment of members must be accompanied by variability in each member's income so that costs be covered. This characterization conforms to the virtual fixity of the typical co-op's employment and membership and the variability of per member income. Hired workers can be added to the co-op's short run problem as another decision variable.[9]

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[9] In other words, let U be the representative co-op member-worker's utility function defined over consumption, c, and working hours, h. There are L members of the co-op. Let p be the price of output, X the level of output produced, M the input of logs, H the input of hired labor, r the price per unit of logs, w the wage paid to each hired worker, and y the member's nonlabor income. In the short-run, the co-op selects c, h, M, and H to maximize $U(c, h)$ subject to the member's budget constraint $L^{-1}[pX - rM - vH] + y = c > 0$ where the production function $X = f(M, h, H; L)$ constrains inputs and output.

Which Type of Plywood Firm was More Efficient?

The plywood industry would seem to satisfy many of the requirements for a study of the relative productivity of the different types of organizations. Though the number of workers (employment) in the typical co-op and the typical unionized mill were about the same, workers in the co-ops put in more shifts over the year so that annual hours worked per worker were about twelve percent greater in the co-ops.

In general, a productive workplace is one where, for given inputs into the production process, output is high relative to output in other workplaces. Hence a natural way of measuring productivity consists of determining how much output is produced per unit of all inputs. Use the mills' observations on plywood output, worker-hours, raw materials, and machines to estimate production functions for each of the three types of mills: co-op mills, unionized capitalist mills, and classical (that is, non-union) capitalist mills.

Three inputs are considered (raw material logs, capital, worker hours) and one output (measured in physical units, not in values). Annual observations describe individual mills over time: 7 co-ops, 19 unionized mills, and 8 classical mills. Posit a Cobb-Douglas production function:

$$ln(X_{it}) = \alpha + \beta\, ln\,(E_{it}) + \gamma\, ln\,(M_{it}) + \delta\, ln\,(K_{it}) + \varepsilon_{it}$$

where i denotes a mill and t a year. X is plywood output, E the number of worker-hours (the total number of hours worked by all workers), M the quantity of logs used, and K a measure of physical capital items. α , β , γ , and δ are parameters to be estimated and ε_{it} is an error term that incorporates the effects

on production of all omitted factors. This production function was estimated separately for each type of enterprise. Let *o* denote classical enterprises, *u* unionized enterprises, and *c* coops.

Write *Z(j)* for all the inputs and let $\theta(j)$ denote the estimated values of all the α , β , γ , and δ production function parameters *(j = o, u, c)*.

X[Z(j),θ(k)] = output implied by mean inputs corresponding to firm type *j* and parameters estimated to firm type *k*

for example, *X[Z(c),θ(u)]* = output implied if the mean inputs used by co-ops were applied to the production function parameters estimated for the unionized firms

In this way, a number of counter-factual situations can be examined to ascertain which production technology seems to generate the most output.

In the table below in line 1, we consider the level of output produced when firms use the average level of inputs actually employed by the coops. In this case, when these inputs are applied to the coops' production function parameters, θ_C, they generate 6.3 percent more output than when these same inputs are applied to the classical mills' production function parameters (θ_O) and 11.9 percent more output than when these inputs are applied to the unionized mills' production function parameters (θ_U).

In line 2, we consider the average level of inputs used by the unionized conventional mills. When these inputs are applied to the estimated co-op production function they generate 11.6 percent more output than when they are applied to the estimated unionized mills production function (in the final column).

In line 3 the production functions are evaluated at the mean values of the inputs of the classical mills. At these inputs, the implied differences between the output implied by the co-ops' production function and the outputs produced by the two conventional mills' production functions are very large - 57 percent and 51 percent. Perhaps little should be made of this particular comparison in view of the fact that very few co-op mills are ever observed operating at the levels of inputs calculated for the average classical mill.[10] Therefore, the figures on line 3of this table should not be taken too seriously. Nevertheless, whether evaluated at the co-ops' production function or at the unionized mills' production function or at the classical mills' production function, the co-ops produce more output from any given set of inputs.

simulated proportionate differences in output

		$X[\theta(c)] - X[\theta(o)]$	$X[\theta(u)] - X[\theta(o)]$	$X[\theta(c)] - X[\theta(u)]$
1	at *Z(c)*	0.063	-0.050	0.119
2	at *Z(u)*	0.116	-0.030	0.150
3	at *Z(o)*	0.573	0.040	0.513

[10] In other words, the average inputs used by the classical firms is much less than those used by the co-ops so the output levels predicted by the co-ops' production function parameters (θ_C) is substantially below the output actually produced by the co-ops. We are making inferences about the co-ops' output that is out of the sample range of their actual output and such out-of-sample inferences will be unreliable and uncertain.

Because of their similar size, the most convincing comparison is between the co-ops and the unionized mills where output is simulated at the levels of inputs actually employed by the co-ops and the unionized firms. The simple average of the proportionate differences between the co-ops and unionized mills' outputs in lines 2 and 2 is 13.5 percent (from the last column of the table). This is not a trivial difference. It is as if the workers in the co-ops can go on vacation for an extra seven weeks a year and still produce in total output what the unionized firms would have produced for that year.[11] The comparisons of the co-ops with the classical firms would suggest the co-ops are also superior in efficiency to the classical firms although the substantially different levels of inputs and outputs between the two groups of mills make comparisons more hazardous.

What is the source for this difference in productivity? Surveys suggest that a co-op's owner-workers are more industrious and the co-op mills operate with fewer supervisors than the conventional mills. "The shareholders [co-op workers] individually manage themselves and each other. Filled with a sense of responsibility for the enterprise as a whole, they work in a manner that is sufficiently diligent and responsible as to require little outside supervision. If coordination becomes necessary, or some members are not contributing in a way that other members consider appropriate, groups of worker-shareholders will tend to act as collective supervisors on the job".[12]

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[11] That is, the product of 0.135 and 52 weeks.

[12] Edward S. Greenberg, Workplace Democracy: The Political Effects of Participation, Ithaca: Cornell University Press, 1986, p. 49.

Monitoring in the Plywood Co-ops

In worker cooperatives, who monitors work effort to prevent shirking and who monitors the monitor? The plywood co-ops made use of a manager and, just like the capitalist firm, the general manager was an employee of the owners. The manager in the co-op was not one of the owners of the mill. However, while the typical manager in a capitalist firm is managing fellow employees, in a co-op the manager is supervising the firm's owners, the workers! It is an unusual situation for a manager to be supervising the people who own the firm. So it is not surprising that some plywood co-op managers complained they lack sufficient discretionary authority over certain operations and they sometimes met with resistance to decisions with which workers do not agree. As a consequence, some co-op mills experienced high turnover of managers who quit complaining about challenges to their authority by the worker-owners.

However, it also appears as if the general manager of a co-op mill has less of a monitoring function than his counterpart in a conventional mill. This is because, in a co-op, all the workers seem to function as monitors and they monitor one another. Rather than a problem of an absence of a monitor, the co-op has a surfeit of monitors! The reduced role of the manager as monitor is suggested by the fact that the number of supervisors was smaller in the plywood co-ops than in conventional plywood mills: a survey suggested that, on average, co-op mills operated with one or two supervisors per shift compared with the six or seven in capitalist mills. When one coop was converted to a capitalist mill, the number of supervisors quadrupled.[13]

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[13]Edward S. Greenberg, Workplace Democracy: The Political Effects of Participation, Ithaca, Cornell University Press, 1986

Is the University a Worker Co-op?

Imagine working in a university where the design of the curriculum, the courses that each faculty member teaches, and the scholastic standards determining the awarding of degrees are determined by the "managers" who have not and do not undertake any teaching or scholarship. Imagine also that, if enrollments in any department's courses suddenly drops, that department's faculty are promptly laid off. Would this system lead to a university with a curriculum and course structure that is "efficient" from the point of view either of research or of teaching and would it be a gratifying place to teach and study?

In fact, the American university is a good example of an organization where a subset of the workers participate extensively in determining its operation and design. Most universities are organized so that many issues are determined at a highly decentralized level and the university's principal administrative officers are drawn from the ranks of the faculty.

Unlike co-ops where workers' pay assumes the brunt of adjustments, in academia, wage flexibility has been severely attenuated by the system of tenure. The courts have interpreted tenure as implying that, except in special circumstances, no tenured professor may experience a nominal wage reduction. This obliges the university to seek other ways, both monetary and non-monetary, to respond to shocks.