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WHY ARE WORKER COOPERATIVES
SO RARE?

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ABSTRACT

This paper argues that worker cooperatives are prone to redistribution among members, and that this redistribution distorts incentives. I assume that employment contracts are incomplete. In the model cooperative members pay in a capital contribution to purchase equipment. They then receive shocks to ability. Each worker's (observable) output depends on ability and on effort, neither of which can be observed separately. After ability is realized, members vote on a wage schedule as a function of output. If the median member has less than average ability, the cooperative will vote for a redistributive schedule, dulling incentives. Whereas workers in firms owned by outside shareholders would quit if the firm redistributed away from them, cooperative members will be reluctant to leave, since this entails forfeiting the dividends on their capital contribution. The model can explain why cooperatives typically have egalitarian wage policies.

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As disillusionment with state socialism has spread, people on the left have increasingly advocated decentralization of decision making to local community organizations. As part of this movement, there has been renewed interest in worker cooperatives. Yet despite many attempts to establish worker cooperatives, from 19th century utopian communities, to Israeli kibbutzim, to non-ideological worker buy-outs, worker cooperatives remain rare, outside of professional partnerships.

This scarcity is puzzling, since cooperatives enjoy substantial advantages over firms owned by outside shareholders. Worker-owned firms can effectively avoid the corporate income tax by raising wages, and thus lowering recorded profits. Since the maximum corporate income tax rate is 40% in the United States, and 58% in Germany, this benefit is substantial. U.S. rules on Employee Stock Ownership Plans (ESOPs) provide further tax advantages [Hansmann, 1995]. Moreover, investors in cooperatives, unlike investors in firms owned by outside shareholders, do not have to worry that they may wind up sharing rents with unions. Aside from these tangible advantages of cooperatives, it is often argued that workers inherently value participatory decision-making in cooperatives and that worker cooperatives are better at monitoring managers and workers.

Legros and Newman [1996] and Bowles and Gintis [1996] argue that cooperatives are scarce because credit constraints prevent workers from buying shares in their firms. Others suggest that cooperatives are rare because cooperative members cannot diversify their capital income. While these factors are no doubt present, they seem inadequate to explain why worker cooperatives are so scarce, even in most industries with low capital requirements and stable

earnings.

This paper argues that worker cooperatives are rare because the very feature that makes worker cooperatives ideologically attractive -- democratic decision-making -- makes cooperatives prone to inefficient redistribution among worker-owners. Following Grossman and Hart [1986] and Hart and Moore [1990], I assume that it is impossible to write complete contracts specifying the myriad details of employment, including such intangibles as office allocation, choice of radio station to play at work, and assignment of tasks such as attending meetings in Hawaii. The defining characteristic of cooperatives is taken to be that any decisions not specified in the contract are determined by a majority vote of worker-members, either directly or through an elected manager or board of directors.

Section I examines a model in which cooperative members contribute a fixed payment that is used to buy the cooperative's capital stock. Members are then subject to shocks to ability. Each worker's (observable) output depends on her ability and effort, neither of which can be observed separately. The cooperative votes over the wage schedule as a function of output. Effectively, the cooperative votes over a tax rate, with the median cooperative member as the decisive voter. If the mean and median ability of cooperative members differ, cooperatives will choose a non-zero tax rate, and hence work effort will be inefficiently distorted. Cooperative members will remain in the cooperative as long as the cost of taxation is less than the value of the capital they forfeit by leaving the cooperative. In contrast, workers in firms owned by outside shareholders will receive their marginal product, since they can threaten to switch firms otherwise. The model thus helps explain the dramatic wage compression in cooperatives relative

to firms owned by outside shareholders.

To understand the intuition, it may be helpful to think of cooperatives as redistributing one member's dividends to another member, rather than as redistributing wages. In fact, members can only be taxed to the extent they have capital invested or are otherwise tied to the cooperative -- they would leave if the total payments from the cooperative fell below the wage they could earn elsewhere. The analogous phenomenon in firms owned by outside shareholders is redistribution among shareholders. For example, a majority shareholder could vote to sell the firm's assets at a discount to a separate firm it owns outright, thus expropriating dividends that would otherwise have been shared with minority owners. This has historically been a problem, and there is an extensive body of law designed to prevent groups of shareholders from exploiting other shareholders.² However, it is easier to prevent transfers among outside shareholders than among worker-owners since it is difficult to disguise transfers among people who only interact with the firm as shareholders, rather than as workers, suppliers, or customers.³ In any case,

² Until recently it was illegal for more than three shareholders to meet together. This law has been eliminated in large part because exploitation of shareholders by management is now seen as more of a problem than exploitation by other shareholders.

³ Opportunities for redistribution among shareholders are greater if one of the firms' shareholders is also a supplier or customer. For example, if a supplier has a majority of votes, it could transfer resources from other shareholders to itself by making the firm pay more than the market price for supplies. However, it is easier to make laws to prevent supplier-owners or customer-owners from expropriating other owners than it is to prevent worker-owners from exploiting other worker-owners. This is because it is easier to obtain information on fair prices for goods by looking at the price charged to other customers for the same good, whereas the heterogeneity and indivisibility of labor makes it difficult to determine a fair wage. Moreover, labor contracts cover many more dimensions than contracts for goods. For example, it is easier for a court to decide on whether Pepsi-owned Pizza Hut is paying an unfair price for Pepsi-Cola than to decide on a combination of wages, vacation policies, promotion policies, working conditions, and fringe benefits for an individual worker.

redistribution among outside owners may be less costly than redistribution among worker-owners, because it does not dull workers' incentives.

Section II argues that although redistribution distorts incentives, it provides potentially valuable insurance. Section III argues that the scope for redistribution in cooperatives cannot be eliminated through cooperative constitutions which guarantee departing members the right to reclaim their share of their capital stock on leaving the cooperative, since if cooperative members had the right to fully withdraw their capital share, cooperatives would be prone to costly dissolution. Section IV examines Farrell and Scotchmer's [1988] argument that since cooperatives share profits, workers will tend to sort by ability in joining cooperatives, as seems to be the case empirically in law firms. Section V examines the case in which high-ability cooperative members can credibly threaten to leave the firm if there is too much redistribution. Section VI goes outside the confines of the median voter model, arguing that the desire to protect cooperative members against potentially tyrannical majorities can paralyze cooperatives, making them reluctant to fire workers or introduce organizational or technological innovations with distributional implications. The conclusion discusses implications of the analysis for other institutions, arguing that limited liability helps avoid inefficient redistribution among shareholders in conventional capitalist firms. The conclusion also discusses the tradeoff between minimizing redistribution among owners and avoiding principal agent problem between owners and managers.

This paper develops ideas expressed by Hansmann [1988, 1990, 1995], Benham and Keefer [1991], Hart and Moore [1994], Gilson and Mnookin [1985], and Lang and Gordon

[1995]. It provides a formal model to support Hansmann and Benham and Keefer's argument that heterogeneity among cooperative owners creates inefficiency. One important difference is that although Hansmann and Benham and Keefer mention inefficient redistribution, they focus on majority cycles and the costs of decision-making. For example, Hansmann argues that law firms adopt equal sharing rules because "using a political process to decide on a more complex differentiated scheme of division would be time-consuming and divisive for all involved, and there is no reason to believe that a stable outcome could be easily achieved." This paper argues that cooperatives adopt equal share rules primarily because of the voting power of partners who would earn less under alternative arrangements. Unlike Hansmann or Benham and Keefer, this paper examines the role of exit mechanisms in limiting the ability of cooperatives to redistribute, and the insurance advantages of cooperatives.

Hart and Moore [1994] argue that consumer cooperatives will be inefficient if the preferences of the median voter differ from the mean preferences in the cooperative. This paper adopts their use of the median voter model, but focuses on producer, rather than consumer, cooperatives. Transferable membership can prevent inefficient redistribution in consumer cooperatives that face competition, but transferable membership is difficult to use in producer cooperatives because workers vary in quality in ways that are difficult to verify in court. While political conflict within consumer cooperatives is likely to be organized along differences in members' tastes, political conflict in worker cooperatives is likely to be structured according to differences in members' ability. A model that explicitly focuses on differences in ability among members of worker cooperatives can help explain the strong wage compression in cooperatives.

Several writers have discussed the role of cooperatives and partnerships in providing insurance [Gilson and Mnookin, 1985; Lang and Gordon, 1995]. However, these writers implicitly compare cooperatives with sole proprietorships, not with firms owned by outside shareholders. They are not explicit about why firms owned by outside shareholders could not provide the insurance provided by cooperatives. Moreover, they take the sharing rule as exogenous, or as simply reflecting the preferences of the cooperative as a whole, rather than explicitly modeling the sharing rule as the outcome of a political process within the cooperative.

I. A Median Voter Model of Cooperatives

This section considers a model of redistribution within cooperatives based on median voter models of redistribution in political democracies. Subsection 1.A. lays out the basic model. Sub-section 1.B. shows that the equilibrium tax rate will be non-zero, so work effort will generally be distorted in cooperatives.

I.A. The Model

Consider a model of workers choosing whether to join cooperatives or firms owned by outside shareholders. I assume that the time line is as follows:

1. Workers choose whether to join cooperatives or firms owned by outside shareholders.
2. Workers receive a shock to their ability.

3. The firm receives an uncontractable shock to its value.
4. The cooperative votes over a linear wage schedule as a function of output.
5. Given the wage schedule, workers choose whether to switch firms. I assume that workers pay a cost $q > 0$ in switching firms, which could be interpreted either as a relocation cost, or firm-specific knowledge that is lost in switching firms.
6. Workers choose effort levels and produce. Cooperatives pay wages and split the value of the capital.⁴

In step 1, initially identical workers choose whether to join a cooperative or a firm owned by outside shareholders. Workers who join firms owned by outside shareholders invest all their assets in the stock market, and workers who join cooperatives invest p in the cooperative. For the time being I will simply assume that no portion of the investment p can be refunded once it is made. Section III explains why I make this assumption. I also assume that there is no margin to adjust the amount of capital required per worker.

In step two, workers receive a shock to ability. I assume that realized ability, denoted A , has support $[A_{\min}, A_{\max}]$ and, that the median of A is less than the mean.⁶ I will first consider the

⁴Note that I assume that it is impossible to commit to a wage schedule before ability is realized, but that once ability is realized, cooperatives and firms can commit to a wage schedule. This assumption is analogous to the assumption in Hart and Moore [1990] that complete contracts cannot be made *ex ante* but that contracts can be made *ex post*. For example, it may be impossible for lawyers forming a firm to write a complete contract covering assignment of support staff and clients before specific support staff have been hired and particular clients obtained, but possible to write such contracts after uncertainty has been resolved.

⁶It is essential for the argument that the mean and median of A are unequal, but not that the mean is greater. If the median were greater, firms would choose negative taxes, rather than positive taxes, as will be clear below.

case in which people do not have private information about their future ability when they join the cooperative.

In step 3, the firm receives an uncontractable shock μ to the value of its capital equipment. After the shock, the value of the capital stock per worker is $Rp + \mu$, where R is the return on capital and μ is a mean-zero random variable.

Workers' output depends on ability, A , and effort e ,

$$Y = A + g(e), \quad (1)$$

where $g(0) = 0$, $g'(e) > 0$ and $g''(e) < 0$. I assume that the output of each worker can be perfectly observed, but that the worker's ability and effort cannot be observed separately. This makes it impossible for cooperatives to redistribute without distorting effort.

(More generally, output may be an additively separable function of both unobservable effort, e , and observable effort, e' , so that $Y = A + g(e) + h(e')$. Observable effort would be set optimally in both cooperatives and firms owned by outside shareholders, however, so it plays little role in the analysis.)

Utility is a concave function of consumption minus effort:

$$U(c - e). \quad (2)$$

Given this utility function, a social planner would choose effort such that $g'(e) = 1$.

I will assume that the cooperative votes over a linear wage schedule as a function of output. This is equivalent to choosing a tax rate τ , which is the proportion of each member's

output that is redistributed in a lump-sum fashion to the other $n-1$ members of the cooperative. (Equivalently, members could elect a manager who runs on a platform of imposing a particular tax rate.)

I.B. Equilibrium Effort and Wages

To solve for the equilibrium wage schedule and effort in cooperatives, work backwards, starting with the choice of effort for workers facing a given tax rate. Assuming that the tax is not sufficiently great to drive any workers out of the cooperative, consumption for worker i given a tax rate τ and effort e will equal

$$c_i = Rp + \mu + (1 - \tau)(A_i + g(e_i)) + \sum_{j=1}^n \frac{\tau(A_j + g(e_j))}{n}, \quad (3)$$

where n is the number of workers in the cooperative, which is assumed to be large. The first order condition for a worker choosing effort facing a tax rate τ and taking as given the effort level of other workers as e_j ,

$$g'(e) = \frac{1}{1 - \tau} \quad (4)$$

Note that all cooperative members will choose the same effort level, denoted $e(\tau)$, independently of their ability.

I will first consider the tractable case in which all members have sufficient investment in

the firm that they will remain even if the cooperative adopts a 100% tax rate. (If the tax rate is 100%, then e , unobservable effort, will be zero, but cooperative members would still exert the optimal amount of observable effort, e' .) To check the circumstances under which all cooperative members will stay in the cooperative, define $A^*[\tau]$ as the ability level at which a cooperative member is indifferent whether or not to leave given a tax rate τ . For workers with ability $A^*[\tau]$, utility from remaining in the cooperative is equal to utility from leaving the cooperative, forfeiting the share of the cooperative's capital as well as any firm-specific knowledge, and joining a firm owned by outside shareholders in which they exert the optimal level of effort and are paid their marginal product:

$$(1 - \tau) A^*(\tau) + \tau \bar{A} + g(e(\tau)) - e(\tau) = A^*(\tau) + g(e(0)) - e(0) - (Rp + \mu + q), \quad (5)$$

where \bar{A} denotes average ability among cooperative members. This simplifies to

$$A^*(\tau) = \bar{A} + \frac{Rp + \mu + q - g(e(0)) + e(0) + g(e(\tau)) - e(\tau)}{\tau}. \quad (6)$$

The highest ability worker will therefore remain in the cooperative even with a 100% tax rate if

$$A_{MAX} < \bar{A} + Rp + \mu + q - g(e(0)) + e(0). \quad (7)$$

For now, I assume this condition is satisfied. Section IV considers the case in which workers may wish to leave the cooperative.

To determine how workers will vote over tax rates, note that a worker with ability A_m will prefer the tax rate that maximizes

$$(1 - \tau) A_m + \tau \bar{A} + g(e(\tau)) - e(\tau). \quad (8)$$

The first order condition for the preferred τ for this worker is

$$\bar{A} - A_m = e'(\tau) (1 - g'(e(\tau))). \quad (9)$$

The left-hand side of (9) represents the extra income accruing to a worker with ability A_m from raising the tax rate, holding effort constant. The right-hand-side represents the reduction in effort caused by raising the tax rate, times the welfare cost of this reduction in effort.⁷

Assuming preferences are single-peaked,⁸ the median voter will determine the tax rate. (See Roberts [1977] for weaker conditions under which the median voter applies.) If the median voter has exactly the average ability, the tax rate will be zero. Since the effort level is monotonically decreasing in the tax rate, and $g'(e(0))=1$, if the median voter has greater than average ability, the tax rate will be negative. If the median voter has less than the average ability, then the tax rate will be positive. Thus, the choice of effort will typically be distorted in cooperatives, unlike in firms owned by outside shareholders.

Workers forming a cooperative might like to sign an agreement committing them not to

⁷Since the cooperative is assumed to be large, average ability can be treated as deterministic.

⁸A sufficient condition for utility to be concave in the tax rate and hence for preferences to be single-peaked is that $g''' > 0$. I am grateful to Andrei Sarychev for demonstrating this.

redistribute after ability is realized, but this is impossible as long as issues not fully specified in the employment contract are ultimately subject to democratic control by worker-owners. For example, suppose lawyers forming a firm agreed that they will be paid based solely on billings. If one lawyer turned out to have greater earnings ability than all the others, the others could threaten to assign her the worst paralegals, the smallest office, the most obnoxious clients, and the most onerous administrative duties unless she agreed to renegotiate the wage schedule. (I assume that the cooperative can stay within the contracted agreement, and still make life sufficiently miserable for the high-ability member that she would prefer to leave the cooperative rather than remain.)

The prediction that cooperatives will redistribute from their more productive members to their less productive members is consistent with their actual behavior of cooperatives. Many cooperatives, including most Israeli Kibbutzim, for example, pay all members equally. Even cooperatives without a strong ideological bent choose egalitarian wage schedules. Whereas plywood factories owned by outside shareholders have wage differentials of about 2.5 between the lowest and highest paid workers, cooperative factories (with a few exceptions) have equal hourly wages [Craig and Pencavel, 1995]. In many law firms, partners' with the same seniority receive the same share of profits, independent of productivity. (This may not actually constitute a 100% tax rate, since firms have ways of rewarding performance other than wages, such as allocation of offices and tasks.)

The work of Gaynor and Gertler [1995] suggests that this redistribution comes at a significant cost in output. They find that physician partnerships that allow members to keep a

10% greater share of their output have 3.8% higher output.⁹

Firms Owned by Outside Shareholders

It is straightforward to solve for equilibrium effort in firms owned by outside shareholders. Consider first the case in which the cost of switching firms, q , is zero. In this case, workers in firms owned by outside shareholders will receive exactly their marginal product. If a firm tried to pay a worker less than his or her marginal product, the worker would simply move to another firm. Given that workers receive exactly their marginal product, they will choose their effort level optimally.

If $q > 0$, then firms owned by outside shareholders will be able to extract rents from workers *ex post*, but this will not lead to effort distortions. Suppose the firm can make take-it-or-leave-it offers to workers. In this case, workers will be paid $A + g(e) - q$ after ability is realized, and competition among firms to sign up workers will lead all workers to receive a signing bonus of q . (More generally, if workers have some degree α of bargaining power, then workers would be paid $A + g(e) - (1 - \alpha)q$ *ex post* and would receive a signing bonus of αq .) The important point is that the shareholders will extract a lump-sum amount from all workers *ex post*. The shareholders

⁹The empirical literature does not suggest that cooperatives are systematically more or less productive than shareholder-owned firms, but it is not clear that this literature adequately addresses the selective attraction of workers into cooperatives. Moreover, in equilibrium the marginal cooperative should be as productive as the marginal firm. The question is why there are not more cooperatives.

have no reason to redistribute between high productivity and low productivity workers and so effort will not be distorted in a firm owned by outside shareholders.

Non-Linear Redistribution

So far, I have restricted the cooperative to linear redistribution to abstract from the possibility of majority cycles. To see that the distortion of effort in cooperatives does not arise simply because of this restriction to linear redistribution, consider the case in which the shock to ability is such that a majority of workers have the same ability and can simply impose their preferred redistribution schedule. In particular, suppose that the majority of workers have a realization of skill L and a minority have a realization H. The majority with skill L will vote for the wage schedule that maximizes their welfare subject to the participation constraint that type H workers prefer remain in the cooperative,¹⁰ and the incentive compatibility constraint that type H workers do not want to pretend to be type L workers, assuming $Rp+\mu+q$ is sufficiently great. Following standard mechanism design principles, the optimal schedule will distort downwards the effort of type L workers. The amount that L workers can redistribute from H workers and the distortion of effort will be non-decreasing in $Rp+\mu+q$.¹¹

¹⁰ I assume that it is efficient for the high-ability workers to remain in the cooperative. As discussed in Section V, if switching costs are small enough, the majority may prefer to force high ability workers out of the cooperative.

¹¹A formal proof, for which I thank Andrei Sarychev, is available from the author.

There is no way the cooperative can redistribute from rich to poor members through lump-sum taxation, since effort and ability cannot be observed separately, just as in the standard Mirrlees model. The revenue taxed from workers must be distributed among the owners of the cooperative, and if it is both taxed and redistributed in a lump-sum fashion, then income has not been redistributed.

This paper takes as given that political coalitions in cooperatives will develop along the lines of earning ability, just as in political democracies. I do not address the question of why redistribution does not take place solely around dimensions that are not subject to distortion, such as height.

Comparative Statics of Redistribution

The model with two skill levels suggests that the scope for redistribution increases with the size of the capital stock. If redistribution is *ex ante* inefficient, cooperatives will be more attractive in industries in which firms have little physical capital. This prediction matches the concentration of cooperatives in service professions, such as law. The model also suggests that if there were some margin to adjust the amount of capital per worker, cooperatives would choose lower capital/labor ratios, because this would reduce the scope for inefficient redistribution. In

fact, Craig and Pencavel [1995] find that cooperative plywood factories tend to be less capital intensive than those owned by outside shareholders.¹²

Similarly, the model suggests cooperatives will be more common in industries with smaller costs of switching firms, and thus less scope for redistribution. This seems to be the case. Cooperatives are common among professionals. A lawyer at a big-city law firm can probably switch firms more easily than an engineer at General Motors, or a sales manager at Xerox.

II. Insurance Benefits of Cooperatives and Choice of Organizational Form

Although redistribution distorts effort choice, it provides potentially valuable insurance against unfavorable realizations of ability. Firms owned by outside shareholders will have difficulty committing not to renege on promises to insure workers against shocks to their ability.¹³ Just as cooperatives cannot commit to act against the *ex post* interest of their median member, firms owned by outside shareholders cannot commit not to act against the *ex post* interest of their shareholders. A firm owned by outside shareholders that wished to insure workers against shocks to ability would have to require the workers to pay a premium, out of

¹²These predictions do not distinguish this model from models in which credit constraints make it difficult for workers to purchase their firms.

¹³Outside insurance companies will be ill-placed to provide insurance against shocks to ability if there is some component of effort which is observable within the firm but not outside.

which the firm would finance payments to workers who turned out to be low ability.¹⁵ *Ex post*, however, the firm would have an incentive simply to confiscate the premium. Even if there were some mechanism to force the firm to return the value of the premiums to the workers, *ex post* the firm would prefer to give bonuses to random workers, rather than to actually pay workers with low output, because actually paying insurance would dull incentives, and thus reduce the firm's profits.¹⁶ In contrast, the redistribution that is optimal for the median cooperative member *ex post* will make all workers better off *ex ante* if they are sufficiently risk averse.

To determine whether workers will choose to join cooperatives or firms owned by outside shareholders *ex ante*, note that expected utility for someone entering a cooperative will be greater than expected utility in a firm owned by outside shareholders if

$$E [U((1-\tau)A + \tau \bar{A} + g(e(\tau)) - e(\tau) + Rp + \mu)] > E [U(A + Rp + g(e(0)) - e(0))], \quad (10)$$

where τ is the tax rate preferred by the median voter *ex post*.

Considering some polar cases is useful. Although cooperatives provide more insurance against shocks to ability than firms owned by outside shareholders, cooperative members may still face more risk than workers in capitalist firms since the capital income of cooperative members is not diversified. If the distribution of μ is second order stochastically dominated by

¹⁵If the firm owned by outside shareholders simply raised wages for low-ability workers and paid for this by reducing wages for high-ability workers, the high ability workers would leave.

¹⁶I assume that there is some component of effort which is observable, but not contractable and that the firm could simply claim that low ability workers had not exerted the optimal amount of this effort.

the distribution of $A - \bar{A}$, then firms owned by outside shareholders, which allow full diversification of shocks to the firm's value, will always be preferred to cooperatives.

If cooperatives provide more overall insurance, the choice of organizational form will be dictated by the tradeoff between insurance and incentives. If workers are not risk averse, then (10) cannot be satisfied if the tax in the cooperative is non-zero, and if effort is at all elastic to the tax. In this case, workers will join firms owned by outside shareholders, rather than cooperatives. On the other hand, if all effort is observable, so that it is set optimally in both cooperatives and firms owned by outside shareholders, $g(e)$ is always zero, and if the median ability in the cooperative is less than the average ability, then tax rates will be 100% in cooperatives, and (10) will reduce to:

$$E(U(\bar{A} + Rp + \mu)) > E(U(A + Rp)) \quad (11)$$

In this case, risk-averse workers will join cooperatives if the distribution of μ second order stochastically dominates the distribution of $A - \bar{A}$. In fact, cooperatives tend to arise in industries in which the variance in realizations of ability is large and effort is fairly easy to observe. As Hansmann [1995] points out, it is much easier to determine how many hours a lawyer has billed than to determine the productivity of a personnel manager or a receptionist.

Whereas some have argued that cooperatives are rare because they provide too *little* insurance since the labor and capital income of cooperative members are correlated, this view suggests that cooperatives may provide too *much* insurance and too little incentive. It seems plausible that cooperative members bear less risk than comparable nonmembers, although I know

of no systematic evidence on the issue. Craig and Pencavel [1992] show that members of plywood cooperatives have much less variable employment than workers in firms owned by outside shareholders. None of the 20,000 employees of the Mondragon cooperative in Spain has ever been dismissed [Bonin, Jones, and Putterman, 1993]. Since labor income is a much larger share of income than capital income for typical cooperative members, it seems likely that cooperative membership reduces uncertainty about income.

I have adopted the standard assumption in the literature on organizational form that organizations cannot commit through reputation. To the extent that reputational mechanisms are available, firms owned by outside shareholders would try to establish a reputation for insuring workers against shocks to their ability and cooperatives may try to establish a reputation for not redistributing too heavily. If reputational mechanisms are imperfect, the analysis will be qualitatively similar, but both cooperatives and firms owned by outside shareholders will more closely approximate the optimal trade-off between effort and incentives. If firms and cooperatives could perfectly commit, then there would be little difference between cooperatives and firms owned by outside shareholders, although workers in cooperatives would have to bear additional risk because their portfolios will not be diversified.

Private Information About Ability

So far, I have examined the case in which workers do not have private information about ability before choosing whether to join a cooperative or a firm owned by outside shareholders.

However, in many cases, workers have at least some private information about their ability. In these cases, cooperatives will be subject to adverse selection. Workers who believe their ability is greater than the average ability in cooperatives will be reluctant to join cooperatives, because they will expect cooperatives to redistribute away from them. This process may lead to an unraveling of the market for cooperatives.

The welfare properties of cooperatives are very different if workers have private information about their abilities. Adverse selection might make cooperatives rare even if their insurance benefits outweighed the costs of effort distortion. The desire to avoid this adverse selection problem may help explain legal restrictions on ownership by outside shareholders in law and medicine. The American Bar Association model rules of professional conduct explicitly proscribe lawyers from serving as employees of profit-seeking organizations that sell legal services to the public if the organization is not owned by lawyers who practice in it. Hansmann [1995] notes that almost every state incorporates this provision, or a similar provision, into law, and that analogous rules applied to medicine until 1973.

III. Exit Mechanisms to Limit Inefficient Redistribution

Cooperatives could try to commit not to redistribute by adopting rules allowing departing members either to sell their membership or to claim a refund of their share of the capital stock of the cooperative. This section argues that such rules could potentially reduce inefficient

redistribution, but that they could not be made strong enough to eliminate redistribution without risking premature dissolution of cooperatives.

Transferrable membership is likely to help prevent inefficient redistribution in some types of consumer cooperatives, but is not as tenable in producer cooperatives. To see why transferable membership may prevent redistribution in consumer cooperatives, suppose that most members of a consumer cooperative like carrots, but a minority like zucchini. If the carrot-eaters tried to inefficiently redistribute away from the zucchini-eaters by lowering carrot prices and raising zucchini prices, the zucchini-eaters would simply sell their shares in the cooperative grocery to carrot-eaters.¹⁷

However, the unverifiability of worker ability makes it difficult to implement transferable membership in most producer cooperatives. The remaining cooperative members will prefer that the departing member sell her membership to a high ability worker, while the departing member will prefer to sell to a low-ability worker, since low ability workers will place the highest value on membership in the cooperative. The cooperative could use the power to approve new members to expropriate departing members by insisting on a very high ability replacement.¹⁸

¹⁷Transferable membership will not prevent redistribution if all the high-valuation potential members are already members, as is likely to be the case if the consumer cooperative is a monopoly. This is likely to be the case for the stock exchange examined by Hart and Moore [1995].

¹⁸Membership is transferrable in the plywood cooperatives of the Pacific Northwest. The plywood industry does not require many specialized skills, but new members are still required to go through a probationary period before being accepted. Housing cooperatives which have transferable membership are sometimes restrictive about accepting new members, and this is sometimes a source of acrimony.

A rule that departing cooperative members receive an exit payment will also not eliminate redistribution if the firm is subject to non-contractable shocks to its value. Let z denote the value of the exit payment. If $R_p + \mu$, the realized value of the capital stock, is greater than z , high ability workers will tolerate some degree of redistribution without leaving. On the other hand, if $R_p + \mu$ is less than z , the cooperative will dissolve. This will be inefficient if there are bankruptcy costs.

It is even harder to prevent redistributions if cooperative members face some cost $q > 0$ of switching firms. In this case, departing members would need to receive $R_p + \mu + q$ to prevent redistribution. However, if the exit payment were $R_p + \mu + q$ there would be an equilibrium in which all members tried to leave the cooperative immediately, because they expected others to leave and exhaust all assets of the cooperative. The cooperative could dissolve in a process akin to a bank run.

In practice, cooperatives often allow members to reclaim part of their capital when leaving the cooperative. For example, in the Mondragon cooperative, profits are divided between individual capital accounts and a collective capital account that receives 30% of the surplus. Workers who resign from the firm are entitled to 70% of their accumulated individual capital account [Bonin, Jones, and Putterman, 1993]. This partial access to capital may reflect a trade-off between preventing inefficient redistribution and avoiding inefficient dissolution of cooperatives.

IV. Sorting of Workers Into Cooperatives

Farrell and Scotchmer [1988] argue that since partnerships share profits, workers will sort by ability in joining cooperatives. For example, law firms sort lawyers by ability. The intuition is appealing, but the analysis is somewhat more complicated if the sharing rule within cooperatives is endogenous.

In the previous sections, workers were identical when they joined cooperatives. It is useful to consider a more general model in which workers differ in signals of ability. Suppose that if worker i has an initial, observable signal of ability S_i , the worker's realized ability is $(S_i + A_i)^\theta$, where A_i and θ are random variables. A_i is a shock to individual ability, as in the previous sections, and θ is a common shock to the process determining earning power (such as the recent rise in inequality in the U.S.).

Below I argue that if either A or θ were deterministic, cooperatives could commit to the level of redistribution preferred by workers *ex ante* by appropriate choice of membership. However, if both A and θ are random, such commitment will be impossible.

Consider first the case in which A is deterministic and workers are risk neutral, so they prefer a zero tax rate *ex ante*. If θ were always one, any symmetric distribution of signals of ability in the cooperative would generate zero taxes *ex post* if the cooperative is restricted to linear taxes.¹⁹ If θ is a random variable, the only distribution of initial ability that will guarantee

¹⁹If cooperatives are not restricted to linear taxes, it will be even more difficult to choose members to obtain the optimal tax rate. For example, if workers are risk neutral so a zero tax rate is optimal, a symmetric distribution will yield optimal taxes if taxes are linear. However, if cooperative may choose non-linear taxes, they could tax the highest and lowest ability members and make transfers to middle ability members.

zero taxes is that in which all workers in the cooperative have identical initial signals of ability, S_i . In this case, one obtains the Farrell and Scotchmer result of complete sorting by ability. Note that if there is no shock to individual ability, and if workers are able to sort perfectly by initial signals of ability, then the cooperative will have a zero tax rate and there will be no effort distortion.

A somewhat more complicated case is when θ is always equal to one, but there are shocks to individual ability, A_i . Under the restriction to linear taxes, a newly-forming cooperative might try to engineer its distribution of signals of ability so that the members would vote for the tax rate preferred *ex ante*. For example, if workers were risk-neutral and the distribution of shocks was skewed to the right, the cooperative could admit many workers with signals of some ability level S^* , and then bring expected average ability down to median ability by also admitting a few workers of very low ability. If the cooperative engineered its membership to generate a zero tax rate, it would be happy to have low ability members enter with the same capital contribution as other members, but if it expected a positive tax rate, workers who were expected to be low ability would have to pay more to enter the cooperative.

If both A and θ are random variables, it will be impossible to choose an initial distribution of signals of ability that guarantees the optimal *ex post* tax rate. The distribution of signals of ability that is optimal for one realization of θ will not be optimal for another realization.²⁰

²⁰ What is needed for this impossibility result is that the cooperative face a common shock, not necessarily a common shock to ability. A shock to the voting procedure would have the same effect. I have assumed that the cooperative votes over a linear tax rate. If the

Cooperatives are likely to prefer a non-degenerate but fairly tight distribution of expected realizations of ability. Assuming that cooperative members will stay in the cooperative even with a 100% tax rate, the tax rate depends only on the gap between average and median ability in the cooperative, denoted Ψ . I assume that the cooperative is large enough and the density of function for A is smooth enough that Ψ can be treated as stochastic only because of its dependence on θ . Risk-averse workers will prefer some $\Psi^* > 0$, so taxes are positive. However, if the cooperative is subject to a common shock, then the variance in Ψ , and thus the variance of the tax rate, increases when the expected distribution of ability is blown up symmetrically. This suggests that it may be optimal for cooperatives to be fairly homogeneous in initial signals of skill.

V. Will All Workers Remain in the Cooperative?

This section considers the case in which sufficiently high tax rates will cause some members to leave the cooperative. It shows that if the marginal cooperative member has a sufficiently high cost of switching firms, then the other members will (locally) prefer tax rates that keep the marginal member in the cooperative; otherwise they will (locally) prefer to force out the marginal member. Preferences over tax rates will not generally be single-peaked and

cooperative votes over a single parameter family of progressive tax rates, as in Benabou [1997], the median voter will prefer a positive tax rate if the distribution of skill is symmetric. If there is uncertainty whether the cooperative or firm will vote over a linear or a progressive tax rate, then it will be impossible to choose a distribution of initial signals of skill such that the desired tax rate is chosen with certainty.

hence there will not necessarily be an equilibrium tax rate. However, if there is an equilibrium tax rate, effort will be distorted as long as the ability of the median worker differs from the average ability.

Previous sections examined the case in which all workers would remain in the cooperative even with a 100% tax rate. Now consider the case in which the highest ability worker has ability $A^*(\tau^*)$ for some $\tau^* < 1$. In the absence of costs of switching firms, the other cooperative members would prefer a tax of $\tau^* + \Delta$ to a tax of τ^* , for a sufficiently small Δ . This is because the remaining members of a cooperative appropriate the increase in social welfare created when the marginal member leaves the cooperative and joins a firm owned by outside shareholders in which effort is undistorted. To see this, note that a worker who had been indifferent whether to stay in the cooperative will have a welfare loss from taxation of $R_p + \mu$, the value of her capital share in the firm. However, since taxes are distortionary, the amount redistributed to the other cooperative members is only $R_p + \mu - (g(e(\tau)) - c(\tau) - [g(e(0)) - c(0)])$. If the marginal member is forced out, the rest of the members can appropriate the worker's capital share, $R_p + \mu$.

On the other hand, if workers face sufficient costs in switching firms (for example, relocation costs or the loss of firm-specific human capital),²¹ it will be socially efficient for the member to remain inside the cooperative. In this case, other cooperative members will (locally)

²¹If workers face moving costs, firms owned by outside shareholders will typically not pay workers their full marginal product. Workers and capitalists will bargain over the intercept of the wage schedule, but the wage schedule will still increase one-for-one with output, leaving the effort choice undistorted.

prefer to keep the marginal member inside the cooperative. This is because the marginal member will accept a welfare loss from taxation of up to $R_p + \mu + q$, where q denotes switching costs, but the other cooperative members will only appropriate $R_p + \mu$ if the member is forced out. In the special case in which the moving costs, q , exactly offset the cost of effort distortion inside the cooperative, $g(e(\tau)) - e(\tau) - [g(e(0)) - e(0)]$, cooperative members will be indifferent whether or not marginal workers stay in the cooperative.

If cooperative members prefer either to drive out marginal members, or to keep them in, preferences will not be single-peaked. To see this, recall that if the marginal member has no cost of switching firms, then all the workers with skill less than $A^*(\tau^*)$ will prefer an increase in the tax rate from τ^* to $\tau^* + \Delta$, for sufficiently small Δ . In this case, the preferences of a worker with ability just less than $A^*(\tau^*)$ will not be single-peaked, because that worker's utility will decline in the tax rate for $\tau < \tau^*$, will increase as the tax rate increases from τ^* to $\tau^* + \Delta$, and will decline with taxes again for high enough tax rates. (A similar argument can be used to show that the preferences of low-ability cooperative members will not be single-peaked if cooperative members prefer to keep marginal members in the cooperative.)

If cooperatives may choose tax rates that induce some members to leave, median voter theory may not apply and hence it is difficult to solve for the equilibrium tax rate, or even to show that an equilibrium exists.²² However, zero cannot be an equilibrium tax rate as long as

²²There is a further problem with the analysis -- if a worker leaves the cooperative, mean and median ability in the cooperative will change, changing the equilibrium tax rate. In order to abstract from this problem, I assume members who cease to work at the cooperative retain voting rights.

the ability of the median voter differs from the average ability in the cooperative. To see this, note that if the tax rate is zero, small changes in the tax rate will not cause anyone to leave the cooperative. However, the median voter will prefer to change the tax rate from zero if her ability differs from that of the average worker.

VI. Beyond the Median Voter Model

This paper has followed the political economy literature in using the median voter model for tractability. However, actual political behavior in cooperatives, as in nations, may be much more complicated.

Although it is not clear why, political democracies often adopt policies that are less efficient than the median voter model would suggest. Farmers are supported through farm subsidies and cheap water provision, rather than more efficient transfers. Cooperatives also seem to be inefficient in ways not captured by the median voter model. Kibbutzim and many 19th century utopian cooperatives impose considerable joint consumption. Cooperatives seem very unwilling to fire workers. As mentioned above, no worker has ever been dismissed from the Mondragon cooperative.

Redistribution within cooperatives may be based on characteristics other than output. For example, workers with seniority could impose pay policies that reward seniority, married workers could impose generous parental leave, or male partners in a law firm could assign the least interesting work to female partners. Distributional conflict in law firms sometimes

becomes particularly intense when the relative profitability of various specialities shifts. Anderson has recently faced conflict between accounting partners and partners in its more lucrative consulting business. Some of these ex-post redistributions will be inefficient, and in any case, if they cannot be perfectly anticipated, they will make risk-averse cooperative members worse off *ex ante*.

Whereas the analysis of cooperatives above suggests that cooperatives would be vulnerable to arbitrary expropriations of minorities by majorities, actual cooperatives seem to be characterized by a strong concern for fairness among partners. I suspect this is for the same reason that political democracies adopt constitutions guaranteeing basic liberties. Because people know that minorities are potentially vulnerable to arbitrary redistributions, and because they know they could be members of a minority, they try to develop mechanisms to prevent distributional changes. This creates a conservatism that makes cooperatives reluctant to fire members or to alter rules or technologies. For example, law firms have been slower than most corporations in allowing employees to work part-time while raising children.

One way to model this might be through allowing history-dependent voting strategies. There is an extremely wide set of voting equilibria with history-dependent voting strategies, many of which are inefficient. Following Ordeshook and Niou [1990], suppose that in order for cooperatives to make a decision, somebody must first propose a motion. There will be a set of equilibria in which: 1) anyone who proposes a motion that violates an allocation rule will themselves be punished by the confiscation of the capital that they have supplied to the firm (whether or not their motion passes); and 2) people who propose to punish someone who has

proposed a motion violating the allocation rule are not themselves punished. The only restriction on the set of allocations that can be sustained is that every member of the cooperative must receive some surplus from staying in the cooperative under the allocation, so that confiscation of capital is a punishment. To see that these will be equilibria, note that everyone will vote in favor of confiscating the capital of someone who proposes violating the allocation rule, because punishment allows them to obtain a share of the person's wealth. (It seems plausible that risk averse cooperative members would also want eliminate leaders who have shown that they are willing to propose violations of the norms, but there is no need to appeal to this motive for punishing people who propose violating the rule.)

Cooperative constitutions could be designed so as to eliminate equilibria based on punishing people who propose motions that violate the allocation rule. For example, these equilibria could be eliminated by allowing people to propose policies anonymously. However, if potential cooperative members designing their cooperative's constitution are risk averse, they may prefer an inefficient equilibrium, rather than the risk of being expropriated.

VII. Conclusion

As Hansmann (1988, 1990, 1995), Benham, and Keefer (1991), and Hart and Moore (1994) have argued, heterogeneity among cooperative members may lead to inefficiency. Once members of a worker cooperative have paid in their capital contribution, they will be reluctant to leave. Cooperatives will therefore have some latitude to redistribute income among members.

Since the median voter will typically vote for some redistribution, effort will generally be distorted. Because it is easier to write contracts preventing transfers among outside shareholders than among worker-owners, it will generally be more efficient for outside shareholders to own firms.

The conclusion argues that the institution of limited liability helped overcome analogous problems of inefficient redistribution in firms owned by outside shareholders. It also examines the tradeoff between avoiding inefficient redistribution among owners and minimizing principal-agent problems between owners and managers.

Limited liability is often seen as critical to the modern economy. This analysis suggests a new interpretation of why this might be so: limited liability reduces scope for inefficient redistribution among shareholders. Under unlimited liability, shareholders with a high fraction of their wealth invested in the firm may prefer for the firm to undertake risky projects with negative expected value, because they will share the gains if the project succeeds, but will not share fully in the losses if the project fails and the firm goes bankrupt. On the other hand, shareholders with a small proportion of their wealth invested in the firm may prefer not to undertake risky projects with positive expected value, because they will bear a disproportionate share of the costs if the project fails. If shareholders vote to decide whether to undertake projects, and if the median shareholder has a different share of wealth invested in the firm than the average shareholder, then the firm will not maximize expected profits. Limited liability makes shareholders homogeneous, avoiding this type of inefficient redistribution.

Redistribution among owners has implications for other institutions as well. The model

may help explain why Russian firms which have been privatized with substantial worker and management ownership have not performed very well. The analysis also suggests an analogy between unions and cooperatives. Freeman and Medoff [1984] provide evidence that unions flatten wage distributions within firms, and suggest that this may be because median ability in the union is less than average ability.

Whereas much of the corporate finance literature examines conflicts between owners and managers, this analysis examines conflict between owners with different interests. In some cases, there may be a tradeoff between reducing the scope for inefficient transfers among owners and minimizing the inefficiency associated with principal-agent problems between owners and managers.

Proponents of cooperatives often argue that workers are better than outside owners at monitoring managers. If this is true, cooperatives may reduce principal-agent problems at the cost of exacerbating conflict among owners. However, it is not clear that cooperatives are better than firms owned by outside shareholders at monitoring managers. Owners have more incentive to monitor managers when ownership is concentrated. Large cooperatives will have low ownership concentration if each member has an equal vote. This may explain why most cooperatives are small. Even with 15 or 20 members, concentration of ownership among the top 3 owners would be smaller in cooperatives than in most firms owned by outside shareholders. On the other hand, firms or cooperatives with concentrated ownership may be more vulnerable to redistribution among owners.

Cooperatives may be able to restrict inefficient redistribution among members by

delegating authority to managers, but only at the cost of increased agency problems. Crew members and boat owners in the nineteenth century whaling industry held shares in the profits realized from the voyage, but given the available communications technology, decisions at sea were made by the captain, rather than by a majority of shareholders. The story of Moby Dick suggests this sometimes created principal agent problems. The most successful worker cooperatives, such as Mondragon, have restricted worker control by delegating authority to elected boards. However, this has not eliminated redistribution -- workers in the Mondragon cooperative voted down management proposals to widen the ratio of wages between the highest and lowest paid workers [Hansmann, 1995]. Hansmann notes that ESOPs transfer ownership of the firms to workers without transferring control.

While in many ways the analysis suggests pessimism about the future of cooperatives, it also suggests there may be potential for improved cooperative performance with better institutional design. It may be possible to reduce inefficient redistribution by using written or unwritten constitutions to restrict the control of workers in areas that are particularly vulnerable to inefficient redistribution, by making it easier for workers to leave cooperatives, or by designing mechanisms through which neutral third parties adjudicate disputes among members. Just as the institution of limited liability helped reduce inefficient redistribution among shareholders, there may be institutional innovations that will reduce inefficient redistribution among members of worker cooperatives.

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