ORGANIZATIONAL FORMS AND INTERNAL EFFICIENCY

Markets and Hierarchies: Some Elementary Considerations

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The principal purposes of this paper are to examine the factors which induce a shift of transactions from market to internal organization and, within internal organization, to explain the types of hierarchical relations that predictably emerge. It is generally acknowledged that a prima facie case for the development of nonmarket (or quasi-market) forms of economic organization can be said to exist whenever the market, if used to complete a set of transactions, experiences "frictions." But this is only a rebuttable presumption. As R. Coase has emphasized repeatedly, the problems of efficient economic organization need to be examined in a comparative-institutional way (1960, pp. 17–18; 1964, p. 195). Concern with the study of market failures should thus be expanded to include "institutional failures" (of internal organizational, political, and judicial types) more generally.

As compared with the study of market failures, the analysis of the sources and consequences of internal organizational failures is at a very primitive stage of development. I submit, however, that substantially the same factors that are ultimately responsible for market failures also explain failures of internal organization. If this contention is correct, the study of alternative modes of economic organization can proceed in a symmetrical fashion. Rather than having to devise a separate apparatus for each organizing mode, a common language and conceptual apparatus can be brought systematically to bear across modes.

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I. Markets and Market Failures

It will be argued here that the interesting problems of economic organization are mainly to be explained by reference to the conjunction of a set of human attributes with a related set of (largely nontechnological) transactional factors. Inasmuch as economics is a social science concerned with exchange, this is perhaps unsurprising. Discussions of economic organization nevertheless are frequently dominated by references to technology.

To be sure, technological indivisibilities or nonseparabilities in production processes sometimes exist and have important organizational implications. Inasmuch, however, as exclusive reliance on such considerations would permit only relatively simple forms of economic organization to be explained, whereas actual firms and markets are often highly complex and subtle instruments, other (nontechnological) factors are presumably operative. To these we now turn.

A. Human Factors

But for the existence of one or more of the following three factors, there would appear to be little reason to supplant market organization with some form of nonmarket organization.

1. Bounded Rationality

Bounded rationality refers to rate and storage limits on the capacities of individuals to receive, store, retrieve, and process information without error. The reasons why the absence of unlimited computational capacity prevents comprehensive contracting of the sort required for the standard theorems on the existence and optimality of a competitive equilibrium to go through have been examined by R. Radner (1968). Certain specific problems of interfirm (but, more generally, of autonomous) contracting are also examined in my discussion of vertical integration (1971, pp. 115–18).

2. Opportunism

Opportunism is an effort to realize individual gains through a lack of candor or honesty in transactions.[1] It can take either of two forms. The most commonly recognized is the strategic disclosure of asymmetrically distributed information by (at least some) individuals to their advantage. Original negotiations may be impaired on this account.

The second type manifests itself during contract execution and renewal. The impossibility of extracting what can be confidently regarded as self-enforcing promises to behave "responsibly" requires that agreements be monitored and may pose problems, due to first-mover advantages, at the contract renewal interval—where by a first-mover advantage I mean that winners of original bids acquire firm-specific experience which places them at a cost advantage in relation to nonwinners on subsequent rounds of negotiation (O. Williamson, 1971, p. 116). (The consequences of this are discussed further in conjunction with the small numbers issue below.)

3. Atmosphere

Individuals are not (all) given to the strict maximization of expected pecuniary gain but also consume "atmosphere." Modes of organization or practices which would have superior productivity consequences if implemented within, and thus would be adopted by, a group of expected pecuniary gain maximizers may be modified or rejected by groups with different values. For one thing, favorable productivity consequences may no longer obtain. In addition, preferences for atmosphere may induce individuals to forego material gains for nonpecuniary satisfactions if the modes or practices are regarded as oppressive or otherwise repugnant.

This does not lead to a uniform preference for one mode of organization over another, however. Individuals who value independence highly may favor markets over hierarchy, while others may favor internal organization because of associational satisfactions which they derive. The institutional design problem requires that requisite variety be supplied so as to permit individuals to allocate themselves appropriately among alternative modes.

B. Transactional Factors

Whether markets experience contractual problems as a result of bounded rationality and opportunism turns on a related set of transactional factors. Thus the consequences of bounded rationality are less severe if the transactions in question are uncomplicated and experience little un-

[1] Returns attributable to productive advantages (e.g., a unique location or differential skill) are *not* to be regarded as opportunistic. Strategic representations are required for opportunism to obtain.

certainty. Similarly, opportunism is restricted if competition reliably obtains or if information asymmetries can be overcome at little cost.

1. Uncertainty

The effects of uncertainty on economic behavior are extensive and pervasive (K. Arrow, 1969, 1971; Radner, 1968, 1970). Of particular interest to us here is that, inasmuch as a full set of contingent claim markets is infeasible (by reason of bounded rationality), adaptive, sequential decision-making procedures need be devised. Vulnerable as market exchange is to opportunism in these circumstances, hierarchical forms of organization are apt often to be favored.

2. Small Numbers

If a large number of traders are roughly equally qualified to supply the good or service in question—not merely at the outset but also (inasmuch as environmental uncertainty and bounded rationality render once-for-all contracts uneconomical) at contract renewal intervals—competition will obtain, trading ranges will be narrowly restricted, and market exchange will be attractive. But while frequently a large numbers condition will seem to obtain at the outset, this may be illusory or may not continue into contract renewal stages.

The illusion is that implicit homogeneity assumptions may not be satisfied. Nonhomogeneity coupled with information impactedness and opportunism pose serious disclosure problems. Not only can markets shrink on this account, but they may vanish altogether (see G. Ackerlof).

In addition, although large numbers homogeneity conditions may obtain at the outset, this may no longer hold at the contract renewal interval. If parity among suppliers is upset by first-mover advantages, so that winners of original bids subsequently enjoy nontrivial cost advantages over nonwinners, the joining of users and suppliers under a sales relationship will predictably give rise to small numbers haggling and associated maladaptations.

The argument has relevance not only for examining when separable components will be made internally rather than purchased, but also when the work flow between successive individuals will be exchanged under an employment rather than a sales relationship. Transaction-specific human capital is not all that uncommon (P. Doeringer and M. Piore) and favors hierarchy.

3. Information Impactedness

Information impactedness is partly an information asymmetry condition: one of the agents to a contract has deeper knowledge than does the other (Arrow 1969, p. 55). But more than asymmetry is implied by our use of the term impactedness. It is also costly for the party with less information to achieve information parity. To the extent that it is difficult to distinguish between agents who disclose the impacted information to which they have access in an opportunistic (selective or distorted) manner from those who make good faith representations, agents of the latter type may be induced to withdraw from the market.

C. An Example

Although most of the problems of markets (including public goods, externalities, markets for information (including invention), etc.) can be traced to the conjunction of the human and transactional factors described above (in that, absent these, the problems would vanish), it is beyond the scope of this paper to attempt such a showing here. Insurance, however, offers a simple illustration. Risk aversion will be assumed and the question is whether a

group of individuals who are exposed to independent risks will be able to pool these successfully with an insurer.

Assume that the members of the group are uniformly distributed over the risk interval p_1 to p_2, where $p_1 < p_2$ and p denotes the probability for a particular individual that the contingency to be insured will eventuate. (Since this probability will vary depending on the risk-mitigating actions taken by an individual, assume that p reflects efficient risk mitigation.) Whereas individuals will be assumed to know their risk characteristics exactly, the insurer is unable, at low cost, to distinguish one member of the group from another. Information impactedness thus obtains. Assume also that the highest premium that an individual of risk class p will pay is $(p+\epsilon)D$, where $\epsilon < (p_2 - p_1)/2$, and D is the (common) damage that will be incurred if the contingency obtains.

In the absence of other information, and assuming transaction costs to be negligible, insurers would break even if they could sell insurance to all members of this group at a premium of $[(p_1+p_2)/2]D$, which is the mean loss. Such a premium will be regarded as excessive, however, by those risk types for whom $p+\epsilon < (p_1+p_2)/2$. Inasmuch as these preferred risks cannot easily establish that they are honestly entitled to a lower premium—since (opportunistic) poor risk types can make the same representations and insurers are unable (except at great cost) to distinguish between them—they will withdraw. Break-even then requires that remaining parties be charged a higher premium; the system will stabilize eventually at a premium of $(p_2-\epsilon)D$. Information impactedness and opportunism thus result in what is commonly referred to as the "adverse selection" problem.

Moreover, the matter does not end here if the extent of the losses incurred is influenced by the degree to which insured parties take steps designed to mitigate losses. If promises were self-enforcing, insurers need merely extract a promise from insureds that, once insured, they will behave responsibly. Alternatively, if it could easily be discerned *ex post* whether efficient contingency mitigating practices had or had not been followed, insurers could supply insureds with appropriate incentives to behave responsibly by paying only those claims that fell within the terms of the agreement. If, however, such determinations can only be made at great cost and (some) insureds exploit *ex post* information impactedness opportunistically, the problem referred to in the insurance literature as "moral hazard" obtains (Arrow, 1971, pp. 142, 202, 243). Premiums will be increased on this account also. Note finally that responsible parties who otherwise would be prepared to self-enforce promises to take efficient loss-mitigating actions may find that such behavior is not competitively viable and will consequently be induced to imitate opportunistic types by underinvesting in loss mitigation as well.[2]

D. *Administrative Expense*

Although information asymmetries may initially be great, so that estimates of the true characteristics of economic agents are

[2] It is furthermore relevant in this connection to distinguish between insurance claims attributable to excessive exposure to hazard, for failure to take appropriate protective actions, and the "over-utilization" of insured services (e.g., health care) because, given insurance, the effective price is less than the market price. M. Pauly contends that only the former and not the latter reflects moral hazard, and describes the price responsiveness as a result "not of moral perfidy, but of rational economic behavior" (p. 535). Clearly, however, behavior of both types could and would be eliminated if insurers could extract self-enforcing promises from insureds not to exploit *ex post* information impactedness opportunistically. Inasmuch as *ex post* behavior of both types is attributable to the impossibility of extracting such guarantees, it seems artificial that one type should be regarded as moral perfidy but not the other (Arrow 1971, pp. 220–21).

subject to considerable uncertainty, these can be reduced in a variety of ways. One is to infer true characteristics from experience. A simple performance record can be maintained and a priori probabilities successively revised. This can often usefully be supplemented by both precontract and performance auditing. Performance audits are especially important where outcomes are jointly dependent on the state of nature that obtains and the behavior of the economic agent. Arrow refers to this condition as the "confounding of risks and decisions" (1969, p. 55). Absent a performance audit, the true explanation for the outcomes observed in these circumstances cannot be accurately established.

Revising the terms of a contract to reflect the additional information gleaned from experience may be referred to as experience rating. The prospect that this will be done serves to curb opportunism in contract execution. Inferior agents will nevertheless be able to exploit information impactedness, however, unless original terms are relatively severe (i.e., no bargains are to be had on joining) or parties are unable easily to opt out when terms are adjusted adversely against them.

One way to accomplish the latter is for markets to pool their experience so that opportunistic types cannot secure better terms by "quitting" and turning elsewhere.[3] This requires that a common language be devised for describing agent characteristics, which will be greatly facilitated if the behavior in question can be easily quantified. Where instead the judgments to be made are highly subjective, the costs of communication needed to support a collective experience rating system are apt to become prohibitive. Internal organization may be favored instead because it affords economies of communication.[4]

[3] This should not be read as a rationale for anticompetitive collusion.

II. Internal Organization and Hierarchy

To describe the transformation of internal organization from simple peer groups through intermediate hierarchical stages to include eventually complex, adaptive organization of the sort described by S. Beer, in his cybernetic account of the enterprise, is beyond the scope of this paper. The discussion here is accordingly restricted to hierarchies of a comparatively primitive sort. The shift from peer groups to simple hierarchies, for bounded rationality and experience rating reasons, and thence to multistage hierarchies, for transactional reasons, is all that will be attempted.

Inasmuch as individuals derive nonpecuniary satisfactions from a wide variety of nonwork group affiliations, while the work group is distinguished by its productivity attributes, the discussion proceeds mainly along productivity lines. But while this delimits the inquiry, it does not imply that workers are schizophrenic with respect to their economic and noneconomic identities. Those social psychologists who have been concerned with the "human side of enterprise" have counseled against this for years. Thus, although an emphasis on productivity will be maintained, an attempt will be made to display sensitivity to the potentially oppressive consequences of alternative modes of organization by reference to on-the-job atmosphere.

[4] To the extent that supervisors and experience raters are one and the same individual, the need to rationalize subjective assessments that are confidently held but difficult to articulate is reduced. Thus the occasion to communicate is less. In addition, interorganizational communication on complex matters is often more costly than is intraorganizational. Full-time membership in an organization involves common training and experience as well as recurrent interpersonal contacts. Informal coding economies are realized naturally and subtle nuances come across easily as a result.

A. Peer Group Associations

So as to avoid imputing benefits to hierarchy that can be had, in some degree, by simple nonhierarchical associations of workers, it will be useful to begin with an examination of worker peer groups. These involve collective and usually cooperative activity, provide for some type of income sharing arrangement, but do not entail subordination.

1. Advantages

Peer group organization (possibly in the nature of a cooperative) for which loose metering has been expressly provided may arise on account of indivisibilities, for associational reasons, or because of risk-bearing advantages. Inasmuch as the rationale for shifting from individual to collective organization to reach requisite size consistent with indivisibilities is familiar, consider the associational and risk-bearing issues.[5]

The associational gains of peer groups in relation to markets are attributable to the transformation of "involvement" relations (in the sense of A. Etzioni) from a calculative to a more nearly quasi-moral mode. Such an affiliation may incur productivity losses but nevertheless be valued for itself. But it may also, for pure associational reasons, yield productivity gains—by mobilizing energies which, even if they could be monitored costlessly and priced accordingly, could not be exacted in the market by the assured prospect of pecuniary reward. Vulnerable, however, as loose-metering structures are to free-rider abuses, membership restrictions designed to cull out those who would exploit average group productivity are to be expected.

Group affiliation may also be sought for insurance purposes if membership can provide income guarantees to buffer the effects of unanticipated contingencies on terms superior to that which market insurance can provide. The advantage of the group over the market here is presumably due to its capacity to (1) limit membership in a discriminating way, thus mitigating problems of adverse selection attributable to *ex ante* information impactedness and opportunism on the part of insurance purchasers, and (2) check malingering and other *ex post* manifestations of moral hazard. Lacking hierarchy, however, the argument has only small group implications.

2. Limitations

Whether peer groups can fully realize economies attributable to indivisibilities turns partly on utilization. Consider, for example, the problem of devising access rules for an indivisible physical asset for which simultaneous utilization is not possible. Any of a number of rules may be efficacious, but agreement on one must be reached. While a full group discussion may permit one of the efficient rules eventually to be selected, how much simpler if instrumental rules were to be "imposed" authoritatively. Resort to hierarchy may thus be favored on this account—though the "leader" in these circumstances may merely be the first among equals.

More serious, probably, is the vulnerability of peer groups to free-rider abuses—where these are due to the conjunction of information impactedness and opportunism. Such free-rider abuses can take either of two forms: *ex ante* nondisclosure (disguise) of true productivity attributes, and *ex post* malingering. The parallel with the insurance example should be noted.[6]

Thus let p in the insurance example now refer to the potential productivity of an individual. If members of the peer group

[5] Indivisibilities can take either physical or informational forms. Indivisibilities of the former type are familiar. On the latter, see Radner 1970, p. 457.

[6] This was called to my attention by Jeffrey Harris.

are all rewarded by average group productivity ($\bar{p}$) and if no individual is prepared to accept less than a $\bar{p}-\epsilon$ return, the peer group can be viable only if it can successfully screen out low productivity applicants. To the extent that the cost of *ex ante* screening is high in relation to *ex post* experience rating, where the latter involves hierarchy, peer group organization is perforce limited.

There is the further problem in the peer group of checking malingering, which is an employment manifestation of moral hazard. Although informal peer group pressures may be mobilized to discourage malingering, supplementing these by experience rating is apt often to be even more efficacious.[7] A shift to hierarchy is favored on this account as well. Thus, although peer groups afford associational gains, may be efficient risk-bearing instruments, and potentially permit economies attributable to indivisibilities to be realized, the costs of communicating and reaching joint decisions are apt to be high and, by design, peer groups lack a formal auditing and experience rating capability.

B. Simple Hierarchies

1. Advantages

The advantages of hierarchy for communicating purposes are reasonably obvious and have been developed elsewhere. Consider, therefore, the auditing and experience rating properties of simple hierarchies.

Often the most efficient way to discover an individual's true potential productivity (p) is by observing his work product rather than by preadmission audits. Accordingly, the peer group can usefully be supplanted by hierarchy. Not only can easier admission standards be allowed if one is confident that he can discern true productivity *ex post* and pay the appropriate discriminating wage, but the prospect of being audited and experience rated discourages malingering as well. High productivity types and/or those who would be prepared to self-enforce promises not to malinger can thus be induced to affiliate at a low wage by the assurance that this condition will be rectified as information accumulates and more discriminating wage assignments can be made. Correspondingly, those with low productivity and/or high proclivities to malinger will be unable long to exploit the system. The leader who is charged with auditing and experience rating, however, is no longer merely first among equals; a genuine supervisor-subordinate relation now obtains.[8]

2. Limitations

The ideal manager in this model is one who has talents for discovering and extinguishing opportunistic behavior.[9] Nothing has been said about his risk-bearing aptitudes, innovative characteristics, leadership qualities, or differential decision-making skills. Neither has the bounded

[7] D. Hampton, C. Summer, and R. Webber describe the group disciplinary effects of informal organization in four stages (p. 283). The most casual involves cajoling or ribbing. This failing, rational appeals to persuade the deviant to conform are employed. The group then resorts to penalties by withdrawing the social benefits that affiliation affords. Finally overt coercion and ostracism are employed.

[8] The issue here is similar to that examined by A. Alchian and H. Demsetz in their interesting treatment of what they refer to as the "classical capitalist firm." As they see it, technological nonseparabilities in production are responsible for the emergence of hierarchy. As the above discussion reveals, however, nonseparability is not a necessary condition for hierarchy to evolve.

[9] That hierarchy of a supervisor-subordinate sort facilitates auditing and experience rating does not, however, imply that all such hierarchies need meter productivity in the same degree. Differing attitudes among workers toward metering intensity will permit enterprises to specialize accordingly. Some will meter closely and appeal to those who favor very tight correspondence between rewards and deeds. Others will meter less closely in support of a less calculative associational relationship. Both types, given that workers allocate themselves appropriately, can be fully viable.

rationality problem been faced. Although a complete theory of the firm must eventually address all of these issues, such an effort is beyond the scope of this paper. Consider instead the following delimited problem: What organizational relations are to be expected if a set of technologically separable work groups (each, say, organized as a simple hierarchy) is engaged in *recurring exchange of a small numbers sort for which successive adaptations to uncertainty are required?*[10]

For reasons that can be traced ultimately to the human and transactional factors described in Section I, neither long term nor short-term interfirm contracts have attractive properties in these circumstances (Williamson 1971, pp. 115–21). Consider therefore two hierarchical alternatives: extend the span of control of a single manager over the entire set of transactionally-related activities; and inside contracting, which is a hierarchical variant (involving two or more stages) on the manager as monitor model.

The first possibility can be dismissed on bounded rationality grounds. Spans of control can be progressively extended only by sacrificing attention to detail. Neither transactional economies nor effective monitoring can be achieved if capacity limits are exceeded. Thus suppose that inside contracting were employed.

J. Buttrick has described the inside contracting system as follows:

> Under the system of inside contracting, the management of a firm provided floor space and machinery, supplied raw material and working capital, and arranged for the sale of the final product. The gap between raw material and finished product, however, was filled not by paid employees arranged in [a] descending hierarchy . . . but by [inside] contractors, to whom the production job was delegated. They hired their own employees, supervised the work process, and received a [negotiated] piece rate from the company. [pp. 201–02]

The system developed among New England manufacturing plants at the time of the Civil War and was continued in many of them until World War I.

The inside contracting system had the attractive attributes that it (1) provided for the aggregation at a single location of a series of primary work groups that were involved in successive manufacturing processes, thereby reducing transportation expense and assuring that a cheek-by-jowl association would develop, with corresponding economies of communication; (2) permitted the capitalist with relatively little technical knowledge to employ his capital productively while limiting his involvement to negotiating contracts with the inside department heads, inspecting and coordinating the output of the various departments, and taking responsibility for final sales; and (3) provided the inside contractors (first level monitors) with incentives for efficient labor performance, in both supervisory and process innovation respects. In addition, although neither is mentioned by Buttrick, (4) the monopoly powers of the various inside contractors were, in relation to supply by an exclusive outside supplier, presumably limited by the capitalist's ownership of plant and equipment, and (5) problems of information impactedness, which might otherwise inhibit new investment, were avoided. The system nevertheless experienced numerous difficulties (Buttrick, pp. 210–15):

(1) a bilateral monopoly position, albeit restrained, developed between the parties;
(2) the periodic renegotiation of rates induced the contractor to hoard information and strategically delay innovations;
(3) the flow of components was difficult to regulate;

[10] Two work groups will be considered to be separable if a buffer inventory would sever the interdependence relation between them. Most large groups can be decomposed into a series of small groups in this way.

(4) work-in-process inventories were excessive and, since each stage incurred only its own direct labor costs, later stage processes were wasteful of components on which early stage work was completed; and
(5) contractor incomes were sometimes excessive in relation to those of the capitalist, endangering the status of company officials.

The system moreover was beset by defective incentives in that:

(6) equipment was not utilized and maintained with appropriate care;
(7) process innovations were biased in favor of labor saving, as against materials saving, innovations; and
(8) the incentives for product innovation were insufficient.

Although some of these defects—namely, 4 and 7—might have been remedied by making simple changes in the internal pricing system, the other disabilities of inside contracting appear really to be immanent. Given uncertainty, whence the occasion to make coordinated adaptations between successive parts, and bounded rationality, whence the infeasibility of a flat (single stage) hierarchy, the defects listed are manifestations of small numbers bargaining relations in which opportunism and information impactedness conditions obtain.[11] Thus, the disabilities of yet another organizational mode, this time inside contracting, are explained in terms of the human and transactional factors described in Section I.

C. Subordination of Functional Departments

The reasons, I submit, why inside contracting was displaced by a hierarchical system in which department managers were no longer semiautonomous contractors, but were made to accept employee status instead, are that this harmonized interests, permitted fiat to be employed to settle instrumental disputes that might otherwise occasion costly haggling, and allowed auditing and experience rating to be brought more sytematically to bear. The resulting transactional economies are examined in my treatment of vertical integration (1971). (For a discussion of the human and transactional difficulties which such functionally organized enterprizes eventually encounter as firm size is progressively scaled up, see Williamson, 1970.)

[11] Defect number 5 involves, in addition, a strain on atmosphere. Upsetting the normal correspondence between hierarchical position and income apparently poses personal and functional status threats of a potentially disruptive sort.

III. Concluding Remarks

The discussion of internal organization in this paper deals with only elementary forms of hierarchy and relatively simple types of adaptive behavior. The management of a complex firm, however, must deal with such issues as the redeployment of internal resources in response to environmental disturbances in kind, strategic planning, including innovation, and preserving (or not degrading) intrafirm atmosphere as firm size is scaled up. In addition, the eventual limits of complex hierarchies need to be assessed. While these matters are beyond the scope of this paper, my contention that the interesting problems of organization in complex hierarchies are likewise to be understood in terms of the framework proposed in Section I is surely, at this stage, unsurprising.

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