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Vertical Coordination and  
Vertical Coordination Mechanisms:  
Analysis and Case Studies:

by

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## Introduction

An early statement of the NC-117 subcommittee on vertical coordination indicated that it would "examine the systems of coordination that are used in input supply-producer-marketing system vertical complexes...and the effects of different coordinating arrangements..." The statement went on to say that "particular emphasis will be placed on analyzing different types of exchange instruments and price discovery procedures." Initial efforts were to be "focused on coordination at the producer-first handler level." In this connection, the report spoke of a "paucity of information concerning causes and consequences of changing exchange arrangements."

Central concerns of the committee have involved the definition of vertical coordination and the assembly of examples illustrating the consequences of alternative vertical coordination instruments. This paper focuses directly upon these concerns.

Its aims are (1) to distinguish vertical coordination as a process from vertical coordination as an objective, (2) to define vertical coordination as an objective, and (3) to illustrate through cases how a particular vertical coordination mechanism performs with respect to such an objective. The approach includes four steps. These are: 1) to define vertical coordination as an objective and as a process, 2) to analyze some causes of variations in levels of vertical coordination as an objective, 3) to explain why alternative vertical coordination mechanisms may alter the levels of vertical coordination, and 4) to draw upon case studies of institutionally-induced changes in vertical coordination for illustration and analysis. The paper concludes that different coordinative mechanisms affect the level

of vertical coordination achieved and attempts to explain why this is so. It acknowledges that some coordination mechanisms are more costly than others and that benefits from improved coordination must be weighted against the costs of achieving it. The report does not attempt to assess the benefits or costs of greater vertical coordination.

### What is Vertical Coordination?

Vertical coordination may be defined as a "process" or as an "objective". The term is almost always used in the former sense. Mighell and Jones are most frequently cited for their definition:

"It includes all the ways of harmonizing the successive vertical steps, or stages, of production and marketing. Vertical coordination may be accomplished through the market price system, vertical integration, contracting, cooperation, or any other means, separately or in combination. There is always some kind of vertical coordination if any production takes place."<sup>1/</sup>

Mighell and Jones go on to suggest that some of the alternative coordinating mechanisms (market price system, vertical integration, etc.) may bring about "better" vertical coordination than do others.

The notion that some vertical coordination mechanisms may be "better" than others is, as suggested above, also implicit in the work of NC-117. NC-117 involves a study of the organization and control of agriculture. It aims, in part, to provide information facilitating more informed policy decisions with respect to the question, "Who will control agriculture?"

Many agricultural economists are fairly comfortable with the notion of vertical coordination as a process (as evidenced by extensive discussion

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<sup>1/</sup> Mighell, R. L. and Jones, Lawrence A., Vertical Coordination in Agriculture, U.S.D.A., ERS-19, February 1963.

and use of the term).<sup>2/</sup> But the concept may disturb other economists and agricultural economists. This is because much of our theoretical training is built around assumptions of perfect knowledge and foresight, homogenous products and perfect fluidity of resources. If such assumptions were justified there would be no vertical coordination problems. "But what is vertical coordination?" they may ask. "How can you tell whether one coordination mechanism does a "better" job of coordinating than another?"

These questions address a definitional issue which, in the author's view, is understood by those concerned with the consequences of alternative vertical coordination mechanisms, but which they have not explicitly addressed. One aim of this paper is to suggest a means of defining vertical coordination so that discussion thereof can be more precisely understood. With this aim in mind, the following paragraphs attempt to define vertical coordination as an objective.

To do this, "perfect" vertical coordination is first defined. It is then suggested that perfect vertical coordination is probably infinitely costly, impossible to achieve, and therefore undesirable. Nonetheless, the concept of perfect coordination enables us to conceive of different levels of vertical coordination relative to perfection, higher levels being preferable to lower levels for given levels of costs in coordination.

In theory, perfect vertical coordination is always achieved. First, the quantity of a commodity growers produce is exactly equal to what buyers

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<sup>2/</sup> See, for example, Coordination and Exchange in Agricultural Subsectors, Bruce Marion, ed., N.C. Project 117, Monograph 2, January 1976.

purchase. In the perfectly competitive model, there is perfect foresight. Second, the quality of the product exchanged is exactly and uniformly what is paid for. The neoclassical models assume homogenous products. Third, the timing of physical exchange is perfect. Neither party has to wait to deliver or receive. The theory is static. Time is constant. Fourth, the location of delivery is consistent with the lowest level of total assembly costs. Again, in the perfectly competitive model, knowledge is perfect, firms are profit maximizers and opportunities to exploit lower costs would be seized. These four dimensions of vertical coordination correspond exactly with the concepts of quantity, time, form (quality) and place (location) utility.

It is stressed that it may be impossible to achieve perfect vertical coordination in terms of any of these dimensions for reasons discussed below. Under most circumstances, better coordination in one dimension also may be achieved only at the expense of poorer coordination in terms of another dimension. If, for example, greater quantities of a commodity, say sweet corn, can be produced only by extending production to marginal land which produces smaller ears and less than uniform kernels, improved quantity coordination can be achieved only at the expense of poorer quality coordination.

Some examples of coordinative problems in the various dimensions presented later in this work may make the concept of perfect vertical coordination clearer. They will also act as a prelude to a discussion of obstacles to vertical coordination and whether perfect vertical coordination is possible and/or desirable.

Vertical coordination can be said to be "imperfect" if the quantity of a commodity produced exceeds (or is less than) the quantity purchased or if the quantity that would have been produced at a "market clearing" price is greater (less) than that actually produced. Because neoclassical theory does not distinguish between quantity produced and quantity supplied, such imperfections are not considered.

In the short run (a growing season), the quantity supplied may be less than the quantity produced because the market clearing price may not cover marginal costs of harvesting. Furthermore, if the "market clearing" price is such that growers would have produced more had they known what that price would be, it is impossible to supply more within that time period.

In the longer run (more than one growing season), supply can be adjusted. For individual growing seasons, however, the lagged response problem remains. Imperfect quantity coordination occurs when price is such that growers would have produced more (or less) had they known what price would be. Thus, coordination may be imperfect even though price "clears" the market of what can be delivered given supply response problems and marginal costs of harvesting.

Imperfect quantity coordination has occurred in many commodity sub-sectors. Buyers of sweet corn and peas for processing, because they are uncertain as to the quantity they will want to pack or because they want to make certain that they will have enough to pack, may contract for more acreage than they would typically expect to harvest. By using a "bypass" clause in production contracts, processors may elect not to purchase or

harvest a portion of the crop. If processors purchase exactly what is produced, vertical quantity coordination is perfect. This analysis focuses only on the relationship between producers and first handlers. It assumes that prices paid by processors are consistent with perfect quantity coordination (as defined here) at higher stages in the subsector. If this were not the case, we could not speak of "perfect" quantity coordination.

In apple (or any other tree fruit) production, quantities produced may exceed levels which can be economically harvested. The result is imperfect vertical coordination.<sup>3/</sup> The reasons may be traced to variations in production levels based upon price signals generated years ago and leading to excessive plantings.

Imperfect time coordination occurs in tomato, sugarbeet, and other commodity subsectors when growers must "queue up" to deliver to handlers. It also occurs in such commodity subsectors as peas, sweetcorn, and snap beans when there are inadequate facilities for harvesting. In the first case, when growers cannot harvest, deliver and unload their crops according to a schedule, or when handlers have to suspend or reduce levels of operations because of inadequate deliveries, timing coordination is imperfect. In the second case, when plantings are timed such that crops ready for harvest exceed or are significantly short of processing capacity there is also imperfect time coordination. Costs of achieving perfect time coordination include handler purchase of new facilities, scheduling personnel, new risk assumed by growers in changing planting schedules, etc.

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<sup>3/</sup> "Perfection" as defined here is not with anyone's point of view in mind; rather, the concept is used to refer to a condition in which people produce what is expected, when it is expected, that it be accessible, etc., and at equilibrium prices.



Imperfect quality coordination occurs when the value of a commodity must be or could logically be discounted because it cannot be used in its entirety for reasons of quality. If potatoes produced are too large or too small for their intended purpose and they are only partially used, quality control is imperfect. Resources are expended to produce something that is not used. The reasons for imperfect vertical quality coordination may include absence of knowledge as to 1) what quality is desired, 2) how it may be produced; 3) incentives to respond to desires for improved quality, or 4) natural biological variations and weather patterns.

Imperfect locational coordination occurs when the total costs incurred by all growers and handlers in assembling a commodity are not minimized. Such imperfections result in the diversion of resources from other uses. The reasons for imperfections in locational coordination may include imperfect knowledge of alternatives for buyers and sellers or price differentials inconsistent with transportation and handling cost differentials.

This series of examples illustrates three key concepts. First, there are four readily identifiable dimensions of vertical coordination which are consistent with the notions of time, form, space, and quantity utility as Mighell and Jones originally observed.<sup>4/</sup> Second, one can define what perfect vertical coordination would be with respect to each of these coordination dimensions. Vertical coordination as an objective of vertical coordination as a process is to maximize the level of vertical coordination achieved for a given level of transaction costs. Third, there are obstacles to the achievement of vertical coordination. Removal of these

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<sup>4/</sup> Mighell, Ronald L. and Jones, Lawrence A., Vertical Coordination in Agriculture, USDA, ERS-19, February, 1963, p. 4.

obstacles is a costly process. Different vertical coordination mechanisms are used to carry out this process. The underlying question addressed by this research and that in NC-117 is "Do some methods of (mechanisms for) achieving vertical coordination bring us closer to perfect coordination than others?" Another question considered is whether the greater transactions costs associated with some vertical coordination mechanisms (e.g., collective bargaining) are justified by enhanced levels of vertical coordination which may result.

#### Obstacles to Vertical Coordination

Obstacles to perfect vertical coordination are assumed to include: 1) biological, chemical, and meteorological factors which foster variations in yield and quality; 2) lags in supply response, processing, and shipping functions; 3) the absence of perfect knowledge and foresight with respect to supply and demand conditions; and 4) barriers to human rationality. While technological and institutional innovations may provide means to reduce levels of and costs associated with such uncertainties, it is assumed that they will not be eliminated. Perfect coordination is probably infinitely costly and not economically desirable.

Obstacles to better vertical coordination are discussed here. They are broken into market failure and imperfect competition categories. The discussion does not pretend to be exhaustive but rather draws upon selected abstractions from case studies described in succeeding pages.

It will be argued that structural obstacles to better vertical coordination appear on the sellers' side of the studied markets in the form of

contracts which are incomplete<sup>5/</sup> or contain perverse incentives. Possible reasons for the existence of such contracts are drawn from the literature on market failures.<sup>6/</sup> Certain provisions of contracts or quality dimensions of products have public good characteristics which prevent the completion of contracts or responses to quality demands. The effect of such market failures is to create a suboptimal level of specification in contracts.

On the buyers' side of the markets studied, imperfect competition (one or a few buyers) leads to the existence of organizational slack or "X-inefficiency". While opportunities seem to exist for buyers to rewrite contracts so they can capture the efficiencies lost to market failure, they do not do so. One hypothesis is that they do not face the competition in input markets which forces them to do so. They do not, in Liebenstein's words, "operate on an outer-bound production possibility surface consistent with their resources."<sup>7/</sup>

"Rather they work on a production surface that is well within the outer bound. This means that for a variety of reasons people and organizations normally work neither as hard nor as effectively as they could. In situations where competitive pressure is light many people will trade the disutility of greater effort, of search, and the control of other peoples' activities for the utility of feeling less pressure and better interpersonal relations."<sup>8/</sup>

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<sup>5/</sup> Incomplete contracts are those which do not specify all elements of exchange.

<sup>6/</sup> Williamson, O. E., Markets and Hierarchies: Analysis and Antitrust Implications, The Free Press, New York, 1975, Chapters 1 and 2.

<sup>7/</sup> Liebenstein, Harvey, "Allocative Efficiency vs. X-Efficiency," AER, June 1966, p. 413.

<sup>8/</sup> Ibid.

The information gathered for this report does not allow testing the hypothesis that failure of handlers to write better contracts is due to organizational slack and X-inefficiency or to allocative efficiency (the benefits to be gained from rewriting contracts do not justify the cost of the effort). The information does justify further examination of the hypothesis that X-inefficiency is present, however.

#### Why Do Different Coordinating Mechanisms Matter?

The hypothesis advanced here is that collective bargaining as a different coordinating mechanism from the "free market" provides one means to restructure incentives so that gains from better coordination are captured. Individual growers may not secure contractual rewards for particular cultural practices because of an indivisibility problem. The gain to the individual grower from a contract revision is inadequate to justify what he would "pay" for revision of the entire contract. If there is a mechanism by which growers may share the costs of the contract revision (through the cost of negotiating different terms of trade, for example), the costs to individual growers may be justified. In the absence of a mechanism for insuring that all growers "pay" for contract revisions, there are inadequate incentives for individual growers to work for such revisions. They would benefit from them whether they "paid the price" of securing them anyway. A collective bargaining association may overcome the market failure problem on the seller side by diffusing the cost to growers of achieving contractual adjustments so as to overcome the "free rider" problem associated with the public goods nature of contract changes. Collective bargaining may also bring pressure to bear on

organizational slack and resulting X-inefficiency which may exist in an imperfectly competitive buyers market. This pressure may generate search for more information with respect to potential contract provisions and create an incentive to write contracts in a way which puts risk and other production and marketing functions in the hands of those who can minimize them.

In what follows, two sets of case studies in vertical coordination changes associated with collective bargaining are outlined and discussed. The first set of examples involves cases where contracts were made more complete. The changes enabled the system to capture efficiencies previously lost due to the absence of individual incentives to capture them.

Before proceeding with the series of cases, three points must be stressed. First, the cases related below apply only to the producer-first handler relationship. Thus, case arguments that vertical coordination may have been improved by collective bargaining relationships ignore the effect of changing coordination arrangements at vertical stages below the producer and above the handler. A second and closely related point, is that the various economic climates (changes in the demand for and supply of other crops) in which coordination changes occurred have not been described. This makes it difficult to isolate the impact of collective bargaining on vertical coordination. A third and also related point is that the cases do not allow us to conclude that changes occurred because system benefits exceeded system costs. A complete understanding of the consequences in each case would require extensive study of those cases. What is argued is that the cases offer evidence which justifies further study of the impact of collective bargaining on the coordination process.

Such study would focus on a broader set of consequences (including other vertical stages) and upon the costs to the vertical system of alternative coordination instruments.

Type I Cases: Incomplete or Perverse Incentive Contracts

Case #1<sup>9/</sup>

Four years ago, sugarbeet processors paid growers on the basis of a "district average" sugar content. Within the district there was no differentiation among growers as to the sugar content of their beets. Growers were rewarded for quantity and not for quality. Individual growers responded with higher yields but lower percentages of sugar--this combination brought on by increasing nitrogen levels in the soil. As some very large growers began this practice there was a significant reduction in the "district average" sugar content. This drove down returns per acre to growers.

The beet growers' association responded by negotiating for individual measurement of sugar content. The association alleges that there was initial resistance to this request. Processors claimed that paper work and individual measurement would be costly and unjustified. The growers won their point and individual measurement was adopted. The result was an increase in sugar content of the district beets. Growers report that processors will now claim credit for the idea.

The contractual arrangement was characterized by a perverse incentive structure. While growers as a group were rewarded for higher levels of

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<sup>9/</sup> Johnson, Claude. Idaho Beet Growers, personal interview, Blackfoot, Idaho, March 23, 1976.

sugar content, they were rewarded as individuals for producing high volume which varied inversely with sugar content. Since individual growers could not capture the benefits of their efforts to increase the district average sugar content, the arrangement led to a "free rider" problem. The incentive was to let others produce beets with greater sugar content.

The processing firm appears to have been indifferent to the incentive structure for growers. The firm was interested in the sugar content of the beets. It would pay for a high sugar content in a small quantity of beets or a lower content in a greater quantity of beets. Its pricing formula apparently compensated for differences in extraction costs from beets with different sugar contents. Meanwhile, costly resources were being devoted to the production of heavy beets. Since more sugar could have been produced at the same expense, the process was inefficient. Presumably, there was something to be gained from a more efficient allocation of resources, but growers were not in a position to capture the benefits from those gains.

Since the processor behaved indifferently, it appears that the growers who were receiving progressively lower rewards for greater expenditures of resources had to supply an incentive for handlers to change their practices. As individuals they had a negligible incentive to pay the processor for his efforts. There was also a free rider problem. As a group, however, they could share the cost of inducing the processor to change the rewards structure because they could make a group concession on some other matter, thereby overcoming the free rider problem.

## Case #2

The 1976 contract dispute between the Mountain States' Growers and Great Western Sugar centered around the fact that the "purity" of the sugar as measured by the factory extraction of sucrose had decreased over the last decade. Great Western came to the negotiation requesting (among other things) that the growers accept less for their beets in order to compensate for the reduction in extractable or pure sugar. Growers refused.

Both parties accepted as fact the reduced levels of purity in the factory tests. The conflict surrounded the question of responsibility. Great Western alleged that growers were producing a beet with lower pure sugar content. Growers charged that Great Western was processing faster and failing to extract all the sugar.

In fact, neither party knows for certain where the loss in purity occurs. While total sugar content can be measured easily on delivery, sucrose content cannot. It could be lost as a result of cultural, handling, storage or processing practices. Whatever the explanation, incentives cannot be aligned with the individual who controls the loss until research is completed.

Both parties have an acknowledged stake in securing research results. Once the information is available, the likely response of growers is implied in the first question of a Ft. Collins beet grower, "What can I do to improve purity?"<sup>10/</sup>

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<sup>10/</sup> Author's observation as guest at meeting of the Mountain State Beet Growers, Fort Collins, Colorado, April 12, 1976.



Because the cause of reduced levels of purity in factory tests are unknown, neither processors nor growers are in a position to make the kinds of resource allocation decisions which will optimize the level of sucrose content in the beets. Until such knowledge is acquired, the net effect of this lack of knowledge is to produce lower levels of sucrose than possible given existing levels of resource use or to use more resources than necessary to produce existing levels of sucrose. Assuming that the causes of low sucrose yields can be discovered and related to specific production or processing practices, property rights could be defined so that parties could internalize the costs of their actions. Presumably, the net effect would be to increase sucrose output and/or reduce resource use.

If there were a market in which handlers were terms-makers and growers terms-takers, handlers would be expected to reduce rewards to growers as a compensation for the loss of sucrose. Individual growers, as part of a diffused group, might not seek out the needed knowledge even though as a group they have something to gain from it. Once again, such information has characteristics of a public good; the incentive for the individual is to let others provide the knowledge.

Group action appears to have provided the impetus for securing the information. Neither party is in a position to dictate terms to the other. Exchange itself appears to depend upon an effort to seek out technical knowledge on sucrose production. Had growers not been in a position to refuse terms suggested by the processor, a position afforded by the cohesiveness which led virtually all growers to commit themselves to market according to the desires of the group, the stalemate which forced inquiry into the nature of sucrose production would never have occurred. Collective

bargaining appears in this case to have provided the impetus for the generation of better information and presumably a higher level of vertical quality coordination.

Case #3<sup>11/</sup>

There are at least three ways in which vertical coordination with respect to quality has been improved in the Maine potato industry. It can be argued that three aspects of potato quality, sugar content, specific gravity, and size, have been improved because the collective bargaining process led to the inclusion of related terms in contracts, thereby providing incentives for growers to meet desired quality standards.

The marketability of frozen french fries is dependent upon their color. If there is too much sugar in the potatoes, they fry up dark brown. Growers can control the sugar content of the potatoes by maintaining them at a temperature which prevents the starch from turning to sugar. If there is a reward in the contract for delivering a potato with low sugar content, there is reason to believe growers will do so, thereby responding to the observed market preferences of consumers.

The processed yield of potatoes is affected by their specific gravity. Specific gravity can be affected by the timing of harvest, amount of water, fertilizer and maturity. Again, pecuniary incentives to follow desired cultural practices can be expected to induce profit maximizing growers to modify accordingly.

Size of tubers is also important to processors. If growers kill vines at the proper time, they increase the probability that their potatoes

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<sup>11/</sup> Smith, Duane, Extension Economist, personal interview, Presque Isle, Maine, March 8, 1976.

will have the desired size. Again, contract incentives bring forth the kind of behavior which makes what is produced and marketed more consistent with what is preferred by processors and consumers.

The appearance of contract incentives for desired cultural practices has coincided with the emergence of collective bargaining activity. Pressure created by the bargaining process appears to have encouraged processors to add quality incentives to contracts. Processors, apparently indifferent to the quality of the crop (because contracts are written to correct for variations in quality), had to be rewarded for or pressured into adding contract terms. When they did so, potato quality levels were increased. Presumably, the benefits of increased quality (in terms of rewards) were greater than the transaction costs of inducing processors to include the rewards and the costs of changing cultural practices. This suggests that the bargaining process was a "positive-sum" game. Individual growers could not induce the change by handlers--perhaps because of the free rider problem. Their individual rewards from inducing the change would not justify their costs.

Another possible explanation for the failure of processors to provide the additional quality incentives to contracts in a market for individual growers is that the quality changes must come in quantity. If one or a few growers produce potatoes with low sugar the value of the total purchases to handlers may not change. On the other hand, use of a uniform contract for association members would encourage a more widespread change in cultural practices, thereby justifying rewards for desired practices.

#### Case #4

A related phenomenon, directly associated with collective bargaining,

is seen in Oregon filberts. The filbert's main marketing season is Christmas. It is therefore important that the pack get out early or at least on its regular schedule. In some years this is difficult because the crop is wet and must be dry before harvest. At a marginal cost of about \$50/acre growers can effect an early harvest. If a premium is paid for the effort, growers will arrange the early harvest. The use of this technique can help reduce inventory costs as well. The need to meet early demand has required a high planned carryover. If the early harvest can be effected by contract incentives, needed carryover and associated inventory space is reduced.

This case has striking similarities with the preceeding one. Through grower collective bargaining, processors were induced to add new contract incentives which provide a new means for growers to increase their expected earnings while responding to consumer demands. At the same time, processor inventory costs appear to have been reduced. Earlier arguments as to the relationship between collective bargaining and the phenomenon apply.

Particularly in this case it is not clear why the phenomenon did not occur without collective bargaining since the processor appears to have gained from the transaction. The point remains that it did not occur until collective bargaining took place.

#### Analysis of Type I Cases

In the preceeding cases, market failures owing to the public good nature of contract revisions and knowledge required to make such revisions were defined as the underlying reason why individual growers would not respond to market signals. Property rights were not clearly specified.

Costs associated with such specifications were not justifiable for growers as individuals. As individuals, growers could not capture rewards for their efforts to change contracts, secure knowledge or follow "desirable" cultural practices. As a group they could. Collective action was an effective means of countering market failures and overcoming the free rider problem.

What remains is the question of why handlers did not see an opportunity for greater efficiencies in production, rewrite contracts to reward growers as a group for following better practices and then capture any benefits from improved quality for themselves. One hypothesis has been advanced. There exists organizational slack and therefore X-inefficiency in handler operations because handlers do not operate in highly competitive buyer markets. Again, information is inadequate to accept this hypothesis or the alternative--that the gains of better coordination to handlers were inadequate to justify the costs of contract revisions. Further research is needed if conclusions are to be drawn with respect to either hypothesis.

#### Type II Cases:

##### Revision of Contractual Obligations

Case #5<sup>12/</sup>

Upon delivery from grower to plant, sugar beets may sit in a receiving yard long enough to have shrinkage reduce the value of the beets. At one time, all shrinkage was charged to growers even though much shrinkage took place after delivery. There was no incentive for the processors who controlled the beets after delivery to prevent the shrinkage.

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<sup>12/</sup> Claude Johnson, Ibid.

The grower association bargained a maximum dockage for shrinkage. Any shrinkage of more than 5% resulted in a net loss to the processing firm. The reaction of the firm was to adopt an improved storage technology for the beets. The use of canopies on piles of beets and the running of vents through the same piles led to reduced shrinkage and maintained desired temperatures.

Again, the handler was indifferent to the shrinkage since he did not bear its costs. Individual growers could not bring about the change in exchange arrangements themselves. Since there were no competing firms in the area, they also could not exploit alternative markets as a means of disciplining the buyer. The buyer had no incentive to change the practice unless a grower organization spoke on behalf of all growers.

Case #6<sup>13/</sup>

Pea growers have in the past been "docked" for the percentage of "splits" or damaged peas in their crop. The splits and other forms of damage are the result of rapid combine harvesting. The combines are owned by processors and generally operated by their employees.

A point negotiated by the Western Washington Farm Crops Association was the elimination of dockage for "splits" and "blond" peas. The incentive was placed on the shoulders of those who could control the problem situation.

Again, the processor was in position to make a decision (to harvest faster) for which he did not directly bear the consequences (more "splits").

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<sup>13/</sup> Gary Van Dyke, Western Washington Farm Crops Association, Mt. Vernon, Washington, March 29, 1976.

Because of the highly concentrated structure of the processing structure, it is hard to see how individual growers would have negotiated such a change in practices.

Case #7-<sup>14/</sup>

Numerous processing firms contracting with growers of peas, sweet corn, lima beans and other crops have operated with a "bypassed acreage" clause. The clause permits the contracting firm to elect not to harvest a field if it is too dry or if for some other reason it is not suitable for harvest.

The most serious charge raised in connection with this practice is that processors contract acreage well in excess of their anticipated needs in order to reduce the risk of short supplies to pack. The charge goes on to say that if, at harvest, the processor discovers that he has over-contracted, he becomes arbitrary in deciding how much acreage cannot be harvested. Such processors allegedly "pass" acreage that is suitable for harvesting.

Regardless of the extent to which this clause is implemented, it does place decision control in the hands of the processor. However, the cost of a decision not to harvest falls directly upon the grower. The grower bears the processor's risk.

Growers have been understandably unhappy with this practice. Through collective bargaining, they have shifted part or all of the risk back to the processors. In one case growers and processors each make a specified

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<sup>14/</sup> Ibid. and others including Alan Roebke, Dennis Rea, Alton Rosenhranz, George Webster and Fritz Collette.

contribution to a pool which pays growers whose crops are bypassed. Any amount left in the pool at season's end goes back to the grower association; any amount in excess of the pooled amount is charged to the processor. Another arrangement simply requires processors to cover production costs accrued by growers in planting and raising their crops.

These changes do not mean that passed acreage will be eliminated. They do mean that the handler will consider both the benefits and the costs of the decisions to over contract and pass acreage.

Case #8<sup>15/</sup>

Bargaining efforts of the Potato Growers of Idaho have been instrumental in refining the quality incentive provisions of contracts with Idaho processors. Contracts signed by growers with Ore-Ida have included a "bruise fee" provision for several years. Growers charged that many of the potato bruises for which they were being docked were the result of rough handling at the plant. To enable the assignment of responsibility for bruises, technologies have been adapted which can distinguish old bruises (those attributable to the grower) from "recent" bruises (those incurred at the plant). This has led to new receiving practices at the plant in which the distance potatoes drop when unloaded from trucks is significantly reduced.

Again, by changing decision control and the incentive system, handlers were made accountable for their actions and responded in a way that benefited growers and the entire potato subsector.

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<sup>15/</sup> Tom Sahlberg, Potato Growers of Idaho, personal interview, Blackfoot, Idaho, March 23, 1976.



Case #9<sup>16/</sup>

Ohio tomato growers faced the problem of long waits to deliver their tomatoes to the processor. Since growers absorbed the cost of the "floating inventory",<sup>17/</sup> processors had no incentive to insure that receiving facilities and hours were adequate. Processors benefitted from a steady supply of growers anxious to deliver and return to the field. The Ohio Agricultural Marketing Association (OAMA) bargained for demurrage charges for growers, thereby shifting responsibility and reducing waiting time and/or compensating growers for it. This created an incentive for handlers to reduce waiting time for growers. Time coordination was improved.

Another change in coordination of the quantity and timing of deliveries of tomatoes merits note. Growers and handlers have negotiated a rate of delivery per acre per day. This reduces the probability of excessive deliveries for existing facilities. In the past, if excesses were delivered the grower absorbed the loss. In the absence of a specified daily quantity for all growers, individual growers had no guarantee that their tomatoes would be accepted on any given day. Vertical coordination appears to be improved through this practice since resources needed to deliver and receive tomatoes are committed with more complete knowledge of the total flow of deliveries.

A guide to quantity on the down side has also been negotiated in Ohio. Contracts specify a date before which the processor will not close down. Given this guide, the grower can better plan for harvest.

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<sup>16/</sup> Paul Slade, Ohio Agricultural Marketing Association, personal interview, Toledo, Ohio, January 23, 1976.

<sup>17/</sup> Quantities of tomatoes that wait in growers' tucks at growers' expense.

Case #10<sup>18</sup>/

Filbert contracts are expected to change from a "95 crack" test (where all filberts in a load are accepted if 95 of 100 are free of "blanks" and "shrivels") to a "100 crack" test. Growers can control blanks and shrivels with correct fertilization, better equipment (which throws out blanks), and precleaning. The "100 crack" test would encourage growers to follow practices that raise quality.

Grower incentives have also been affected by changes in cleaning and drying charges for filberts. Instead of flat charges for cleaning and drying, processors now charge lower rates per ton for the cleaning of loads with less debris. Again, an incentive is provided for the grower to clean the product if he can do it for less than the handler.

Analysis of Type II Cases

The presence of market failure in the Type II cases is not so readily apparent. They involve the redefinition of contractual obligations (property rights) so that responsible practices bear the consequences of their actions.

For example, in case 6, payments to pea processors were discounted for damaged peas even though harvest rates, controlled by processors, determined the damage. Contracts were rewritten, apparently through bargaining, so that such deductions could not be made. The processors then bore the consequences of their decisions on how fast to harvest.

Some may say that the redefinition of property rights did not alter resource allocation. If deductions were made for damage, growers would simply consider them a cost of doing business and shift their supply functions upwards to cover those costs. If deductions were not made, the

processors demand (marginal value product) curve would shift downward to cover the loss in value of the product.

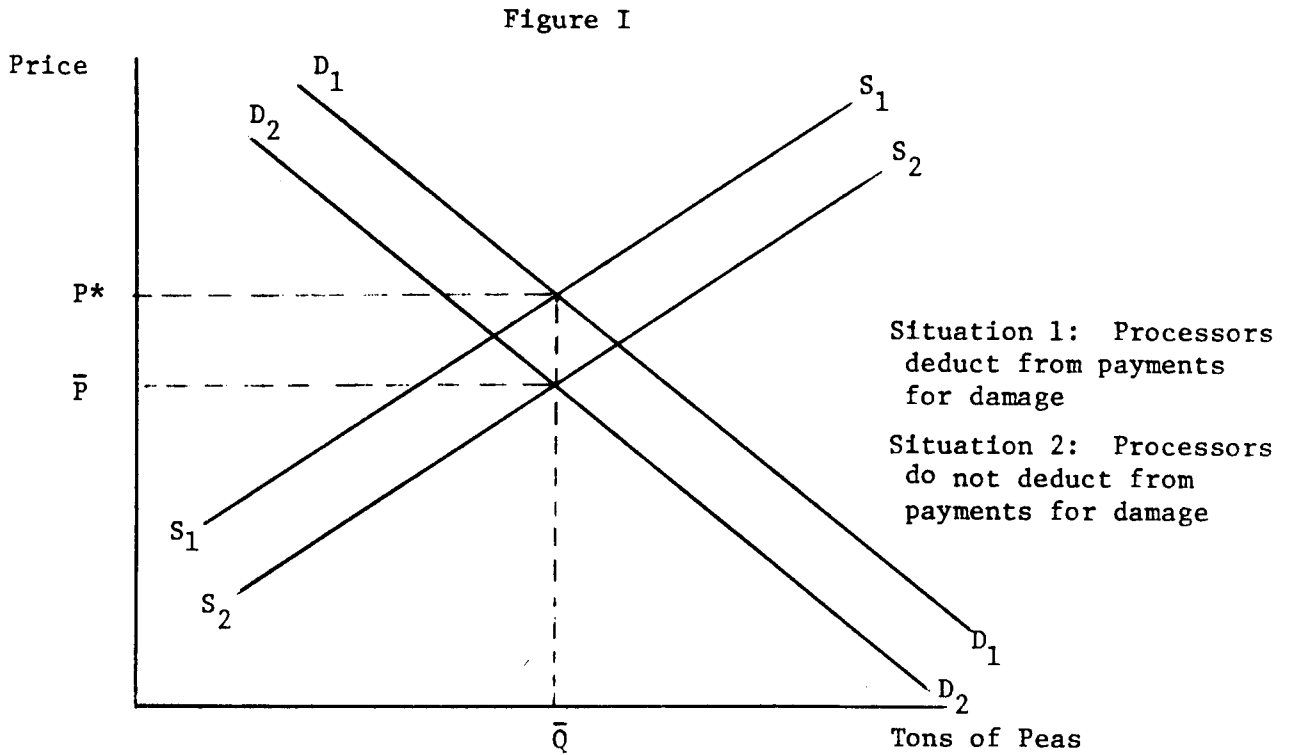


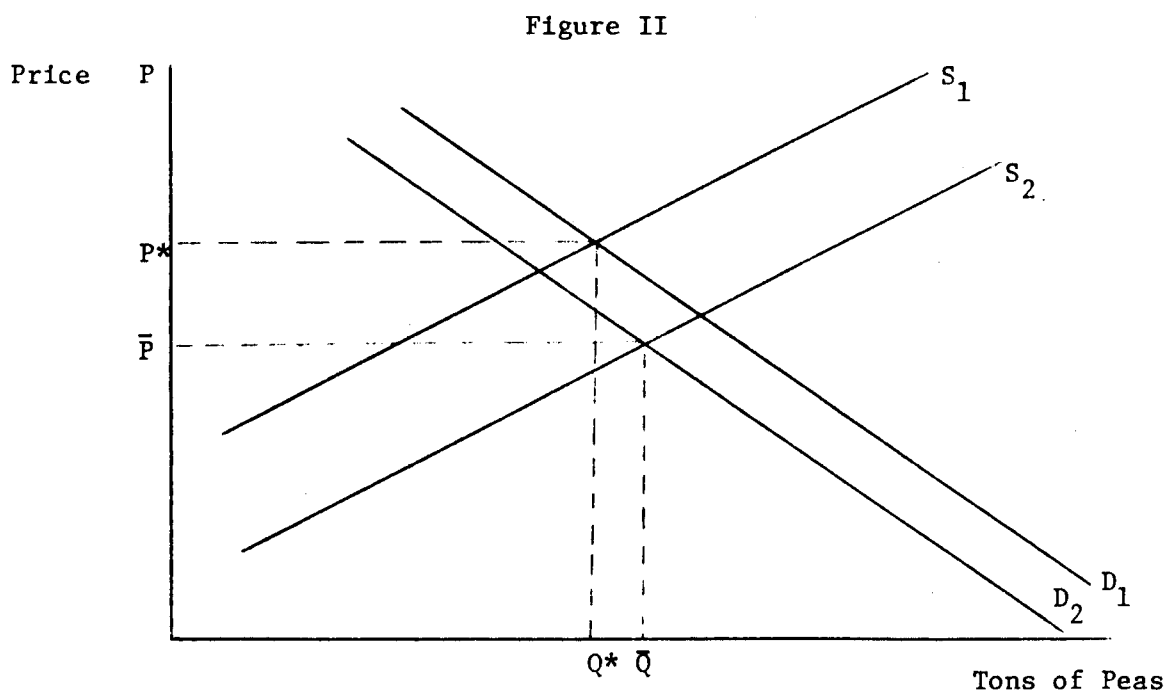
Figure I illustrates the example. In the equilibrium represented by  $SS_1 = DD_1$ , processors deduct for damaged peas. This deduction represents a cost or a reduction in the effective price per ton paid to growers. When the contract is rewritten so that payments are not discounted for damaged peas, growers will supply more tons of peas at a given price. At the same time, the marginal value to the processor of each ton of peas will be reduced. The demand curve will shift to the left. The new equilibrium is represented by  $SS_2 = DD_2$ . The reduction in cost (supply) to growers equals the reduction in value to the processor. Therefore equilibrium quantity will be identical no matter how the contract is written.

If the difference between supply prices on  $S_1$  and  $S_2$  corresponds exactly with the differentials in demand prices for  $D_1$  and  $D_2$  at any level of  $Q$ , there would be no difference in tons of peas exchanged under alternative contractual relationships. Resource allocation would be identical under either definition of property rights (contract provisions). The exchange price  $P^*$  would be greater than  $\bar{P}$ , but  $\bar{Q}$  would be equilibrium in either case.

It is not clear, however, whether the price differential for  $S_1$  and  $S_2$  at any particular level of output would necessarily correspond to the price differential for  $D_1$  and  $D_2$  at that level of output. If the shift in the contractual arrangements involved a shift of responsibilities for physical harvesting itself, this assertion may be tenable. The analysis would simply assess resource allocation under a shift of functions between growers and processors. In fact, both supply functions assume that processors will continue to harvest in a manner consistent with past harvesting practices. Price differentials for  $S_1$  and  $S_2$  at a given level of output are based upon the production cost per ton of peas and growers' expectations regarding levels of defects. Thus, there is reason to expect a correlation between the price differentials for  $S_1$  and  $S_2$  and for  $D_1$  and  $D_2$  at quantity level  $Q$ . But the expectation is by definition a stochastic variable--the growers' best guess of defect levels based upon the past behavior of processors.

A contract which permits handlers to make deductions for defects from grower payments shifts risk or uncertainty to growers. Growers would be expected to discount the value of a contract on the basis of such risk.

If the contract is written so that processors may not discount for defects, this risk would be absorbed by processors. It seems reasonable that the risk would be smaller for processors since they are in a better position to know (and control) rates of harvesting, therefore the level of discounting. If there is greater risk for growers, we would expect that the supply price differential at a given level of output would be greater than the demand price differential at the same level of output. The effect of the differential on equilibrium positions is illustrated in Figure II.



Assuming that the cost of this risk is less when borne by handlers than when borne by growers, resources are not allocated equally under each contract. The level of resource use is higher when handlers cannot discount for defects. Joint costs are also lower under this arrangement because the net level of risk and uncertainty is reduced.

If joint costs for growers and processors under one arrangement are lower, why is there no effort by handlers to capture the benefits of lower costs? The hypothesis here is the same as that applied to "type I" cases. Because there is little competition in the purchase of inputs, organizational slack and therefore "X-inefficiency" may appear. Processing firms may not be working on the outer bound of their production possibilities frontiers. Employees or managers in buying firms may simply trade off the effort required to seek out better coordination and lower cost arrangements in favor of less personal pressure on the job. The alternative hypothesis is that the costs of such efforts exceed the expected benefits.

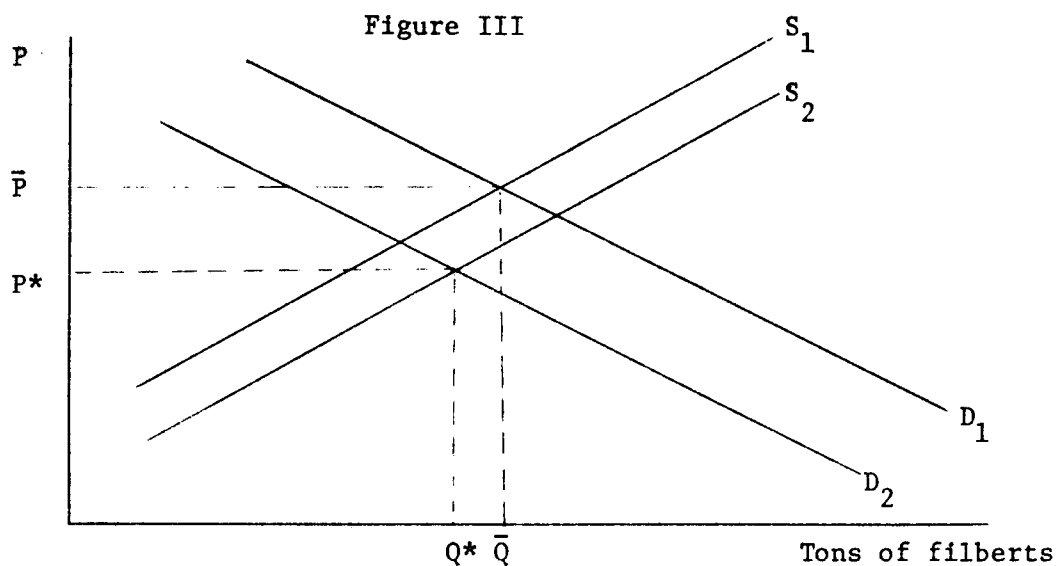
The above analysis can be extended to all type II cases. Case 5 describes a situation in which the shrinkage of sugar beets while in the processor's receiving yard can either be charged to growers or to processors. If growers absorb the cost of shrinkage, they would be expected to discount the value of their product based upon expectations regarding storage practices of handlers and therefore the level of shrinkage. However, if handlers bear the cost of shrinkage, their risk is less since they are in a better position to know and control their storage behavior. This analysis also would show a higher level of resource use under a contract where handlers bear the risk of storage losses.

The same analysis would apply to the discounting for potato bruises (case 8) and the payment of demurrage charges for delivery of tomatoes (case 9). Resource use would be higher and net costs of risk lower when borne by handlers who are in a better position to know and control the risk-generating situation.

The case of bypassed acreage (case 7) can also be examined from this standpoint. Two kinds of risk give rise to the bypass clause. One is the risk with respect to packing intentions of handlers. The other is the risk with respect to yields.

If the only risk involved was that regarding packing intentions, handlers would be able to predict with a lower standard error than growers. The analysis would be identical to that for the other cases. However, the risk associated with yields may be as great for handlers as for growers. It is not clear who has the greatest cost of risk. This may explain why contractual changes involving passed acreage have resulted in risk-sharing arrangements while other cases involved a complete shift of risk.

The case of Oregon filberts (case #10) led to a shift in marketing/production functions from handlers to growers. The analysis in this case is just the reverse of that in other cases. The alternatives were the same. Contracts could require that either growers or handlers absorb the cost of "blanks" and "shrivels". Since growers have control over these defects, the supply price differential for a given level of output should be lower under the alternative contracts than the demand price differential. In this case, higher equilibrium output ( $\bar{Q}$ ) is expected when processors discount for defects (Figure III). Under contract 1, grower payments are discounted for defects whereas under contract 2, the handler does not discount for defects. (Since individual growers would have no incentive to reduce shrivels under the second kind of contract, the number of defects may be expected to increase.)



### Summary

This discussion has analyzed two distinct sets of cases in which (the author asserts) improvements in vertical coordination have been associated with collective bargaining. In the first set of cases, market failures associated with the public goods nature of certain production practices and contractual arrangements led to perverse incentives and an allocation of resources which was inefficient in the market sense. Collective action enabled growers to capture the benefits of efforts to respond to market demand where individual growers could not. Other institutions (vertically integrated systems for example) may lead to similar effects.

In the second set of cases, collective bargaining appears to have created pressures to allocate production/marketing risks so that they could be minimized. The preceding analysis indicated that the effect was to raise the equilibrium level of output.



In both sets of cases, an obvious question is why handlers did not rewrite contracts in order to capture the rewards for improved vertical coordination. Two alternative hypotheses were offered. First, organizational slack associated with imperfectly competitive buyer markets may explain handler behavior. Second, it may be that the gains from such changes do not justify the costs.

In both sets of cases, collective action improved vertical coordination in the sense that it was defined. The research did not provide information adequate to say whether those improvements in coordination were great enough to justify possibly higher transaction costs associated with the movement from a diffused sellers' market to collective bargaining. The research also did not examine non-monetary benefits of collective bargaining such as the sense of control growers may have as a result of a bargaining association.