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COORDINATION AND EXCHANGE IN AGRICULTURAL SUBSECTORS

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CONTRACTUAL EXCHANGE ARRANGEMENTS A LITERATURE REVIEW

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INTRODUCTION

A cursory review of agricultural economic literature indicates vertical coordination began to receive increased attention during the late 1950's. This review includes some of the major accomplishments since that time. The purpose is to learn what kind of research has been done and use these accomplishments as a basis for suggesting what kind of work might enable a fuller understanding of alternate exchange arrangements. Essentially I have drawn from three areas, the proceedings of two conferences sponsored by an earlier regional committee, some USDA publications and selected items from the general economic literature. Other good work is omitted in the interest of brevity.

RECOGNITION OF PROBLEM AREA

Four 1957-59 citations mark the renewed interest. Each is briefly described.

At their 1957 annual meeting the American Farm Economics Association sponsored a session entitled: An Evaluation of Marketing Research and Extension. In critically examining marketing research, Richard Kohls listed the mechanics of pricing, the nature of competition at all levels of marketing, and an evaluation of different market and industry organizations and systems as relatively neglected areas needing research emphasis (11). Evaluating the impact of an integrated system was cited as a current research need at that time. Even though there has been considerable work since then, many would still list the topics in the same place today.

Later in 1957 further evidence of new interest in the area was the inclusion of "Vertical Integration of Production and Marketing in Agriculture," in Congressional hearings on "Policy for Commercial Agriculture" (6).

In 1958, the U.S. Department of Agriculture published information Bulletin 198, Contract Farming and Vertical Integration in Agriculture. This publication marked the Department's renewed interest in these alternatives to open markets (16).

In its foreword, Ezra Taft Benson, the Secretary of Agriculture at the time wrote:

"Contract farming and other forms of vertical integration are

among the most potent forces in our agriculture today. Farmers have every right to decide how far they want to go in sharing risks or assigning managerial responsibilities, but they should carefully consider the benefits to be gained in exchange for the responsibilities transferred. The next decade will bring more integration to agriculture" (16).

Few would disagree with the statement, either at that time or since. The bulletin addressed two ideas, the meaning of integration and the extent of integration. Estimates of the extent of integration were based on opinion rather than survey or Census.

Suggestions were also made that farmers work to improve markets, to further strengthen cooperatives and to make better use of research. But, the bulletin does little to aid future researchers. Contract farming and vertical integration are loosely defined and a variety of contractual arrangements are included in the estimates of the extent of integration.

In a 1959 *Journal of Farm Economic* article Raphael Trifon catalogued reasons why companies vertically integrate or contract (15). Even though the article was published in this initial period, discussion of it is deferred to a later section.

Agriculture Economic Report No. 19, "Vertical Coordination in Agriculture" (13) published by the U.S. Department of Agriculture in 1963 presents a systematic analysis of concepts involved in coordinating economic activity. A need for a classification system that reflects the degree of integration achieved by various contracts is identified. Market specification, production management and resource providing contracts are described in terms of the number of traditional functions transferred. In addition, separate chapters discuss the theory of the firm and profit maximization, market structure, risk and uncertainty and capital and financing as reasons for particular forms of vertical coordination.

The Report also includes estimates of the percent of farm output produced under integrated or contractual arrangements (Table 1). It concludes with a catalogue of needed research. Many of the items listed could serve as a basis for current research.

Proceedings of two conferences sponsored by some earlier North Central Committees, primarily NCR-20, the Center for Agriculture and Economic Development and the Farm Foundation include discussion of some aspects of contract farming, market organization and competitive behavior.¹ Points reviewed here are of two types. Some describe forces that might lead to an increase in contractual exchange arrangements. Others identify research areas needing emphasis.

A 1967 conference focused on implications for research of structural and market changes (3). George Irwin suggested increasing specialization leads to higher proportion of fixed costs which in turn puts pressure on traditional competitive institutions, thus fostering alternate approaches to exchange, especially contracting. Richard

Kohls identifies a need for realistic and acceptable criteria for determining the effectiveness of a given level of competition. That is, theoretically well defined models of competitive behavior are applicable to polar extremes and are not very useful for analyzing the exchange relationships existing in most markets.

A 1968 conference examined agricultural organization in a modern industrial economy (7). Harold Breimyer argued that the policy issues regarding open markets relates more closely to considerations of centralization versus decentralization in our economy. Breimyer suggested that if we want to maintain a decentralized economy, "an open competitive market system for farm products is one of the instruments available." Lowell Hill concluded that perfect competition does not exist in agricultural markets but existing organizations have generated acceptable performance. Hill also suggested that continuation of acceptable competition and performance will depend on maintaining a) freedom of entry, that is, equal access for all to factor and product markets, b) adequate cross elasticity of demand for the products of any one firm and c) alternative uses of resources with maximum mobility. Paul Farris noted a spread of the Galbraithian organizational pattern to the food and fiber industries. Farris suggested possible institutional arrangements for strengthening decentralized decision making in agriculture and identified a need for defining alternative organizational policy actions and analyzing their consequences.

Review of three additional U.S. Department of Agriculture publications helps clarify problems associated with undertaking research on vertical exchange arrangements.

"Vertical Coordination Via Contract Farming," (10) published by the Department in 1968 makes three important contributions to the literature dealing with the vertical coordination of economic activity. First, it describes, categorizes and analyzes various legal elements of more than 400 contracts used to coordinate agricultural production.

Second, the contract elements are scaled according to the extent that control is transferred from the contractee (farmer) to the contractor in each contract. Ten contract elements are divided among three categories; acquiring the inputs, producing the commodity and marketing the output; the same three way grouping used by Mighell and Jones in their 1963 Agricultural Economic Report.

Finally, a unique feature of the publication and most important in terms of guiding future research is a last section entitled, "Critique and Revision of Classification Systems." A self-appraisal at the end of a study that focuses on conflicts between ideas developed during the study is not often found. But one is found in this publication. The initial classification scheme is rejected because it is unable to accommodate alternate views of integration. Interfacing contracts with the classification scheme produced different degrees of integration depending on which view of integration was used in the exercise.

The original view of integration (the classical view) holds that integration increases as elements of entrepreneurship are shifted to the contractor via management control and decision-making. In this view, increased integration means increased assumption of risk and uncertainty by the contractor and increased certainty of price and market for the contractee (farmer).

In a conflicting alternate view (tight control view), integration is increased to a peak when the contractor has all the management control and decision-making and the contractee (farmer) bears all the risk and uncertainty.

An alternate scheme for classifying contracts is proposed at the end of the report. The proposal provides separate categories for contracts exhibiting little transfer of entrepreneurship or partial or complete transfer of entrepreneurship, under either the classical or the tight view of integration. Implementation of the revised scheme is not a part of the report. Neither is there any conjecture about the possible or likely result of such an exercise.

In 1970, the U.S. Department of Agriculture published "Concepts Involved in Defining and Identifying Farms" (9). A chapter titled, "Contracts, Vertical Integration and Agricultural Specialization," cites several examples of contracting and integrating, describes reasons why each developed and identifies fundamental data problems caused by vertical coordination. Basically, three problems are: 1) Who is a farmer? That is, is someone who produces agricultural products under some sort of a contractual arrangement a farmer, an entrepreneur, a business man, an employee or a laborer? 2) What is farm income (and farm expenses)? That is, do the products produced under vertical integration or contract contribute to farm income and do the costs incurred to produce them contribute to farm expenses? and 3) How is the price (value) of a product determined if no sale occurred? That is, if the answer to the previous question is yes, how much do they contribute?

ERS Report 479, "Contract Production and Vertical Integration in Farming, 1960 and 1970," published by USDA in 1972 (12) estimates the proportion of total farm production under some form of contracting or vertical integration in 1970. The estimates are comparable with those for 1960 published in Agricultural Economic Report No. 19 (estimates shown in Table 1).

The percent of total farm output produced under production contracts increased slightly between 1960 and 1970, from 15.1 percent in 1960 to 17.2 percent in 1970. Similarly the percent grown under vertical integration increased from 3.9 percent in 1960 to 4.8 percent in 1970. The two combined increased in importance from 19 to 22 percent during the decade.

Rather modest increases in terms of total farm output do not call attention to some larger shifts for individual commodities. For live-stock items, the proportion of eggs, turkeys and fed cattle raised under production contract or vertical integration increased respectively from

15 to 40 percent, from 34 to 54 percent and from 13 to 22 percent. For crops, the largest increases were registered by vegetables for processing (from 75 to 95 percent) and by vegetables for fresh market (from 45 to 51 percent).

Table 1. —Estimated Percentage of Agricultural Output Produced Under Production Contracts and Vertical Integration, United States, 1960 and 1970

<i>Product</i>	<i>Production contracts</i>		<i>Vertical integration</i>	
	<i>1960</i>	<i>1970</i>	<i>1960</i>	<i>1970</i>
<i>Crop</i>	----- <i>Percent</i> -----			
Feed grains	0.1	0.1	0.4	0.5
Hay and forage3	.3	---	---
Food grains	1.0	2.0	.3	.5
Vegetables for fresh market	20.0	21.0	25.0	30.0
Vegetables for processing . .	67.0	85.0	8.0	10.0
Dry beans and peas	35.0	1.0	1.0	1.0
Potatoes	40.0	45.0	30.0	25.0
Citrus fruits	60.0	55.0	20.0	30.0
Other fruits and nuts	20.0	20.0	15.0	20.0
Sugarbeets	98.0	98.0	2.0	2.0
Sugarcane	40.0	40.0	60.0	60.0
Other sugar crops	5.0	5.0	2.0	2.0
Cotton	5.0	11.0	3.0	1.0
Tobacco	2.0	2.0	2.0	2.0
Oil bearing crops	1.0	1.0	.4	.5
Seed crops	80.0	80.0	.3	.5
Miscellaneous crops	5.0	5.0	1.0	1.0
Total crops ¹	8.6	9.5	4.3	4.8
<i>Livestock or Livestock Product</i>				
Fed cattle	10.0	18.0	3.0	4.0
Sheep and lambs	2.0	7.0	2.0	3.0
Hogs7	1.0	.7	1.0
Fluid-grade milk	95.0	95.0	3.0	3.0
Manufacturing-grade milk . .	25.0	25.0	2.0	1.0
Eggs	5.0	20.0	10.0	20.0
Broilers	93.0	90.0	5.0	7.0
Turkeys	30.0	42.0	4.0	12.0
Miscellaneous	3.0	3.0	1.0	1.0
Total livestock items ¹	27.2	31.4	3.2	4.8
TOTAL CROP & LIVESTOCK¹	15.1	17.2	3.9	4.8

¹ The estimates for individual items are based on the informed judgments of a number of production and marketing specialists in the U.S. Department of Agriculture. The totals were obtained by weighting the individual items by the relative weights used in computing the ERS index of total farm output.

Source: (12).

A summary evaluation of the items reviewed so far suggests that many questions remained to be answered. Concern about the possible demise of open markets underlies much of the work. But too often the concern continues with inadequate measurement of its incidence and too little study of its causes and implications. Good substantial empirical accomplishment is scarce. Problems hindering progress, besides those identified in the articles reviewed so far, appear in a brief review of general economic literature.

GENERAL THEORETICAL CONSIDERATIONS

More than 35 years ago Ronald Coase eloquently stated the need for giving more attention to the theoretical foundation underlying a problem area.

"Economic theory has suffered in the past from a failure to state clearly its assumptions. Economists in building up a theory have often omitted to examine the foundations on which it was erected. This examination is, however, essential not only to prevent the misunderstanding and needless controversy which arise from a lack of knowledge of the assumptions on which a theory is based, but also because of the extreme importance for economics of good judgment in choosing between rival sets of assumptions" (5).

Such a statement seems quite appropriate for work concerning economic coordination because contributions to a sturdy, even if not rigorous, theoretical base are limited. Kenneth Arrow suggests that little attention is given to a theory of vertical integration because in conventional analysis it is an anomaly; that is, costs of operating markets are usually assumed to be zero (2).

Two early articles focus on the cost of doing business with others. First is Coase's suggestion that the cost of using the price mechanism (operation of a market) is the main reason why it is profitable to establish a firm (5). Coase goes on to show how the size of firm and functions encompassed by the firm (including vertical extension) can be explained by Marshallian marginal analysis. Avoidance of sales tax on market transactions is consistent with the existence of a firm but Coase doubts whether this factor by itself would generate firms.

The next is George Stigler's 1951 elaboration of a theorem of Adam Smith: namely, "The Division of Labor is Limited by the Extent of the Market" (14). It is used to sketch a theory of the functions of a firm that recognizes different activities as being variously subject to increasing and/or decreasing returns and that suggests vertical disintegration (specialization) to be the typical development in growing industries, vertical integration in declining industries.

In a 1971 American Economic Review article Oliver Williamson used different terminology to describe properties of a firm that may favor internalization, that is, substitution of internal organization (in-

cluding contractual arrangements) for market exchange (16). Forces favoring internalization are presented as a categorization of transactional failures; namely, incentives, controls and "inherent structural advantages."

In such a classification, **incentives** represent activities that if not coordinated within the company would likely involve protracted arms' length bargaining in arriving at a transaction. This is similar to the point Coase makes about the applicability of Marshallian analysis, that is, substitution of a more efficient activity (internal coordination with proper incentives) for a less efficient activity (protracted arms' length bargaining with suppliers, etc.).

Control of the firm's activities may be enhanced by internalization. The firm has constitutional authority and low cost access to data needed for evaluating the performance of subject activities. This information allows more selective and refined use of reward and penalty instruments.

According to Williamson "inherent structural (dis)advantages" include two kinds of ideas that favor internalization, faulty property right specification and relatively inefficient communication networks. In a market failure context, property right specification viewed in *ex ante* terms is an inability to completely specify contracts, while situations involving both *ex ante* and *ex poste* uncertainty are strategic misrepresentations, that is, it may not be able to accurately establish what happened or if it can, only at great cost.

In summary, Williamson's discussion of forces favoring internalization in a market failure context focus around how and at what cost the firm acquires information needed to manage its business and to improve its competitive position. Using internalization to accomplish this is the important point for market economists. Markets may be plagued with all the ills so aptly described by Williamson but does this mean we are to do away with some of them? Maybe so, if too little attention is given to their upkeep.

Armen Alchian and Harold Demsetz, in a 1972 article, argued that the classical firm is a contractual structure that enhances efficient organization of production (1). As such its private behavior competes with what an open market accomplishes publicly.

The 1959 article by Raphael Trifon referred to earlier uses more traditional economic language to identify situations amenable to internalization (15). His discussion focuses on two general motives for vertical integration, investment opportunities for congested capital reserves and product diversification. Congested capital reserves develop when the firm cannot expand horizontally because the major market of the firm is formally regulated, in delicate oligopolistic balance, or because legal restrictions obstruct such growth. Via product diversification the firm expects either to reduce risk of loss by dispersing income over successive industries or effect price discrimination between different markets for successive commodities.

The balance of Trifon's discussion concerns possible advantages of forward and /or backward integration. Essentially, the factors mentioned collapse into two categories: those which help the company tackle competition and those which help it implement innovations. The first group tends to perpetuate vertical integration, since according to Trifon, the second group is more temporary, that is, as the innovations become adopted, the market readjusts.

Trifon argues that the reasons for contracting are the same as those sought via vertical integration. In other words, contracting is a temporary form of internalization. So, as mentioned, limitations of vertically integrating can be viewed as factors supporting a contractual arrangement. Trifon lists eight limitations.

- 1) The urge to integrate is fairly temporary in nature, thus not justifying a long-term commitment.
- 2) The commodity in question is only one of several handled by the subsequent or antecedent industry and the company doesn't want to get into uninteresting areas.
- 3) The optimum scale in the adjacent industry greatly exceeds the requirements and the sale of the surplus would be a major problem. Conversely, if the scale is too small there would be heavy administrative burden of managing many small plants.
- 4) The adjacent industry is in a depressed state with low returns to fixed factors
- 5) Capital requirements in the adjacent industry are high or prohibitive.
- 6) Entry into the adjacent industry requires special skills that are hard to acquire.
- 7) Entry into the adjacent industry may be (or appears to be) a conspicuous breach of an oligopolistic agreement (formal or informal) and upsets balance in company's major industry.
- 8) Entry into the adjacent industry may antagonize public opinion.

Recapitulation

Synthesis of the various conceptual approaches to the overall problem is attempted via a summary listing of information needed to assess the viability of alternate exchange mechanisms. It is not a summary catalogue of previous accomplishments. Neither is it a listing of research to be initiated. Identifying research that might be done will require further distillation of the broad ideas in the following list.

- 1) Determine the cost of using the price mechanism in various kinds of markets for a commodity. Essentially, this is the cost to the industry of operating a market. Costs are indirectly borne by firms in the industry. Potential savings represent possible incentives for establishing and/or vertically expanding a firm.
- 2) Determining purchasing and selling costs (including contact and communication costs), especially those that would be avoid-

ed by acquisition of a firm in an adjacent industry. Essentially this is the cost to the firm of dealing with its suppliers and distributors. Integration might further reduce costs.

- 3) Assess the value of information about an adjacent industry that becomes readily accessible by the acquisition of a firm in that industry.
- 4) Assess the value of more selective use of rewards and penalties made possible by the acquisition of a firm in an adjacent industry.
- 5) Determine the value of controlling raw material supply to a) obtain uninterrupted flow of materials to fully utilize plant capacity and b) escape monopolistic exploitation in factor markets.
- 6) Determine the value of controlling distributive outlets to a) obtain market share without bidding down price in cases when supply is inelastic and b) escape monopsonistic exploitation in product markets and/or restrictions imposed by cartels or marketing boards (includes securing immediate market for perishable products).
- 7) Estimate the reduction in cost obtainable through exploiting technical complementarity.
- 8) Estimate the potential value of a) promoting the supply of a new raw material, b) developing a new use for a product and c) establishing direct contact with the ultimate user of a product.
- 9) Estimate the cost and value of having more complete and more accurate information available for use by various size firms to facilitate the process and mechanics of different exchange arrangements.

CONCLUSIONS

Review of published research shows few items focus directly on questions appearing in the summary listing. One reason for this may be that too many of the ideas represent new lines of research for publicly supported economists. Presumably, such work is most often tackled by people employed by firms that are contemplating vertical expansion of their activities. And for obvious proprietary reasons the results are not generally available. Still, a heavy reliance on open exchange generated adequate information for students of agricultural markets. But displacement of traditional spot market transactions by other exchange arrangements will require more than the usual amount of effort if adequate information is to be available for monitoring developments in the food and fiber sector and for understanding their implications for system participants.

Consequently, a new and different thrust is needed for some of our economic research. Less information will be available for analyzing

problems of exchange in the future. Because much of the needed information will likely benefit individual firms, those who work to develop the needed information will face the public research for private benefit issue. But a larger purpose, maintenance of viable and competitive exchange mechanisms seems to require public investigation of some of these heretofore private questions. If so, the information needs mentioned in this review will need careful scrutiny and further development before becoming solid research proposals.

Footnotes

- ¹ Earlier work on market structure by the NCR-20 Committee is reported in a 1961 JFE article by Robert L. Clodius and William F. Mueller and a 1964 volume edited by Paul L. Farris (4 and 8). Neither is discussed in this review although articles by Richard L. Kohls and Allen B. Paul in the edited volume deal with various aspects of firm and market coordination.

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