IMPLICIT CONTRACTS AS A METHOD OF VERTICAL CO-ORDINATION IN THE NEW ZEALAND MEAT INDUSTRY

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M. Jozefa Wylaars

Massey University

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ABSTRACT

A framework is developed using Williamson's seminal discussion of contractual arrangements and governance choice. The New Zealand Meat industry is the subject of this study in that contractual arrangements exist along-side more conventional trading relationships. The main body of the paper is devoted to; the review of other empirical studies of vertical co-ordination and; the collection and primary analysis of data. Primary results show the form and extent of vertical co-ordination in a small non-random sample. While the neo-classical contract to supply stock is used, many producers and processors operate and co-ordinate with a relational, implicit contract in which the producer deals almost exclusively with one company and develops a long term and 'important relationship' with an agent. Several regressions on measures of co-ordination, included in the appendices, while far from robust, show interesting patterns related to the transaction cost hypothesis.

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Chapter One: Introduction

Transaction cost economics has progressed considerably since Coase (1937) identified the distinction between the market and the firm: "the costs of using the price mechanism. It was the avoidance of the costs of carrying out the transactions through the market that could explain the existence of the firm" (1992, p.715). According to Williamson (1985 p.2) - "transaction cost analysis [now] supplants the usual preoccupation with technology and steady-state production (or distribution) with an examination of the comparative costs of planning, adapting and monitoring task completion under alternative governance structures".

The subject of this paper is the New Zealand meat industry. The study is, more accurately, focused on the present extent and form of vertical co-ordination within the meat industry. Recent developments in the relationship between the processor and meat producer have included the use of supply contracts. This is a likely response to the changing marketing effort of the industry which is aiming to differentiate meat products from commodity to specialist, value-added niche markets. However this requires that firms have a certainty of supply, a certainty of supply made more difficult by declining stock numbers and processing over-capacity.

This paper is thus organized as follows. A discussion of the transaction cost hypothesis is followed by a review of literature which empirically tests the transaction cost hypothesis. Secondly this paper presents the results of a survey of vertical co-ordination between a non-random sample of farms and meat processing companies. The surveyed farmers were asked to provide details of the past year's transactions. The transactions as organized by contract or agent are used as evidence of the co-ordination in the industry.

The results suggest that there is vertical co-ordination in various forms, namely the long-term trading relationship, or implicit contract and the formal contract. As there are many transaction-cost explanations of farmer and processor activity, this study while providing evidence of vertical co-ordination is limited by the size of the sample to a simple regression analysis of the determinants of the farmers' co-ordination activity.

Chapter Two: Literature Review

2.1 Vertical Co-ordination

Vertical co-ordination encompasses a wide range of activities. The industrial, behavioural, and institutional economics and management disciplines have identified and defined a range of distinct types of economic organization and behaviour. Examples include vertical integration, quasi- and taper integration, short and long-term contracts, multinational enterprise and franchise to name but a few.

Fundamental to the discussion is the understanding that there is inter-firm activity that goes beyond the usual definitions of the market. Richardson (1972) provides a broad definition of co-ordination; "it is perhaps easiest to envisage co-ordination in terms of matching, in quantity and specification, intermediate output with final output" (p.236), furthermore he writes that "the simplest form of inter-firm co-operation is that of a trading relationship between two or more parties which is stable enough to make demand expectations more reliable and thereby to facilitate production planning. The relationship may require stability merely from goodwill or from more formal arrangements such as long-term contracts or share-holding" (p.226). Likewise Marion (1976) writes of co-ordination as the entire "process by which the various functions of the vertical value adding system are harmonized" (p.180).

2.2 Transaction Costs

2.2.1 Introduction

Transaction cost analysis has provided significant clues as to why various forms of vertical co-ordination and economic organization exist and are seemingly optimal over others. "The key theme is that economic organization is a reflection of the perceptions about the opportunity costs of different ways of arranging and implementing deals to get things done. In other words it is a reflection of anticipated transaction costs, the costs of finding potential trading partners, bargaining with them, drawing up contracts, monitoring implementation, and if necessary using legal process or other means to obtain redress" (Earl, 1993, p.307). The difficulty of the analysis is determining the opportunity costs, the anticipated transaction costs. Coase classified transaction costs, as search and information costs, bargaining and decision costs, and policing and enforcement costs, leading to the reflection that all transaction costs were sure to rise with a rise in uncertainty.

Williamson (1979) in the article, 'Transaction-cost Economics: The Governance of Contractual Relations', introduced, governance structures and possible causes of high transaction costs to the body of thought. The governance structure is specifically defined as, "the institutional framework within which the integrity of the transaction is decided" (Williamson,1979,p.235). Focused on the inter-firm relationship that is governed by contract, the article then identified "three critical dimensions for characterizing transactions, [they are:]

(1) uncertainty,

(2) the frequency with which the transactions recur, and

(3) the degree to which durable transaction-specific investments are incurred"(p.239).

While Williamson's comments pertain to the intermediate product market the analysis is transferable to other transactions.

The governance structure is a function of the minimization of the transaction costs associated with the co-ordination of firms. These transaction costs are dependent on; the degree of transaction specific investments (the same as asset specificity); the frequency of transaction and; the presence of uncertainty. In the discussion of the governance structures, MacNeil's contract law classification is used; the classical, neo-classical and relational contract. Also useful to keep in mind are the two distinct features of a contract (MacCaulay, 1963). They are "relational planning of the transaction with careful provision for as many future contingencies as can be foreseen, and the existence or use of actual or potential legal sanctions to induce performance of the exchange or to compensate for non-performance"(p.56).

2.2.2 The Governance Structure - The Contract

In a simple classical contract, the parties relate with a comprehensive set of rules and remedies. Market transactions in their traditional definition are considered to be classical contracts. But under conditions of uncertainty there is less scope for the classical contract as it is difficult if not impossible to account for all possible contingencies.

The neoclassical contract law allows for some flexibility and adaptability in that it is supported by a confidence in the methods of arbitration if the need should arise. The neoclassical contract is unsuited to the uncertain and rapidly changing world. This is because the ability to cover all contingencies in a contract is limited.

Finally we come to the relational contract which is a function of its own nature. It progressively changes as time passes and adjustments are made to the relation to accommodate realised complexity and uncertainty. It is often very different from the initial contract which began the relation and the relation can be so specific to the parties involved that it can no longer be formalized in contract and has developed into a function of personal relations, goodwill, and trust. The need for communication, trust and goodwill is reinforced by mutual dependence.

Likewise, Ronald Dore (1983) suggests that the relational contracting in Japan is not simply a remnant of history and tradition but rather a product of a high technology environment where quality and flexibility are critical.

Concisely, Williamson states, "that simple governance structures should be used in conjunction with simple contractual relations [reserving] complex governance structures ... for complex relations seems generally sensible"(p.239).

Of the three explanatory variables, asset specificity, uncertainty and frequency

of transaction, which characterize transactions, affect transaction costs and the resulting governance structure, Williamson (1979) places the most emphasis on asset specificity. These variables, along with uncertainty and opportunism are discussed in the following sections.

2.2.3 Asset Specificity

The reasoning is as follows. In the presence of a potential for opportunism, which often occurs when the investment of one party is specific to the transaction with another, the more likely the neoclassical or relational contract. "Items that are unspecialized among users pose few hazards, since buyers in these circumstances can easily turn to alternative sources and suppliers can sell output intended for one order to other buyers without difficulty" (Williamson, 1979, p.239). The party who makes an idiosyncratic investment is unwilling to be left with a specialized asset, that has either low salvage value or few alternative uses. The party who has made a specific investment requires assurance that the other party will behave in a favourable manner. Note also that the terms asset and investment include human capital; an example is the investment into training in a highly specialized field. While very common, human capital investments, especially into 'learning by doing' are intangible, and difficult to quantify and insert into formal agreements and negotiations. Market governance would suffice if there were suitable alternative uses for the asset.

2.2.4 Uncertainty

Another of Williamson's explanatory variables is uncertainty. His argument

is that uncertainty will exacerbate the vulnerability of the parties when investments are idiosyncratic to a non-trivial degree. "Increasing the degree of uncertainty makes it more imperative that the parties devise a machinery to "work things out" - as contractual gaps will be larger, and the occasions for sequential adaptations will increase in number and importance as the degree of uncertainty increases" (Williamson, 1979, p.254).

2.2.5 Frequency of Transaction

Williamson provides little intuition to his inclusion of the frequency of transaction as explanatory of governance structure. Perhaps this is because the relational contract by definition requires, time and experience for the learning dimension and the development of the independent governance structure. This argument does have its limitations, as ex-post analysis may reveal a long-term inter-firm relationship, but ex-ante, the transactions may operate with a classical governance structure. The frequency of transaction has the problem of being both, a feature of the governance structure and a necessary condition.

2.2.6 Opportunism

Another concept central to transaction cost economics is opportunism. Opportunism, self-interest seeking with guile, is "especially important for economic activity that involves transaction specific investments in human and physical capital" (Williamson, p.234). The risk of a party acting in an opportunistic manner is inherent in the formation and need for contract and/or legal or other redress. Mutual dependence is a critical aspect of a successful contract in that it reduces opportunism

with the threat of a loss-loss outcome.

There is debate as to whether opportunism is a significant, pervasive influence in contractual relations. Hill(1990) writes that opportunism is a short-run phenomena and that the market mechanism operates so that "in the long-run the invisible hand gets rid of actors whose behaviour is habitually opportunistic"(p.500). This may be so but it can be argued that the actors wise-up to the threat of opportunism and develop sufficiently secure governance structures. As with the discussion of transaction costs, analysis of opportunism is problematic in that it is an opportunity cost, a potential threat, that must be minimized.

2.3 Networking and Co-operation

However transaction cost analysis cannot lay sole claim on the inter-firm relation. Networking and co-operative strategies seem to be in a very similar sphere as the transaction cost analysis above. The literature on co-operative linkages and networks [for example see. (Bureau of Industry Economics, 1991), (Powell, 1990), (Berg, 1990)], offers an alternative terminology and framework for understanding inter-firm relations. The definition of a network is broad. "By definition [transactions organized by networks] are not handled within the firm, i.e. by a strategy of integration; but neither are they simple market or contractual relations between firm. Networks may be seen as alternatives to organization by markets or within firm..." (Bureau of Industry Economics 1991b, p.50). Examples include trade organizations and craft guilds, mergers and cross-manufacturing agreements.

Likewise Mariti and Smiley (1981) in a paper named 'Co-operative Agreements and the Organization of Industry' state that "a co-operative agreement is any long

term explicit agreement amongst two or more firms"(p.437). The motivations for participating in the co-operative agreements Mariti and Smiley studied are; technology transfer, technological complementarity, marketing agreement, risk sharing and economies of scale.

The networking literature includes an even more comprehensive list of incentives to network. While the factors raised by Williamson (1979), i.e. asset specificity, uncertainty and frequency of transaction, are included many more are listed as strategic factors. Powell (1990), with reference to transaction cost minimization contributing to the formation of a network, suggests that, "strategic considerations seem to outweigh a simple concern with cost minimization"(p.322).

Nevertheless an overview of networking literature and networks in New Zealand (Harper, 1993) lists meat processing firm's "procurement links (the subject of this study) established with suppliers"(p.47), as an operational vertical network.

2.4 Empirical Evidence

This section reviews empirical studies which test the significance of the presence of transaction specific investments on governance structure. The studies review are not confined to agricultural industries as the basic principles should be the same in all industries.

The asset specificity of coal mines built near electric utilities is the subject of Paul Joskow's (1987) analysis. His study of the nature of the contracts between coal mines and utilities in this case covers the duration of the contract. His first investigation is into the relationship between the duration of a contract and the presence of a utility near the mouth of the mine. Using econometric analysis he finds

that a mine-mouth plant will have a contract about 16 years longer than other plants. The location of the utility thus represents an asset specificity affecting an aspect of the governance structure.

Asset specificity and idiosyncratic investments are given a rather different treatment in the work by Palay (1984). The study of the 'Governance of Rail Freight Contracting', focuses on the enforcement and adjustment of contracts, and the degree of long-term and structural planning related to the relationship relative to the type of investments involved. The central proposition is that the extent of idiosyncratic investment is the most significant factor affecting governance choice. The investments in question are the freight cars which may be highly or moderately idiosyncratic or nonspecific. Palay uses tables to show the patterns and relationship between the three types of investment and governance structure. The results are all consistent with Willimason's general hypotheses.

Also dealing with investment specificity, Masten (1984) and Monteverde and Teece (1982) investigate the product make or buy decision in the aerospace and automobile industries respectively. Masten concludes using an econometric analysis of the make or buy decision with respect to the complexity, specialization of component, standardness and location importance that the design specificity and complexity contribute to the decision to integrate the production of a component in the aerospace industry. Monteverde and Teece conclude that specialized know-how has important ramifications on organizational design. Vertical integration is chosen when there are high switching costs, costs associated with the establishment of a new inter-firm relationship, which would otherwise lock the assembler into dependence and exposure to opportunistic behaviour. Therefore the variable, engineering

investment, is highly significant in the explanation of the make or buy decision.

In a more recent contribution to the study of transaction costs Masten (1991) introduces the concept of temporal specificity. He argues that the "difficulty of identifying and arranging to have an alternative supplier in place on short notice introduces the prospect of strategic holdups"(p.9). The study of Naval shipbuilding and the decision whether to, organize a task or produce a component internally or externally, is very similar to the studies described above but the 'schedule' variable, a ranking of the importance of having the component or performance of the task on schedule, is very significant. Masten raises a very important oversight in the literature thus far; "observed patterns of organization may result from the hypothesized changes in market transaction costs or from systematic [] variations in the costs incurred organizing the production internally"(p.2). So this study also regresses the measure of internal organization costs against each of the variables.

Temporal specificity is a significant theme in the work of Pirrong (1993) on bulk shipping markets. He notes that there is the continuum of contracting practices and that the "characteristics identified by transaction cost economists" that would lead to the use of long term contracts are absent. He concludes that it is temporal specificity that dictates the type of contracting arrangement. Temporal specificity is a term for timely co-ordination and Pirrong identifies firm specific supply sources, the thickness of the market, and whether the ship is general purpose or commodity-specific as factors which contribute to the type of contracting arrangement chosen by both parties. The first factor represents the potential for hold-up due to reliance on a single supply source and thickness of the shipping market, i.e the number and frequency of ships transporting cargo, determines the potential for competitive spot

contracting. For each of the 15 commodities studied, i.e. grain, oil, coal fertilizer etc, there is a comprehensive overview of the contracting practices as they relate to the factors outlined above. The table of general conclusions, i.e. "Yes" or "No" for each of the factors shows a convincing pattern in accordance with the transaction cost approach.

Globerman and Schwindt (1986) study the organization of vertically related transactions in the Canadian forest products industries and conclude that asset specificity is an important determinant of governance structure. Although not directly named as a temporal specificity as the term was used above, Globerman and Schwindt recognize that the mills are inherently vulnerable due to the nature of the product. Firstly, "timber is not nearly so specialized to specific mills, especially in the temporal sense"(p.203), secondly, a non-decadent stand of timber is a non-wasting asset. These are good reasons for all but one of Canada's 30 largest forest product enterprises to integrate back into the ownership of timber rights. Integration of transportation was deemed to an issue of co-ordination rather than dedicated assets. Another interesting part of the industry is the production of newsprint. All but 3 of the 15 largest consumers of newsprint, newspaper publishers, had ownership/directorship or fiduciary links back to forest product industries due to their vulnerability to supply disruption.

Lieberman (1982) tests the significance of sunk costs, market concentration and demand variability on vertical integration in the organic chemical industry. The empirical results support the hypothesis that integration is likely when there is investment into transaction specific assets and the input accounts for a large proportion of total cost. There is also evidence that high demand variability by other

buyers of the input will lead to vertical integration. Integration is thus a way of mitigating the input supply and price uncertainty of the input.

Leffer and Rucker (1991) test the hypothesis of the transactions costs involved with the harvesting of timber. They test the use of per unit vs lump sum contracts to hypothesize that the greater the transaction costs associated with obtaining presale information and the harder it is to enforce and monitor the harvesting the more often per unit contracts will be used. They use variables such as the type of timber and its end use to indicate a degree of variability. Variability would encourage them to use a lump-sum contract because the cost of predetermining the value of the tract is high. The sample uses a sample of 188 contracts from North Carolina privately owned forests and all variables in the logit regressions are significant at 90%.

Hubbard and Weiner (1991), studied contracting in the U.S. natural gas industry. They recognized that the contracts between the suppliers, the gas fields, and the pipelines which distribute and resell the gas, had features which indicated the presence of efficiency gains rather than a tendency toward monopoly or monopsony power. The transaction costs and potential for opportunism, is over the entire market, symmetrical as there are instances where the supplier has few options and the pipeline many and vice versa. Yet each transaction displays an asymmetry in terms of small-numbers bargaining, uncertainty and immobile capital. Thus the objective of the study was to determine the "relative effects of transaction-specific and market-power considerations on outcomes of contract negotiations"(p.27).

The most-favoured-nation (MFN)[1] provision in contracts was used as a

[1]The MFN 'clause states that, if a pipeline signs a new contract in a field at a higher price than that paid on existing contracts in that field it must grant the higher price to existing contracts as well.'(Hubbard, p.34)

distinguishing feature between market power and transaction-cost theories of contracting. The MFN clause would mitigate the chance of ex-post opportunistic behaviour by the pipeline after the seller has made a transaction-specific investment into the gasfield. Their approach used variables associated with market structure, transaction and information costs and production costs. They identify the first set of determinants as that of a market power model; buyer and seller concentration ratios. The second are those of the transaction-cost and are absolute buyer and seller size within specified markets. The third set, production costs, are a control. They empirically test the determinants of contract prices and find that the number of contracts entered into by the seller is significant. This is reflective, they deduce, of the advantage of information-gathered through greater involvement in the market. There is a positive effect of price from greater seller size and a negative one from greater buyer size. And while there is evidence of buyer monopsony power there is no evidence of producer concentration associated with prices received. From a second regression, which tested the determinants of the inclusion of a MFN clause they find support "for the hypothesis that the MFN is part of a contractual package designed to approximate marginal efficiency over the course of the long-term contract, [], allowing rents to be distributed between producer and pipeline according to bargaining power"(p.56).

2.5 Vertical Co-ordination in Agriculture

Marion (1986) provides a comprehensive overview of co-ordination in agriculture in 'The Organization and Performance of the US Food System'. He writes, "the realities of commodity subsectors ,[] suggest that vertical co-ordination

is one of the central dimensions of the organization and conduct of economic activity"(p.53). The study uses a structure-conduct-performance framework, with subsector analysis following the general discussion on vertical co-ordination. Of vertical control, Marion explicitly states that, while increasing the efficiency and synchronization of a subsector, it may also "overcome deficiencies in the pricing, grading, and information systems and in the process, increase the likelihood that the mix and timing of products produced are consistent with demand"(p.57).

In the analysis of the US beef sector, Marion notes that there is scattered vertical co-ordination. Auctions were still an important outlet accounting for 52% of cow and bull sales in 1982. However with the advent of large scale feed-lots, which were explicitly linked through ownership by large grain-feed companies, vertical co-ordination between processing and production of stock has increased. The study cites several cases where large feed-lots supplied approximately 75% of the stock processed by some of the larger companies in the US beef sub-sector. The processing companies also had further down-stream linkages to retail and fast food outlets. This study undertaken in the early 1980 is sure to show only the beginning of a trend in increasing vertical co-ordination, as the size of US farms continues to increase.

Observations on contracting in agriculture (Shrader, 1986) qualitatively highlight idiosyncrasies of the sector that determine the prevalence of co-ordination. These idiosyncrasies stem from the inability to supervise and control an operation such as agricultural production which may take place over a large area. Full integration may thus have prohibitive costs yet the benefits of contracting, such as the reduction of uncertainty, will still be positive. Schrader also suggests that farmers trade greater returns from being an employee in an integrated unit for the utility

derived from operating an independent operation.

As previously noted there has been much difficulty in determining a method of analysis of the degrees of vertical co-ordination which encompass the entire co-ordinating spectrum from spot markets to integration. Most of the previous studies cited in this literature review use a dependent dummy variable to test the presence of one form of co-ordinating behaviour i.e contracts yes/no. Frank and Henderson (1992) test transaction costs as determinants of vertical co-ordination in US food industries with an index which incorporates input-output relationships and non-market arrangements. Put simply, a Leontief industry input-output matrix is utilized to represent a degree of production interlinkage and a second matrix assigns values for the "degree of administrative control that is consolidated by the contractor/integrator" (p.943). The assigned values for consolidated control were, "spot market, 0; market specification 0.5; production management, 0.8; resource providing, 0.9; and integration, 1.0.

The explanatory variables used in the study were, uncertainty, concentration, idiosyncratic investments, and the cost of administered co-ordination. The empirical results support the transaction cost hypothesis that uncertainty, input supplier concentration, asset specificity, and scale economies are a primary motivation for vertical co-ordination.

Barry, Sonka and Lajili (1992) suggest vertical co-ordination will also take the form of a financial arrangement between firms. Among the causes of increased co-ordination they suggest that the "growth in sizes of commercial scale farms, especially very large units, along with a focus on niche marketing, [] enhances the prospect for further co-ordination" (p.1220). They believe that "lender incentives can influence

borrower behaviour" and thus the "lenders can utilize extensive contracts in order to more closely align incentives and monitor and control borrower performance" (p.1222). This phenomena is thus important to consider as a form of vertical co-ordination. As this paper further discusses in the next section, financing arrangements play an important part in the contractual arrangement between meat producers and processors in New Zealand.

2.6 Vertical Co-ordination in the New Zealand Meat Industry

In 'An Application of Transaction Costs Theory to the New Zealand Meat Industry' Maughan and Wright (1993) analyze the historical evolution of the New Zealand Meat industry and suggest that an application of the transaction cost model would provide insight into its current and future structure. The two broad causes of high transaction costs and thus an explanation for the presence of vertical co-ordination, as suggested by Blair and Kaserman, are: "uncertainty about the conditions under which exchange will take place and problems related to small numbers bargaining"(p.3).

They next suggest that "the existence of contracts and various form of vertical integration" in the industry imply the presence of high transaction costs. Meat supply contracts, in their current form, are primarily a way for processors to reduce the uncertainty of supply, i.e a method of securing procurement rather than obtaining stock at a pre-specified quality and price. Due to the existence of overcapacity in the processing industry Maughan and Wright conclude that the vulnerability of the processors suggests a small numbers bargaining problem on the part of the processors due to their limited options and bargaining power. The benefit of the

contracts to farmers seem to be financial, where temporary cashflow problems, as farms are converted, are mitigated (Blanchard and Wright, 1994). This, to be sure, is still an issue related to uncertainty and the risk associated with transaction specific investments.

In line with the focus of this study, surveys on the extent and use of contracts for sheep and beef have been undertaken. Waddell (1994) surveyed farmers" opinions on lamb supply contracts. This study showed that contract use was significant with 30% of respondents having previously entered a lamb supply contract. One of the more interesting findings was that large farms were more likely to enter a lamb supply contract; 72% of the larger farms had sold lambs on contract.

Blanchard (Wright and Blanchard, 1994), surveyed the use of the Riverland's weaner bull contract. This contract involved 100% financing for the cattle at low interest rates and farmers indicated that this was their primary reason for entering into the contracts. While some farmers exited the contract because of uncompetitive prices and the inflexible killing date, they in general had a positive attitude to the farm management and bull beef advice that was included in the contract agreement.

A recent study, 'Farm Business Marketing Behaviour and Strategic Groups in Agriculture' (McLeay, 1993) aimed to identify and describe strategic groups and evaluate their marketing activity. While this article does not directly pertain to vertical co-ordination in the New Zealand meat industry, the marketing behaviour and the strategic management process of Canterbury arable farmers is approporiate to this discussion. The analysis of Canterbury arable farms had to first identify the range of strategic and marketing activities and then classify them into a strategic group. Each group was deemed to have a focus, for example, arbitrage, production,

differentiation, or flexibility. The paper concludes that "it is necessary to examine the issues of why alternative strategies have been chosen by individual farmers"(p.13). The survey also gathered results on information sources and type, and produced some notable results. The agent, the article did not specify what type of agent, as an information source ranked in the top three important sources for all the groups bar the differentiation group, for whom agents did not even rank in the top 12. Crop field days were in the top three for all groups and 'other farmers' as a source of information ranked in the top four (Appendix 5.). The types of information required and obtained, that were ranked highly by all groups were, pest and disease, crop and cost returns, management practices, local growing conditions and NZ crop prices.

Other recent literature on the New Zealand Meat industry has focused on the role of the Meat Producers Board and deregulation (ACIL, Savage). Savage does however raise the issue of the "Commerce Act acting as a constraint on rationalization" (p.73) and the fear that it may limit healthy vertical and horizontal integration. Inertia, according to Savage, due to "a history of steady demand, high returns and/or government support has resulted in a slow response to changed circumstances" (p.75).

Chapter Three: Methodology

3.1 Introduction to the New Zealand Meat Industry

This section discusses a framework for this part of the paper. A brief discussion of the meat industry precedes discussion of the transaction cost hypothesis and a suitable methodology given the constraints of this study.

Meat processing involves the interaction between the farm, a livestock producer and the meat processing company. It is this inter-firm relationship that is to be studied. This relationship has changed considerably over the past decade due to internal and external factors. There has been a removal of the barriers to entry in the meat processing industry. Farmers suffered transitional trauma as subsidy programs were withdrawn and the Meat Producer's Board reacted by intervening intermittently. Demand conditions have changed to the extent that the industry "is trying to orientate itself to a variety of much more differentiated markets" (Maughan, 1993, p.3). A combination of demand and stock supply factors have left the industry with significant excess capacity.

The meat producing and processing industries have operated in a stable regulatory anvironment and low intervention market for the past decade. There has however been mass exit and entry; entry due to the introduction of competitive technology and the exit, partially due to an inability of some firms to adjust to the more competitive low-intervention environment. Dick Davidson, former Chairman of Federated Farmers Meat and Wool Council writes, "the lesson of decades of political interference in agriculture is that instead of reducing uncertainty, it creates the risk that rules will suddenly be changed (Straight Furrow, May 23 1994, p.18).

The sector is changing to meet the demands of the new environment. The

New Zealand Meat Producer Board's Strategic Plan 1993-2000 (1993) includes the objective to - "develop a more reliable supply base to ensure product continuity" - and the corresponding action statement was - "stronger farmer/processor loyalty is critical to improving livestock quality and to provide a more certain supply base to allow exporters to strengthen their levels of customer service" (p.39).

To reiterate, while the industry is utilizing neo-classical contracts as a governance structure to assure supply, two issues remain; do governance structures other than neo-classical contracts exist and is so to what extent are they in use?

3.2 An Alternative hypothesis

3.2.1 Introduction

Most of the empirical studies reviewed in the previous chapter have a commonality. They have sought to test the relationship between governance structure and an investment or asset specificity variable. This analysis will present a framework for incorporating importance of the asset specificity of both parties. The contention is, remembering the importance of mutual dependence, that both parties must have made transaction specific investments for successful contractual conditions. The result of this assertion is that when only one party makes significant idiosyncratic investment the only viable alternative is vertical integration.

Figure 1 Diagrammatic Representation of Hypothesis

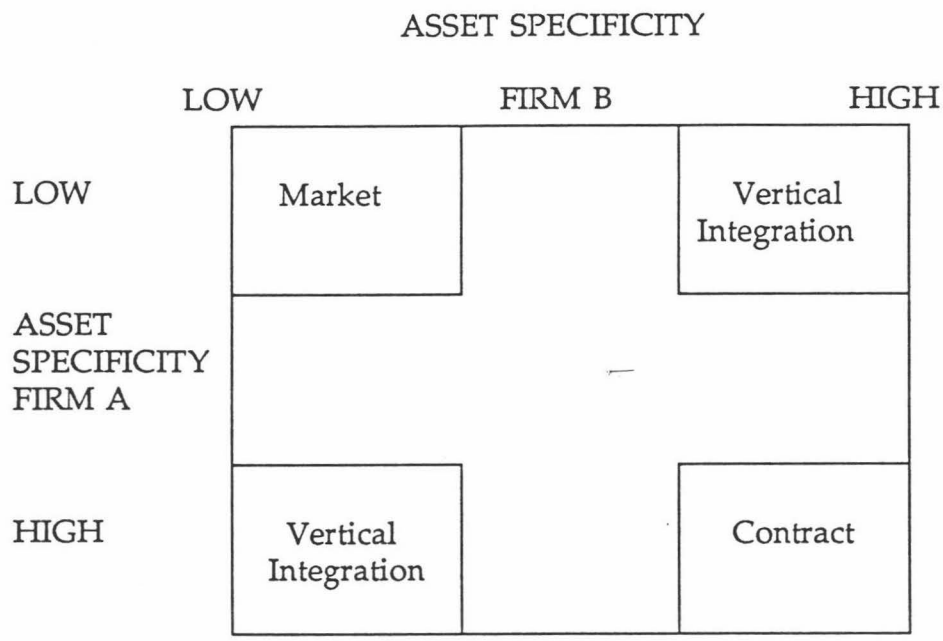

Figure one shows that two parties will use a market transaction, when neither have made a significant investment into the transaction. When one has made a significant investment vertical integration will result, see bottom left and top right corners of figure two. Contractual relations will result from the two parties having similar levels of asset specificity.

3.2.2 Asset Specificity of the Farm

In accordance with Williamson's hypothesis, transaction specific investments, characterize a transaction. In this study farmers' transaction specific investments must be identified. The stock a farmer owns is an asset quite specific to a transaction with a meat processing company. Given that the group studied all own stock, stock

ownership is not a distinguishing feature. Different types of stock, i.e. breeds, ages etc have varying degrees of specificity. The animals which could be sold for store or breeding or a meat processing company are less specific than those raised to be sold to a meat processing company. Sheep are less specific than cattle because of the income derived from wool.

The land and improvements, like stockyards and fences, used in the production process are of varying specificity. The land may be able to be converted from production of sheep to beef or vice versa and from pastoral to arable in a year. Conversion to horticulture or forestry would also be viable for some units.

Temporal specificity best describes the nature of stock produced at a certain time. Stock produced out of season are more specific to a transaction than those produced in season. Out of season production represents a cost, an investment in that extra feed may be required at higher cost, and stock losses may be higher.

The extent of diversification in an operation, creates an asset specificity, when there is a reliance on one type of output for income.

The quantity of stock produced represents an asset specificity simply by scale. Large quantities of stock are an asset in that the transaction costs per unit are reduced as the quantity sold increases.

3.2.3 Asset Specificity of Meat Processing Company

Like the meat producing transactor, the processing industry has a highly specific asset base; the building and plant have few alternative uses. Older plants have a higher fixed cost associated with them as technological advancements have lowered the set-up cost for new plants. The asset specificity is perhaps less

significant for many of the new plants as they are smaller operations and thus the relative importance of the asset base is lower. Many of the new plants are single chain and exploit the latest technology[2]. There are several ways they have an advantage over other plants. They have better capacity utilization, due to the smaller number of stock they process and they may achieve economies of specialization due their flexibility and ability to cater to niche markets. Location of the plant is also an asset specificity. Whether this features highly in the transaction is dependent on transportation costs. Some plants are specific to processing only one type of livestock while others process sheep, cattle, deer and goats.

The marketing and distribution activities of a meat processing company also have an aspect of asset specificity. Consider a meat company that arranges to sell a quantity and quality of meat at a certain time, for example, pre-Christmas, chilled lamb. Their asset, the ability to sell the early lambs, is specific to farmers capable of supplying stock to the specifications of the order. The marketing agreement is an investment to the extent that the firm is vulnerable to losing the goodwill associated with their brand if they fail to meet the order. Thus a niche or specialist market requires a relatively more idiosyncratic investment. Maughan and Wright (1993, p.9) write, "as a general rule, the more a firm differentiates its product the greater the investment it makes in that differentiation, the higher the costs of non-supply of the product. Thus the differentiating firm will seek to reduce uncertainty of supply by some form of vertical co-ordination".

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[2]Savage (1990) notes that they may have a cost advantage of as much as 40% over some traditional plants.

3.2.4 The Governance Structure

The way meat processing companies and farmers interact has changed considerably over time. The earlier sections have discussed the various methods available to transacting parties in general. The transaction between meat processors and producers is currently dominated by the agent who acts on behalf of the meat producer in facilitating sales. These agents may be employees of a meat processing company or act indpendently. There may also be informal contracts between the independent agents and meat processing companies.

Recently farmers have begun to enter into contracts to supply meat processors. While these contracts are evidence of co-ordination in the industry, studies (Blanchard and Wright, 1994) that suggest that farmers primarily enter them to gain from financial aspects, lead to the question, 'is there any other co-ordination prevalent in the industry?'.

In the light of literature on relational contracting and informal relationships these possibilities must be considered. What may appear to be a market transaction, facilitated by an agent, may in fact be a transaction encompassed in a extensive coordinating scheme, and the result of a long-term implicit and informal contract, from now referred to as a relational contract. In this study we therefore identified the activities of the agent as a significant part of the coordinating picture. The agent, one who communicates information between parties is a vehicle for the relational contract. Of the three types of agents that organize transactions between farms and meat processing companies at present the most important to this discussion is the meat company agent. The meat company agent is a direct link between the processor and producer. In the light of co-ordination, a sale organized

through a meat company agent or on contract is considered to be more co-ordinated than a sale through an independent or stock and station agent. This is because there is direct communication between the producer and processor.

3.3 Methodology for this Study

Due to the preliminary nature of this study, the hypothesis presented in section 3.2 is unable to be tested. This study will instead study the co-ordination activity of the meat producers. This study will thus classify the sales of the sample farms by the type of agent that organized the sale or the use of contract for the reasons discussed in the previous section. They will be classified as follows:

A. Sale by Agent to Meat Processing Company

   (i) Independent Agent

   (ii) Stock and Station Agent

   (iii) Meat Processing Company Agent

B. Sale by Contract

C. Other Sales.

The data collected from the sample is then presented, to show the use of the various methods of sale. An analysis of the method of sale by farm size is undertaken.

The data is also used to generate 3 dependent dummy variables. The regressions on these dependent dummy variables test transaction cost theories of asset specificity affecting governance structure. These variables and regressions are fully discussed and the results are present in Appendix A.

Chapter Four: Research Method

4.1 Data Collection - Farmer First Sample

This study required extensive and particular information, some of which the respondents might find difficult or tedious to recall. The survey was therefore sent to 57 farmers who have been involved with the Farmer First Research Programme at Massey University[3] and for whom detailed records were already available. It must be stressed that in the context of the industry as a whole this is a non-random sample. Surveying the farmers previously involved with the Farmer First Research Programme provided many benefits. In particular, the information gained through previous interviews and surveys could be used in conjunction with new survey data and secondly the survey respondents were more likely to divulge possibly sensitive information due to their past involvement with the research group.

The farmers in the Farmer First research group are a reasonably homogeneous group in terms of farm type, i.e sheep and beef farms, and area. Table 4.2 has details of farm specifications and sample consistency.

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[3]Farmer First Research Programme is funded by Massey University, The Agricultural and Marketing Research and Development Trust, and The C. Alma Baker Trust. The programme was staffed by Research Officers, Robert Brazendale, Janet Reid and Allan McRae, Department Agricultural and Horticultural System management, Massey University.

4.2 Data Collection - Survey

The data from Farmer First provided the explanatory variables for the study and the dependent variable. Degree and type of vertical co-ordination were found through the survey.

The survey had three main objectives. First it was necessary to determine the proportion of stock that was sold to by the farmers using each of the following methods.

A. Sale by Agent to Meat Processing Company
   (i) Independent Agent
   (ii) Stock and Station Agent
   (iii) Meat Processing Company Agent
B. Sale by Contract
C. Other Sales.

Second, farmers were asked for the number of different agents used and the length of the relationship with each. Finally two broad questions were asked to determine the farmers opinion of the agents knowledge of the farming operation and secondly the importance of the agent in deciding the best time to sell. This information was collected for both sheep and cattle sales to meat processing companies. The survey was pretested on the manager of one of the university farms and was successful. His only comment was that he suspected that farmers would not always know the company to which their stock was sent if it was sold through an agent other than a meat company agent. However the name of the company was not

particularly required, except as a reinforcement that the stock were in fact sent to a meat processing company. What was required was also stated unambiguously above the table in the survey.

The sample is likely to be biased due to the fact that by participating in the Farmer First Research Programme, farmers may be of a particular mind-set regarding technology, education and extension or innovations in farming practice, for example contracts. But for a small exploratory study such as this the benefits of the previously assembled information and the further participation of the farmers were significant.

4.3 Survey Summary

Table 4.1 Survey Summary

Surveys sent	57
Surveys returned	39
Surveys used	37
Response Rate	68%

The 57 surveys were sent in September and by early October, after a follow-up letter had been sent, 39 had been received. This is a response rate of 68%. Two surveys were unable to be used due to incomplete and ambiguous answers. The final sample size to be used in the study is 37.

4.4 Attributes of Sample Farms

Table 4.2 shows various attributes of the sample farms. The original Farmer First sample from which the sample in this study was drawn, was established in two climatically distinct regions of the North Island high country; summer moist Taihape/Hunterville and summer dry Coastal Hawkes Bay. The farms are all greater than 200 ha in size and correspond to the characteristics of the NZMWBES class 4 sheep and beef hill country farms (Reid et al, 1993).

Table 4.2 Farm Attributes

	mean	min	max	n
Farm Location				
Eastern Hawkes Bay				19
Taihape Hunterville				18
Farm features				
Size (ha)	683	215	4368	
Stock Wintered				
- cattle	4793	16	12138	
- sheep	1544	1555	26271	
stocking rate (su/ha)	9.57	6.5	12.4	

Comparing the physical characteristics of the Farmer First sample (Reid et al, 1993) with the survey respondents shows that the average size of the farms in this sample is larger than those in the original Farmer First sample, and average stocking rate is higher in the Farmer First sample, than in this sample. Other characteristics are very similar.

Chapter Five: Primary Results

5.1 Introduction

The information in this chapter is predominantly about the sale of stock relative to the method of sale. The methods of sale are as follows:

A. Sale by agent to meat processing company
   - (i) Meat processing company agent (MCA)
   - (ii) Stock and station agent (S/S)
   - (iii) Independent agent (IND)

B. Sale by contract (CONT)

C. Other sales, i.e. store

5.2 Method of Sale

Table 5.1 presents a break down of the sale of all stock by method of sale. Table 5.1 shows that the largest proportion of stock is sold through a meat company agent. Note also that there are significant proportions of sheep and cattle sold on contract. This table is however distorted by the inclusion of store and other sales. Table 5.2 presents the sale of stock to meat processing companies only, and this data is used in all of the subsequent analysis.

Table 5.1 Stock numbers and percentages, sold by agent or on contract to meat processing companies and other sales of sample farms in 1993/94

TOTAL STOCK SOLD STORE AND PROCESSED

METHOD OF SALE		SHEEP		CATTLE	
A. SALE BY AGENT					
(I)	MEAT CO AGENT	43558	36%	1981	31%
(II)	ST' STATION AGENT	28494	24%	1086	17%
(III)	INDEPENDENT AGENT	16850	14%	689	11%
B. SALE BY CONTRACT		10514	9%	1213	19%
C. OTHER SALES		29993	17%	1374	22%
TOTAL STOCK SOLD		120409	100%	6343	100%

Table 5.2 Stock numbers and percentages sold by agent or on contract to meat processing company by sample farms in 1993/94.

TOTAL STOCK SOLD PROCESSED ONLY

METHOD OF SALE		SHEEP		CATTLE	
A. SALE BY AGENT					
(I)	MEAT CO AGENT	43558	44%	1981	40%
(II)	ST' STATION AGENT	28494	29%	1086	22%
(III)	INDEPENDENT AGENT	16850	17%	689	14%
B. SALE BY CONTRACT		10514	10%	1213	24%
TOTAL STOCK SOLD TO MEAT PROCESSING COMPANY		99416	100%	4969	100%

Table 5.2 shows that the most stock is sold to meat processing companies via the meat company agent. This agent is also likely to be the liaison for the arrangement of contracts. Meat company agents and contracts combined account for 54% and 64% of sheep and cattle sales respectively. A high proportion of cattle, 24%, were sold on contract.

5.2 Analysis of Proportions of Stock Sold

Given that the proportion of a farms stock being sold through a type of agent, usually one agent, is relevant to the discussion, this section tabulates the proportion of each farmer's stock through agent type. While Table 5.2 merely states the total stock sold through each channel, Tables 5.3.1 to 5.3.8 divide the stock sold through the channels into the proportion of a farmer's stock that was sold through the respective channel.

Tables 5.3 Frequency of proportions of sheep sold through agent type

Table 5.3.1 Proportions of sheep sold through meat company agents

PROPORTION OF FARM'S SHEEP SOLD USING MEAT COMPANY AGENT	NUMBER OF FARMS IN EACH RANGE	TOTAL NUMBER OF SHEEP IN RANGE	AVERAGE NUMBER OF SHEEP SOLD BY EACH FARM
81-100%	9	23388	2599
61-80%	4	10515	2629
41-60%	1	6581	6581
21-40%	4	2624	656
1-20%	2	450	225
TOTAL USING MCA	20		
TOTAL NOT USING MCA	17		
TOTAL	37	43558	

From Table 5.2 note that 44%, 43,558, of the total sheep processed was sold through a meat company agent. Table 5.3.1 shows that 20 of the 37 farmers in the sample used a meat company agent to sell sheep. This table shows that 9 out of the 20 farmers, accounting for over half of the sheep sold to meat processing companies, used meat company agents almost exclusively and sold 81-100% of their sheep

through this type of agent. Four farms selling 61-80% of their sheep through meat company agents account for a 25% of the stock sold through meat company agents. Thus 13 farms account for 75% of the stock sold through meat company agents.

Table 5.3.2 Proportions of sheep sold through stock and station agents

PROPORTION OF FARM'S SHEEP SOLD USING STOCK AND STATION AGENT	NUMBER OF FARMS IN EACH RANGE	TOTAL NUMBER OF SHEEP IN RANGE	AVERAGE NUMBER OF SHEEP SOLD BY EACH FARM
81-100%	6	10505	1751
61-80%	2	2509	1255
41-60%	5	9818	1964
21-40%	2	2483	1242
1-20%	6	3179	530
TOTAL USING S/S	21		
TOTAL NOT USING S/S	16		
TOTAL	37	28494	

The 28,494 sheep sold by stock and station agents represented 24% of the total sheep sold to meat processing companies (Table 5.2). Table 5.3.2 shows that 21 farmers used stock and station agents to sell sheep to meat processing companies. This is almost the same number of farms that used meat company agents but the sheep sold by stock and station agents is half of the number sold through meat company agents. Of the 21, 6 used a stock and station agent to sell 80-100% of their sheep. Six also used a stock and station agent to sell 1-20% of their sheep, whereas 2 farmers used meat company agents to sell this proportion of their sheep.

The average sale is lower than that of the meat company agent in the higher proportion ranges, and higher in the 1-20% range. There does not however seem to be an obvious pattern in the size of the average sale.

Table 5.3.3 Proportion of sheep sold through independent agents

PROPORTION OF FARM'S SHEEP SOLD USING INDEPENDENT AGENT	NUMBER OF FARMS IN EACH RANGE	TOTAL NUMBER OF SHEEP IN RANGE	AVERAGE NUMBER OF SHEEP SOLD BY EACH FARM
81-100%	6	12065	2011
61-80%	0		
41-60%	2	2380	1190
21-40%	1	549	549
1-20%	6	1901	317
TOTAL USING IND	15		
TOTAL NOT USING IND	22		
TOTAL	37	16850	

Table 5.2 showed that the 16,850 sheep sold through independent agents represented 17% of the total stock processed. Table 5.3.3 shows that an independent agent was used by 15 of the farmers to sell sheep. In a pattern similar to that of the stock and station agent use, 6 farmers used an independent agent to sell 81-100% of their sheep, and another 6 farmers to sell 1-20%. The average sale of the independent agent in the 81-100% range is higher than that of the stock and station agent and lower than that of the meat company agent. Although there were fewer numbers of farmers using independent agents the average sales are quite large and significant.

Table 5.3.4 Proportions of sheep sold on contract

PROPORTION OF FARM'S SHEEP SOLD USING CONTRACT	NUMBER OF FARMS IN EACH RANGE	TOTAL NUMBER OF SHEEP IN RANGE	AVERAGE NUMBER OF SHEEP SOLD BY EACH FARM
81-100%	2	710	355
61-80%	1	5092	5092
41-60%	1	813	813
21-40%	3	1844	615
1-20%	6	1344	224
TOTAL USING CONT	13		
TOTAL NOT USING CONT	24		
TOTAL	37	10514	

14%, 10,514, of the total sheep sold were sold on contract by 13 farmers. Of the 13, 6 sold 1-20% of their stock on contract. Apart from one particularly large sale of sheep on contract, 5092, representing 61-80% of the sheep sold by this farm, the average sale by contract is quite low.

Table 5.3.5 Proportions of cattle sold through meat company agents

PROPORTION OF FARM'S CATTLE SOLD USING MEAT COMPANY AGENT	NUMBER OF FARMS IN EACH RANGE	TOTAL NUMBER OF CATTLE IN RANGE	AVERAGE NUMBER OF CATTLE SOLD BY EACH FARM
81-100%	11	1398	127
61-80%	2	95	48
41-60%	3	397	132
21-40%	2	70	35
1-20%	2	21	11
TOTAL USING MCA	20		
TOTAL NOT USING MCA	17		
TOTAL	37	1981	

The 1,981 cattle sold by meat company agents represented 40% of all cattle processed (Table 5.2). Meat company agents were used to sell cattle by twenty of the farmers in the survey. Of these 20, over half, 11, sold almost exclusively, 81-100% of their cattle through a meat company agent. 70% of all the stock sold through meat company agents came from 11 farms. This is similar to the high proportion of sheep sold through meat company agents by a small number of farms.

Table 5.3.6 Proportions of cattle sold through stock and station agents

PROPORTION OF FARM'S CATTLE SOLD USING STOCK AND STATION AGENT	NUMBER OF FARMS IN EACH RANGE	TOTAL NUMBER OF CATTLE IN RANGE	AVERAGE NUMBER OF CATTLE SOLD BY EACH FARM
81-100%	8	570	71
61-80%	1	80	80
41-60%	2	361	181
21-40%	2	49	25
1-20%	2	26	13
TOTAL USING S/S	15		
TOTAL NOT USING S/S	22		
TOTAL	37	1086	

22% of the cattle processed, 1,086, were sold through stock and station agents (Table 5.2). Fifteen farmers used stock and station agents to sell cattle to meat processing companies. The average sale in the 80-100% range was less than that of the corresponding average sale of the meat company agent.

Table 5.3.7 Proportions of cattle sold through independent agents

PROPORTION OF FARM'S CATTLE SOLD USING INDEPENDENT AGENT	NUMBER OF FARMS IN EACH RANGE	TOTAL NUMBER OF CATTLE IN RANGE	AVERAGE NUMBER OF CATTLE SOLD BY EACH FARM
81-100%	5	474	95
61-80%	1	70	70
41-60%	2	107	54
21-40%	1	25	25
1-20%	2	13	7
TOTAL USING IND	11		
TOTAL NOT USING IND	26		
TOTAL	37	689	

From Table 5.2 we note that 14% of cattle, 689, was sold by independent agents. This is lower than the proportion of sheep independent agents dealt with. Independent agents were used by 11 of the 37 farmers to sell cattle. Five used the independent agent to sell 80-100% of the total cattle sold to meat processing companies. The stock sold by these 5 farms accounted for 70% of the stock sold through independent agents.

Table 5.3.8 Proportions of cattle sold on contract

PROPORTION OF FARM'S CATTLE SOLD USING CONTRACT	NUMBER OF FARMS IN EACH RANGE	TOTAL NUMBER OF CATTLE IN RANGE	AVERAGE NUMBER OF CATTLE SOLD BY EACH FARM
81-100%	4	1070	268
61-80%	1	95	95
41-60%	0		
21-40%	2	48	24
1-20%	0		
TOTAL USING CONT	7		
TOTAL NOT USING CONT	30		
TOTAL	37	1213	

The cattle sold on contract, 1213, represented 24% of all the cattle sold to meat processing companies (Table 5.2). Cattle were sold on contract by 7 of the 37 farms. The average number of cattle sold in 80-100% range is larger than the average number in the same range sold by any other agent type. The other 3 contract sales are of a similar magnitude to that of the other methods of sale. The pattern of contract use for cattle is notable different in that the sales are relatively bigger than sales through other channels and represent a higher proportion of each farm's stock sold.

Discussion of Tables 5.3.1 - 5.3.8

Tables 5.3.1 - 5.3.8 show that the most frequency used method of sale of sheep was that through a meat company agent or stock and station agent. However more farmers sold a high proportion, 81-100%, of their sheep through a meat company

agent than through a stock and station agent. Low proportions of sheep were more likely to be sold through a stock and station agent, independent agent or on contract. Each of these methods of sale was used by six farmers to sell 1-21% of their sheep.

In general cattle were more likely to be sold exclusively through meat company agents and more likely to be sold on contract.

Twenty eight of the 37 farmers sold 80-100% of their cattle through one type of agent, while 23 of the farmers sold 80-100% of their sheep through one type of agent.

5.3 Method of Sale and Size of Farm

This section tabulates the method of sale of the 37 farms relative to their size. The farms are separated into those greater than or equal to 700 hectares, between 500 and 700 hectares and those less than or equal to 500 hectares. There were 12 farms greater than or equal to 700 hectares, 7 farms between 500 and 700 hectares and 18 farms less than or equal to 700 hectares. While Table 5.4 shows the numbers of stock sold through each agent type by farm size, Table 5.5 improves analysis as it presents percentages. We expect to find a relationship between farm size and method of sale due to the hypothesized transaction cost economies of scale.

Tables 5.4 Stock sold by Farm Size and Method of Sale

Table 5.4a Sheep sold by farm size and method of sale

FARM SIZE	NO	MCA	S/S	IND	CONT	TOTAL
> 700 HA	12	32498	12846	5965	5402	56711
500 - 700	7	1731	8085	5641	319	15749
< 500	18	9329	7563	5271	4793	26956
TOTAL	37	43558	28494	16850	10514	99416

Table 5.4b Cattle sold by farm size and method of sale

FARM SIZE	NO	MCA	S/S	IND	CONT	TOTAL
> 700 HA	12	1134	490	215	633	2472
500 - 700	7	293	361	29	406	1089
< 500	18	554	235	445	174	1408
TOTAL	37	1981	1086	689	1213	4969

Tables 5.5 Percentages of Stock Sold by Farm Size and Method of Sale

Table 5.5a Percentages of sheep sold by farm size and method of sale

FARM SIZE	NO	MCA	S/S	IND	CONT	TOTAL
> 700 HA	12	33%	13%	6%	5%	57%
500 - 700	7	2%	8%	6%	.5%	16.5%
< 500	18	9%	8%	5%	4.5%	26.5%
TOTAL	37	44%	29%	17%	10%	100%

Table 5.5b Percentages of cattle sold by farm size and method of sale

FARM SIZE	NO	MCA	S/S	IND	CONT	TOTAL
> 700 HA	12	23%	10%	4%	13%	50%
500 - 700	7	6%	7%	1%	8%	22%
< 500	18	11%	5%	9%	3%	28%
TOTAL	37	40%	22%	14%	24%	100%

Tables 5.5 show that of the majority of the stock processed was sold through meat company agents from large farms, 57% for sheep and 50% for cattle. There was a higher proportion of sheep than cattle sold through meat company agents. However a higher percentage of cattle than sheep were sold on contract by large farms. More analysis of the sales by farm size continues in Tables 5.6.1 - 5.6.6.

Tables 5.6 Method of Sale, Frequency of Use, Average Sale and Percent of Group's Total sold, by Farm Size Group

Tables 5.6.1A - 5.6.6A show for each farm size, the number of farms using each type of channel and average sale through channel. The stock sold through each channel is shown as a percentage of the total stock sold by the farm size group. Tables 5.6.1B - 5.6.6B show the percentage of the stock sold by the farms that use a channel, that is sold through a particular channel. Thus the 9 large farms that used meat company agents had an average sale of 3611 through meat company agents, 56% of all the stock from large farms came from these 9 farms and was sold through a meat company agent. These 9 farms sold 75% of their stock through meat company agents.

Table 5.6.1 Analysis of method of sale of sheep sold by the 12 large farms (> 700 ha)

	MCA	S/S	IND	CONT
NO FARMS USING AGENT[4]	9	7	5	3
AVERAGE SALE THROUGH AGENT	3611	1835	1793	1800
PERCENT OF TOTAL SHEEP SOLD BY LARGE FARMS THROUGH CHANNEL	56%	23%	11%	10%

	NUMBER OF FARMS OUT OF 12 USING AGENT	PROPORTION OF STOCK SOLD THROUGH AGENT TYPE[5]
MEAT CO AGENT	9	75%
ST' STATION AGENT	7	30%
INDEPENDENT AGENT	5	10%
CONTRACT	3	40%

Table 5.6.1 show that a large proportion of all the sheep sold by large farms was sold by a meat company agent from 9 farms. Those who used a meat company agent sold most of their stock through a meat company agent.

[4] Note that farms use more than one type of channel, therefore this row does not sum to total farms in group.

[5]For example: the nine farms small farms that used a meat company agent to sell sheep sold 75% of the total sheep on those farms through a meat company agent.

Table 5.6.2 Analysis of method of sale of sheep sold by the 7 medium farms (500-700 ha)

	MCA	S/S	IND	CONT
NO FARMS USING AGENT	2	5	3	1
AVERAGE SALE THROUGH AGENT	867	1610	1871	319
PERCENT OF TOTAL SHEEP SOLD BY MEDIUM FARMS	11%	51%	36%	2%

	NUMBER OF FARMS OUT OF 7 USING AGENT	PROPORTION OF STOCK SOLD THROUGH AGENT TYPE
MEAT CO AGENT	2	54%
ST' STATION AGENT	5	73%
INDEPENDENT AGENT	3	81%
CONTRACT	1	12%

Farms between 500 and 700 hectares were most likely to use a stock and station agent to sell sheep and 73% of the sheep of the 5 farms that used a stock and station agent was sold through a stock and station agent. 11% of sheep in this category was sold through a meat company agent compared to 56% of the sheep of the larger farms in Tables 5.7.1. Independent agents sold a significant proportion, 81%, of the sheep of three farmers that used them.

Table 5.6.3 Analysis of method of sale of sheep sold by the 18 small farms (< 500 ha)

	MCA	S/S	IND	CONT
NO FARMS USING AGENT	9	9	7	9
AVERAGE SALE THROUGH AGENT	1036	840	753	533
PERCENT OF TOTAL SOLD BY SMALL FARMS	35%	28%	20%	18%

	NUMBER OF FARMS OUT OF 18 USING AGENT	PROPORTION OF STOCK SOLD THROUGH AGENT TYPE
MEAT CO AGENT	9	54%
ST' STATION AGENT	9	46%
INDEPENDENT AGENT	7	45%
CONTRACT	9	31%

Farms less than 500 hectares in size used all channels and had no specific concentration of either the proportion of stock sold sheep sold through them. Noteworthy however is the percentage of stock sold by this farm size sold on contract, this is higher than that for other farm sizes.

Tables 5.6.4 Analysis of method of sale of cattle sold by the 12 large farms (> 700 ha)

	MCA	S/S	IND	CONT
NO FARMS USING AGENT	8	5	3	1
AVERAGE SALE THROUGH AGENT	142	72	10	633
PERCENT OF TOTAL SOLD BY LARGE FARMS	46%	20%	9	25%

	NUMBER OF FARMS OUT OF 12 USING AGENT	PROPORTION OF STOCK SOLD THROUGH AGENT TYPE
MEAT CO AGENT	8	72%
ST' STATION AGENT	5	54%
INDEPENDENT AGENT	3	64%
CONTRACT	1	100%

Over 75% of the large farms used a meat company agent to sell cattle and 72% of the cattle of the eight farmers was sold through a meat company agent. Of the total cattle sold by large farms 46% percent was sold using a meat company agent.

Tables 5.6.5 Analysis of method of sale of cattle sold by the 7 medium farms (500-700 ha)

	MCA	S/S	IND	CONT
NO FARMS USING AGENT	3	3	1	2
AVERAGE SALE THROUGH AGENT	98	120	29	203
PERCENT OF TOTAL SOLD BY MEDIUM FARMS	27%	33%	3%	37%

	NUMBER OF FARMS OUT OF 7 USING AGENT	PROPORTION OF STOCK SOLD THROUGH AGENT TYPE
MEAT CO AGENT	3	71%
ST' STATION AGENT	3	63%
INDEPENDENT AGENT	1	100%
CONTRACT	2	93%

This group of farms show some very high proportions of stock sold through agent type. The two contracts accounted for most of the cattle sold by the two farms. The meat company agent was used as frequently as the stock and station agent but dealt with a higher proportion of the farms' stock.

Tables 5.6.6 Analysis of method of sale of cattle sold by the 18 small farms (< 500 ha)

	MCA	S/S	IND	CONT
NO FARMS USING AGENT	9	7	7	4
AVERAGE SALE THROUGH AGENT	62	34	63	44
PERCENT OF TOTAL SOLD BY SMALL FARMS	39%	17%	32%	12%

	NUMBER OF FARMS OUT OF 18 USING AGENT	PROPORTION OF STOCK SOLD THROUGH AGENT TYPE
MEAT CO AGENT	9	59%
ST' STATION AGENT	7	64%
INDEPENDENT AGENT	7	60%
CONTRACT	4	59%

Like the sheep sales of the small farms, cattle sales were sold though all the channels quite evenly.

Discussion of Tables 5.6.1 - 5.6.6

These tables have shown a trend in that meat company agents deal with a higher proportion of the stock of the larger farms. Medium sized farms were more likely to use a stock and station agent to sell a high proportion of their stock.

Contracts to sell sheep were used most frequently by farms less than 500 hectares in size, whereas 52% of all the cattle sold on contract came from farms greater than 700 hectares.

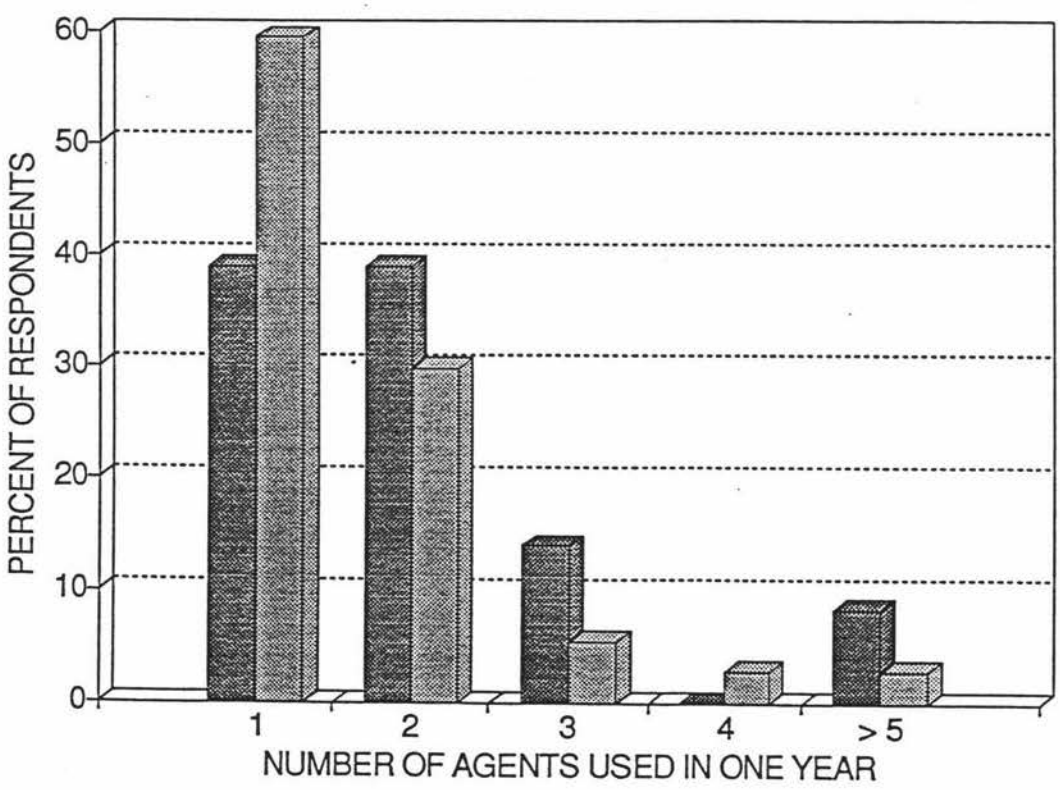
5.5 Farmers' Relationship with Agent

This section presents the results from the questions that required farmers to state how many agents they had used in one year, the number of years they had dealt with an agent if there was an agent they used most of the time. Finally 6 questions were asked about the importance of the agent to their marketing operation.

5.5.1 Number of Agents Used

On average farmers used 2 agents to sell sheep and 1.6 to sell cattle. We did not seek to ascertain as to whether in some instances the same agent was used for sheep and cattle sales. This is likely to occur. Figure 2 shows the distribution of the number of agents used in the last season to sell sheep and cattle.

Figure 2 Distribution of the Number of Agents used in One Year



5.5.2 Length of Relationship with Agent

A question was also asked pertaining to the number of years a farmer had dealt with a particular agent if there was an agent they dealt with most of the time when selling stock to meat processing companies. Average results from this question are presented in the table below. Note the problems of averages are compounded by the variable age of the survey respondents.

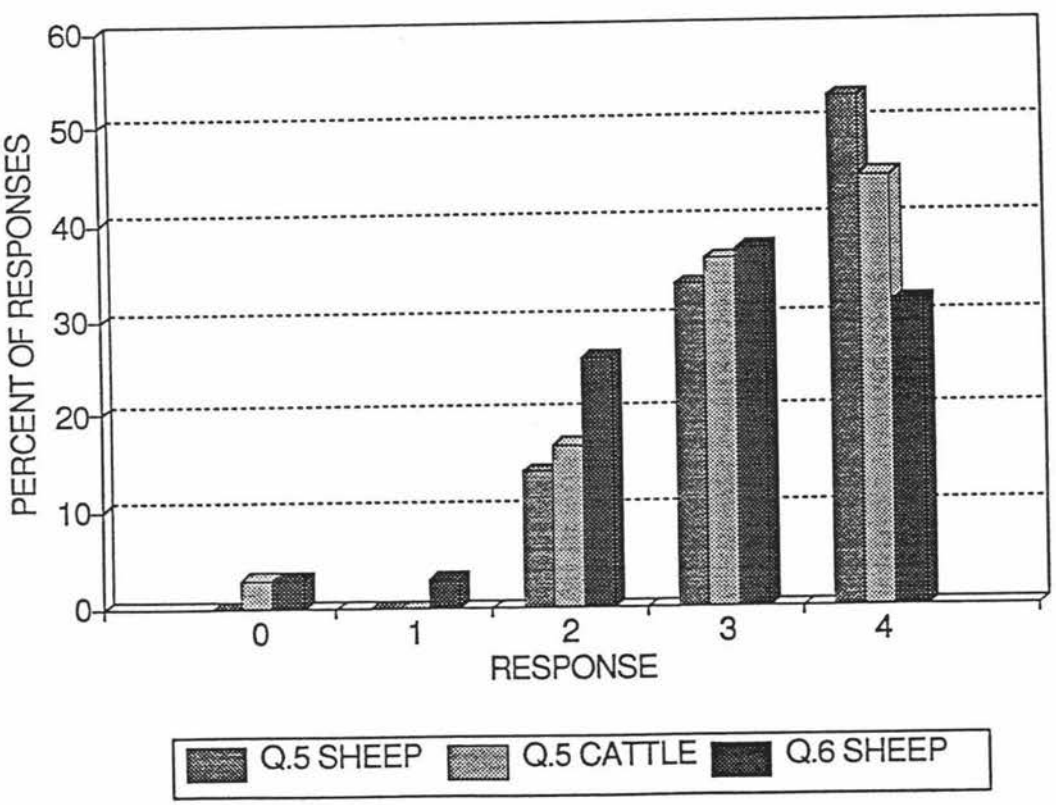
Table 5.7 Average Years with Agent and Number of Responses

SHEEP AGENT TYPE	AVERAGE YEARS SPENT WITH AGENT	NUMBER OF RESPONSES TO QUESTION
MEAT COMPANY AGENT	7	15
STOCK AND STATION AGENT	5	12
INDEPENDENT AGENT	6	21
STOCK AND STATION COMPANY	15	24
CATTLE AGENT TYPE		
MEAT COMPANY AGENT	7	19
STOCK AND STATION AGENT	5	9
INDEPENDENT AGENT	6	17
STOCK AND STATION COMPANY	15	24

5.5.3 Farmers' Opinion of the Importance of Agent

Questions five and six in the survey pertained to the agent they dealt with most often and aspects of their relationship with that agent. Question five asked the extent of the agent's knowledge of stock and when they were likely to be sold, on a five point scale from 'not at all' to 'very well'. Question six asked of the importance of this agent when deciding the best time to sell, also on a five point scale from 'not at all important' to 'very important'. Figure 3 shows the distribution of the responses.

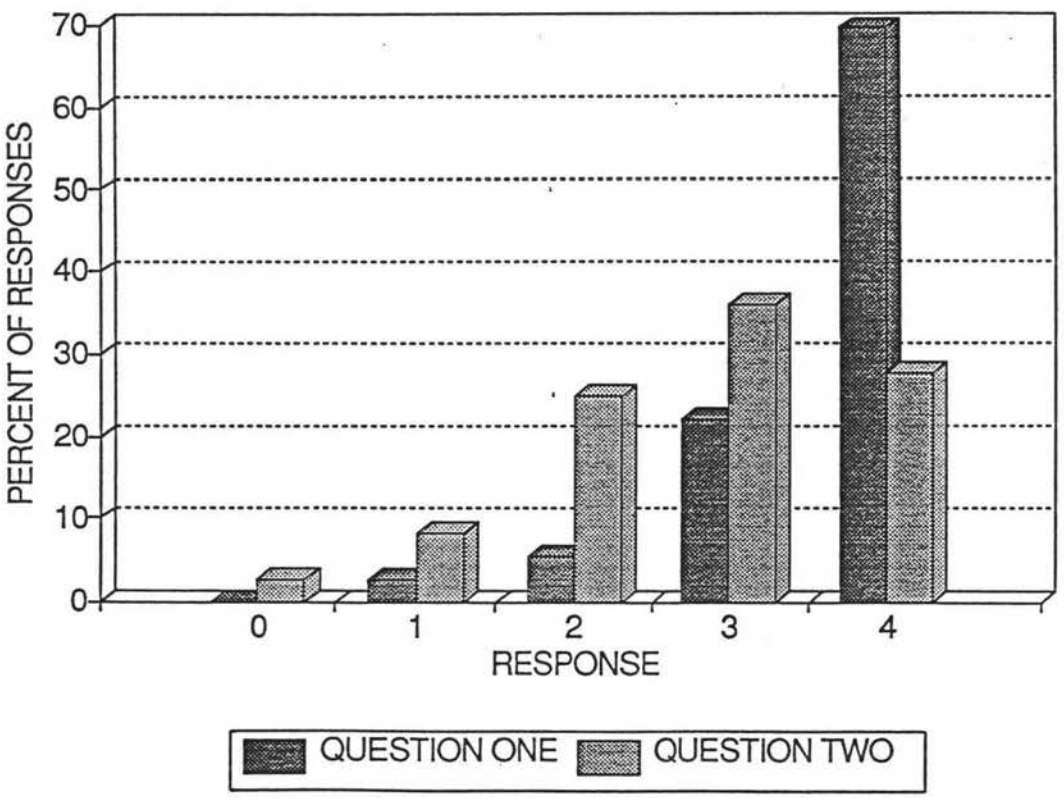
Figure 3 **Distribution of Responses to Questions Five and Six: pertaining to the extent of agents knowledge of stock status and importance of agent in deciding the best time to sell**



5.5.4 Agent as a Source of Information

The final two questions asked the farmer how important the agent was as a source of information regarding current prices and the importance of the agent as a source of information regarding long-term market trends. These questions were also answered on a five point scale which ranging from 'not at all important' to 'very important'. The results of these questions are presented in Figure 4.

Figure 4 **Distribution of Responses to Questions One and Two: pertaining to the importance of the agent as a source of short and long-term information respectively**



5.5.5 General Comments in Survey

Farmers were asked to write comments regarding the questions or the subject in general. Several comments were very pertinent to the discussion and are included here.

One farmer wrote, "contracts are going to be the norm", cutting out a lot of agent's work. Another wrote that "the integrity of our stock and meat company agent is of utmost importance to the success of our operation". Another farmer who had had a long relationship with an agent from a now closed company said that the farm would return to use the services of another meat company agent once a relationship and confidence was established with another agent and company. Several other farmers also mentioned that they must trust the skill of the agent for on farm evaluation of stock condition, namely 'fatness'.

Chapter Six: Conclusions

6.1 Discussion of Results

This study was concerned with the extent and nature of co-ordination between producers and processors in the New Zealand Meat industry. The results presented in Chapter Five highlight several interesting co-ordination issues.

Meat company agents are used by a large proportion of farmers and by many are used almost exclusively. What is ultimately more significant though is the proportion of stock that these meat company agents account for. Of all the stock sold to meat processing companies by the sample farmers around 40% was sold through a meat company agent. This means that the meat company has information and communication with the source of 40% of the stock they process. This is surely more co-ordinated than sale by auction or through an independent or stock and station agent.

The other most significant finding was that larger farms are more likely to use a meat company agent. This is an understandable phenomena as variable transaction costs are reduced as the units sold increase, and the meat processing company has the bargaining power, in that they reap the benefit of loyalty, to nurture relationships with the larger farms.

Other results show that farmers have long and important relationships with their agents. Farmers believed that agents had a high to moderate knowledge of when the farm's stock was likely to be sold. Likewise 67% of the farmers said that their agent was a very important source of information regarding current prices. Regarding long-term market trends the agent was only moderately important as a source of information. The average length of relationship with a meat company

agent, seven years, also suggests that there are mutual gains from these relationships.

These results indicate that farmers and processors do not operate in a relationship-free chasm of pure market activity. Agents are important to co-ordination, in that they facilitate the long-term relationship and communicate information.

6.2 Results from Regression Analysis

The regression analysis presented in Appendix 1 is very preliminary, worthy of inclusion, but by no means a comprehensive piece of econometric analysis. It does however, and was intended to, highlight and test the aspects of a farming operation that would lead farmers to either foster a relational contract or enter a formal contract to supply stock. As discussed in the methodology the regressions were run on the measures of vertical co-ordination in the sale of cattle and sheep separately. The variables referred to are defined in Appendix I.

Again it is emphasised that the following discussion of some interesting patterns is done so knowing that the regressions are not robust.

The sign of the coefficient for IDT2, a variable describing technology adoption, in the regression on CONTRACT is positive, suggesting that the higher the technology use the more likely contract use. This is in line with the transaction specific investment hypothesis.

The positive coefficient for the variable INT, representing interest payments per stock unit, in the cattle CONTRACT regression, supports the earlier mentioned studies that found that farmers entered contracts primarily for the financial benefits.

AGE has positive and significant coefficients in both the sheep and cattle

TOTAL, representing total co-ordination, regressions. While the interpretation of this variable is open to discussion one might conclude that it suggests either of two things. Firstly that older farmers operate differently to younger farmers because younger farmers have changed to suit a new environment, or that time is a necessary condition for the development of a relational contract. AGE may also be related to asset specificity as the older farmer is likely to have a larger asset base, human and phyical capital invested into an operation.

While the results in Chapter Five would suggest that the size of farm affect trading relationship, the regression results give a negative coefficient to the SIZE variable in all the regressions.

6.3 Wider implications of the Study and Further Research

This study has briefly touched on the relationships between the meat processing company, the agent and the meat producer. Unfortunately the study was unable to incorporate qualities of the meat processor to test the alternative hypothesis presented in Chapter Three. A test of that hypothesis would require suitable measures of asset specificity of meat processing companies. The distance between the plant and the farm may have highlighted how important transportation costs are to parties and the decision to trade. A way to incorporate product differentiation, marketing investment and any other forms of asset specificity of the meat processing companies would have to be discovered and would require significant data and mathematical creativity.

The New Zealand Meat industry, as other industries, is changing to survive in a dynamic world. The scale of product differentiation offered to consumers

requires alternative industrial organization. Understanding relatively new forms of organization within the economic framework is underway, as the literature review of this study shows. This study, limited by its size, shows the potential but also the difficulty of such empirical work. While suitable data must be available this area of study also requires further development of indices, representing the degree of vertical co-ordination, such as that of Frank and Henderson (1992).

To conclude, whether contracts to supply stock, between meat producers and processors, dominate in the future remains to be seen. For New Zealand's competitive advantage lies in extensive pastoralism but this feature may also be its downfall. Vulnerability to the vagaries of the variation in weather patterns, affecting pasture growth and thus production, is not removed by a contract. The hypothesis therefore suggests that significant investment into the reduction of uncertainty in the farming operation, for example feed-lot production or irrigation, is necessary before contracts are viable for many production operations.

References

ACIL, (1992) Agriculture Marketing Regulations, a report prepared by ACIL for The Business Roundtable of New Zealand.

Barry, Peter J. , Steven T. Sonka and Kaouthar Lajili, (1992), Vertical Co-ordination, Financial Structure and the Changing Theory of the Firm, American Journal of Agricultural Economics, December, pp1219- 1225.

Berg, R.A. (1990), Co-operative linkages and Small New Zealand Businesses, New Zealand Journal of Business, 12 pp.75-86.

Bureau of Industry Economics (1991a), Networks: a Third Form of Organization. Discussion Paper 14.

Bureau of Industry Economics (1991b), Networks: a Third Form of Organization, Bulletin of Industrial Economics, 10 pp. 5-9.

Coase, R.H. (1937) The nature of the firm, Economica, 4, 386-405.
-----(1992) The Institutional Structure of Production, The Amerian Economic Review, 82, (4), 713-719.

Earl P. (1993), Microeconomics for Business and Marketing, Dept. of Economics and Marketing, Lincoln University.

Frank Stuart D., and Dennis R. Henderson (1992), Transaction Costs as Determinants of Vertical Coordination in the US Food Industries, American Journal of Agricultural Economics, November pp. 941-950.

Globerman, Steven and Richard Schwindt (1986), The Organization of Vertically Related Transactions in the Canadian Forest Products Industry, Journal of Economic Behaviour and Organization, Vol 7, p.199-212.

Gujuarti D.N. (1988), Basic Econometrics, 2nd Edition, McGraw International.
Harper, D.A. (1993), An Analysis of Interfirm Networks, Contract No.584, New Zealand Institute of Economic Research.

Heide, Jan B. and George John (1990), Alliances in Industrial Purchasing: The Determinants of Joint Action in Buyer-Supplier Relationships, Journal of Marketing Research, Vol 27, p.24-36.

Hill, C.W.L. (1990), Cooperation, Opportunism, and the Invisible Hand: Implications for Transaction Cost Theory, Academy of Management Review, 15, (3), 500-513.

Hodgson, G.M. (1988), Economics and Institutions: a Manifesto for a Modern Institional Economics, Cambridge.

Hubbard, R.G. and R.J. Weiner (1991), Efficient Contracting and Market Power:

Evidence from the US Natural Gas Industry, Journal of Law and Economics, 34.

Joskow, Paul L. (1987), Contract Duration and Relationship-Specific Investments: Empirical Evidence from the Coal Markets, The American Economic Review, Vol 77 No. 1, p.168-85.

Leffler, Keith B. and Randal R. Rucker (1991), Transaction Costs and the Efficient Organization of Production: A Study of Timber-Harvesting Contracts, Journal of Political Economy, Vol 99, no.5, p.1060-87.

Lieberman, Marvin, B. (1991), Determinants of Vertical Integration: An Empirical Test, The Journal of Industrial Economics, Vol 39, p.451-65.

Marion, B. W. (1976) Vertical Coordination and Exchange Arrangements: Concepts and Hypotheses in Coordination and Exchange in Agricultural Subsectors. NC Project 117, Monograph 2.

----- (ed) (1986) The Organization and Performance of the US Food System, NC117 Committee.

Mariti, P. and R.H. Smiley (1981), Co-operative Agreements and the Organization of Industry, The Journal of Industrial Economics, 31, (4) pp.437-51.

Martin, S.K., and A.C. Zwart (1986), A Contractual Framework for Evaluating Agricultural and Horticultural Marketing Channels, Agricultural Econics Research Unit, Lincoln College, N.Z., Research Report No. 178.

Masten, Scott E. (1984), The Organization of Production: Evidence from the Aerospace Industry, Journal of Law and Economics, Vol 17, p.403-17.

Masten, Scott E. and Keith J. Crocker (1985), Efficient Adaptation in Long-Term Contracts: Take-or-Pay Provisions for Natural Gas, The American Economic Review, Vol 75, No. 5, p.1083-93.

Masten, Scott E., James W. Meehan, Jr. and Edward A. Synder (1991), The Costs of Organization, The Journal of Law, Economics and Organization, Vol 7, No. 1, p.1-25.

Maughan C.W. and L. Wright (1993), An Application of Transaction Cost Economics to the New Zealand Meat Industry, Dept. Agricultural Economics and Business, Massey University.

Mclaulay S. (1963), Non-Contractual Relations in Business: A Preliminary Study, American Sociological Review 28 (1).

McLeay, F., S. Martin and A. Zwart, (1992), Farm Business Marketing Behaviour and Strategic Groups in Agriculture, Lincoln University.

Monteverde, Kirk and David J. Teece (1982), Supplier Switching Costs and Vertical

Integration in the Automobile Industry, Bell Journal of Economics, Vol 13, p.206-13.

New Zealand Meat Producers Board (1993), Stategic Plan 1993-2000.

----- (1994), The New Zealand Meat Producer, 22 (2).

Palay, Thomas M. (1984), Comparative Institutional Economics: The Governance of Rail Freight Contracting, Journal of Legal Studies, vol 13, p.265-87.

Pirrong, Stephen Craig (1993), Contracting Practices in Bulk Shipping Markets: A Transaction Cost Explanation, Journal of Law and Economics, Vol 36, p. 937-76.

Powell, W.W. (1990), Neither Market nor Heirarchy: Networks of Organization, in Research in Organizational behaviour, 12 Greenwich, Vonn: JAI Press, pp.295-336.

Reid J.I., A.F. McRae and R. Brazendale (1993), Farmer First Research: A Review of Phase One Results in Relation to Farmer's Willingness and Ability to Change, Dept. Agricultural and Horticultural Systems Management, Massey University.

Richardson, G.B.,(1960) Information and Investment, Oxford, Clarendon Press, (2nd ed 1990).

Savage, J., and Allan Bollard (eds), (1990) Turning it Around: Closure and Revitalization in New Zeland Industry, Oxford University Press.

Schrader, Lee F.,(1986) Responses to Forces Shaping Agricultural Marketing: Contracting, American Journal of Agricultural Economics, dec, 1161-66.

Williamson, O.E. (1985) The Economic Institutions of Capitalism, New York, Free Press.

----- (1979), Transaction-Cost Economics: The Governance of Contractual Relations, Journal of Law and Economics, 22 (2)pp.233-61.

Wright L. and V. Blanchard (1994), Market Supply Issues, Rural Management, 5 Spring/Summer, p.30-31.

APPENDICES

Appendix I: Regression Analysis

A1.1 Regression Variables

For the six regressions, there are three dependent variables. The regressions test for vertical co-ordination in the sale of sheep and cattle separately. The dependent variables are defined below. Variable abbreviations are in brackets.

Contract use (CONT)

This variable takes on the value of one when a contract is sell to sell stock, and a zero otherwise.

Relational contracts (RCONT)

This variable, a Relational contract, takes on a value of one when there is a sale of more than 50% of farm's stock to one meat processing company through one meat company agent and zero if otherwise.

Vertical Co-ordination (TOTAL)

This variable is a combination of the two above. Evidence of co-ordination is defined as more than 50% sold on contract or through a relational contract and takes a value of one and zero if otherwise.

The Independent Variables

The independent variables used in this preliminary regression analysis are listed, and if necessary discussed, below. The variables were available from the Farmer First Research and are for the 1991/92 financial year.

Farm size (SIZE)

Proportion of stock units in sheep (PSHEEP)

Interest payments per stock unit (INT)

Age (AGE)

Technology Adoption Score (IDT2 & IDT3)

Two dummy variables account for the three types of technology adoption, high, medium and low. The score was developed by Farmer First after farmers where ranked according to their technology use. Examples of the technology ranked are, pasture measurement, the weighing of stock and artificial insemination.

Exotics (EX)

This variable takes on the value of a 2 when a farm uses an exotic breed, and a one when otherwise.

Farm lifecycle (FC2 & FC3)

The Farmer First research group used cluster analysis to group the farmers according to their position in a lifecycle. The pattern had emerged that showed that farmers were generally either in a development stage, consolidation stage or a retirement stage.

A1.2 The Data

Dependent Dummy Variables

CONT	sheep	13 observations at 1 24 observations at 0
	cattle	7 observations at 1 30 observations at 0
RCONT	sheep	9 observations at 1 28 observations at 0
	cattle	8 observations at 1 29 observations at 0
TOTAL	sheep	13 observations at 1 24 observations at 0
	cattle	13 observations at 1 24 observations at 0

Explanatory Variables

	Mean	SD	min	max
SIZE	673.3	724.04	0	4368
PSHEEP	79	10	56	99
INT	5.84	4.32	0	15.85
AGE	44.892	12.613	0	70

IDT2	11 observations at 1 26 observations at 0
IDT3	11 observations at 1 26 observations at 0
FC2	18 observations at 1 17 observations at 0
FC3	12 observations at 1 25 observations at 0
EX	18 observations at 2 19 observations at 1

A1.3 The Model and its Limitations

There is said to be little difference between the Logit and Probit model. Availability of computer programs usually dictates the use of the Logit model. Because SHAZAM readily computes both the Probit was chosen. The regressions were not tested for heteroscedasity or multicollinearity, and as with all probit and logit regressions the R2 is limited in its value of to judge the goodness of fit of the model. For simplicity the count R2 has been included in the results presented. Statistical inference is also limited in that it must be conducted in large sample asymptotic framework (Gujarati, 1988).

A1.4 Regression Results

INDEPENDENT VARIABLES	DEPENDENT VARIABLE					
	CONTRACT		RELATIONAL		TOTAL	
	SHEEP	CATTLE	SHEEP	CATTLE	SHEEP	CATTLE
PSHEEP	0.0236 (1.0034)	-0.0004 (.0088)	-0.0832 (1.5350)	-0.0191 (.4950)	-0.1107 (1.7659)	-0.0215 (.6833)
FC2	-0.7208 (.8581)	-0.4396 (.3892)	10.665 (.3028)	7.6522 (.0143)	-2.5670 (1.6773)	-0.2089 (.208)
FC3	-0.3238 (.2993)	-0.4696 (.3456)	10.359 (.2924)	6.5356 (.0122)	-5.3907 (2.0828)	-1.3511 (1.0901)
INT	-0.0716 (.4864)	0.1415 (1.7158)	-0.1696 (1.3960)	-0.1559 (1.5801)	-0.0859 (.8353)	0.0038 (.0564)
SIZE	-.00007 (.1728)	-0.0001 (.2731)	-0.0006 (1.2341)	-0.0002 (.3844)	-0.0005 (1.0899)	-0.0001 (.2817)
IDT2	1.6135 (2.3714)	0.7453 (.9928)	-1.3756 (1.8254)	0.0944 (.1438)	-0.5859 (.6932)	0.2324 (.3807)
IDT3	1.1709 (1.6893)	1.0902 (1.3046)	-5.5506 (.1228)	-1.1423 (1.2753)	-0.4767 (.5304)	0.2394 (.3655)
EX	0.5755 (.9720)	0.0897 (.1504)	.3964 (.4732)	-0.4263 (.6540)	3.2698 (2.0204)	0.5134 (.9366)
AGE	-.0379 (.9952)	.0314 (.7099)	0.0230 (.4827)	0.0156 (.4183)	0.2256 (2.2730)	0.0791 (1.9635)
CONSTANT	-1.3939 (.0795)	-3.7635 (.8699)	-4.1392 (.1191)	-5.3475 (.0100)	-3.4161 (.7583)	-2.7222 (.9351)
COUNT R2	0.7567	.8378	.91892	.89189	.78378	.70270

t scores in ( )

SURVEY

OF

METHODS OF SALE

* This survey is about the people and methods you used to organize the sale of sheep and cattle to meat processing companies.

* Part One and Two have two sections. Section A pertains to the type of agent i.e. meat company agent, independent agent or stock and station company agent, you dealt with when selling stock without contracts. For each of the different types of agents you used please write the approximate number of sheep sold through this agent and to whom they were sold to.

  Section B is about the sale of stock on contract. Part one and two are about the sale of sheep and cattle seperately. Part Three has a few general questions regarding the sale of stock.

* Please use the season July 1 1993 to June 30 1994.

* The categories sheep and cattle refer to all types of sheep and cattle; i.e. sheep includes lambs, hoggets, wethers, cull ewes etc.

PART ONE: Sale of Sheep

Approximately how many **sheep** did you sell last season?_____

Approximately how many **sheep** did you sell to **meat processors** last season?_____

Section A: Sale of sheep NOT sold on contract.

Column ONE in the table below lists **the types of agents who help organize the sale of sheep to meat processors.** For each of the **different type of agent you have used** please write **the number of sheep sold and the company you sold them to** in columns TWO and THREE.

Exclude stock that were sold on contract as they are in a separate section.

The first box is an example.

ONE	TWO	THREE
Agent: Sheep Sales	Number	Meat Processing Company
Meat Company Agent		

Agent: Sheep Sales	Number	Meat Processing Company
Major Stock and Station Company Agent e.g. Wrightsons		
Meat Company Agent		
Independent Agent		

1. How many **agents** did you use last season when selling **sheep to processors**?

Meat Company Agents _____

Independent Agents _____

Stock Company Agents _____

2. If there is an **agent** you deal with most of the time when selling **sheep to processors**, how many years have you dealt with this agent?

Meat Company Agent _____ years

Independent Agent _____ years

Stock Company Agent _____ years

3. How many **stock companies** did you use last season when selling **sheep to processors**? _____

4. If there is a **stock company** you deal with most of the time when selling **sheep to processors**, how many years have you dealt this company?_____ years

For the following questions please circle one number for each question.

5. If there is an agent or company you deal with most of the time when selling **sheep to processors** to what extent does that agent have knowledge of the stock you are farming and when you are likely to be selling them?

Not at all		**Moderately**		**Very well**
0	**1**	**2**	**3**	**4**

6. If there is an agent or company you deal with most of the time when selling **sheep to processors**, how important is this agent in assisting you when you are deciding the best time to sell?

Not at all Important		**Moderately Important**		**Very Important**
0	**1**	**2**	**3**	**4**

Section B: Sale of Sheep on Contract

In the table below please list the companies you sold **sheep on contract** to last season and the number of stock sold. In column three please write the type of person who organized the contract, i.e Did you deal with a:

- Meat Company Agent
- Stock Company Agent
- Independent Agent
- Consultant
- Other

ONE	TWO	THREE
Meat Processing Company	Number	Organizer

1. Have you sold **sheep on contract to processors** in other seasons?

Yes ☐ No ☐

If yes, how many seasons? _____

2. Did you sell **sheep on contract** last season to any of the companies you have sold sheep on contract to before?

Yes ☐ No ☐

PART TWO: Sale of Cattle

Approximately how many **cattle** did you sell last season?_____

Approximately how many **cattle** did you sell to **meat processors** last season?_____

Section A: Sale of Cattle NOT sold on Contract

Column ONE in the table below lists **the types of agents who help organize the sale of cattle to meat processors.** For each of the **different type of agent you have used** please write **the number of cattle sold and the company you sold them to** in columns TWO and THREE.

Please exclude stock that were sold on contract as they are in a separate section.

The first box is an example.

ONE	TWO	THREE
Agent: Cattle Sales	Number	Meat Processing Company
Meat Company Agent		

Agent: Cattle Sales	Number	Meat Processing Company
Major Stock and Station Company Agent e.g. Wrightsons		
Meat Company agent		
Independent agent		

1. How many **agents** did you use last season when selling **cattle** to processors?

Meat Company Agents _____

Independent Agents _____

Stock Company Agents _____

2. If there is an **agent** you deal with most of the time when selling **cattle to processors**, how many years have you dealt with this agent?

Meat Company Agent _____ years

Independent Agent _____ years

Stock Company Agent _____ years

3. How many **stock companies** did you use last season when selling **cattle to processors**? _____

4. If there is a **stock company** you deal with most of the time when selling **cattle to processors**, how many years have you dealt this company?_____ years

For the following questions please circle one number for each question.

5. If there is an agent or company you deal with most of the time, when selling **cattle to processors,** to what extent does your agent have knowledge of the stock you are farming and when you are likely to be selling them?

Not at all		**Moderately**		**Very well**
0	**1**	**2**	**3**	**4**

6. If there is an agent or company you deal with most of the time when selling **cattle on contract**, how important is this agent in assisting you when you are deciding the best time to sell?

Not at all Important		**Moderately Important**		**Very Important**
0	**1**	**2**	**3**	**4**

Section B: Sale of Cattle on Contract

In the table below please list the companies you sold **cattle** on contract to last season and the number of stock sold. In column three please write the type of person who organized the contract, i.e Did you deal with a:

- Meat Company Agent
- Stock Company Agent
- Independent Agent
- Consultant
- Other

ONE	TWO	THREE
Meat Processing Company	Number	Organizer

1. Have you sold **cattle** on contract to processors in other seasons?

Yes ☐ No ☐

If yes, how many seasons? _____

2. Did you sell **cattle on contract** last season to any of the companies you have sold **cattle** on contract to before?

Yes ☐ No ☐

PART THREE: General Sales Method Questions:

For the following questions please circle one number for each question.

1. In general how important is your agent as a source of information regarding current prices?

Not at all Important		Moderately Important		Very Important
0	1	2	3	4

2. In general how important is your agent as a source of information regarding long-term market trends (i.e. breeds, quality specifications)?

Not at all Important		Moderately Important		Very Important
0	1	2	3	4

If you have any comments regarding the questions or the subject in general, please write them here:

_____

_____

_____

_____

_____

_____

_____

_____

This completes the survey, thank you very much for your time and cooperation.

Please return in the envelope provided.

12 September 1994

Dear Farmer

I am student studying the relationship between the farmer and the meat processing company and the relative importance of the livestock agent. This study is part of my Honours Program in the Department of Agricultural Economics and Business at Massey.

The survey is short and I hope the explanation, on the first page of the survey, will help you to complete it successfully. The survey is about the use of different types of agents and contracts when selling stock to meat processing companies.

I expect to find a pattern between the type of farmer/processor relationship and the type of farming operation. I look forward to being able to present the results of this study to you either in person or in a summary which I will mail to you.

Because I am surveying only those in the Farmer First programme, your participation is very important and sincerely appreciated.

If you have any questions please do not hesitate to contact me at (06) [redacted] daytime or (06) [redacted] evenings.

Thank you

Jozefa Wylaars

13 October 1994

Dear Mr and Mrs XXXX

Good Morning. A short time ago I sent you the survey regarding the sale of stock, that I am undertaking with the aid of the Farmer First Research Programme.

As of today I have not recieved a reply from you. If you have recently returned the survey, please ignore this letter, and accept my sincere thanks for your help with the study.

As only a small number of farmers are participating in the study, your completion of the survey would be extremely helpful to me and will greatly increase the accuracy and benefits of the study.
I look forward to being able to present the results to you early next year.

Thank you for your time and help.

Yours sincerely

Jozefa Wylaars

10 January 1995

Dear Farmer

Earlier this year you responded to my mail survey. As promised here is a brief summary of the results of the study.

37 of the 57 responded to the survey.

Stock numbers and percentages, sold by agent or on contract to meat processing company and other sales of sample farms in 1993/94 are shown in the table below.

METHOD OF SALE		SHEEP		CATTLE	
A. SALE BY AGENT					
(I)	MEAT CO AGENT	43558	36%	1981	31%
(II)	ST' STATION AGENT	28494	24%	1086	17%
(III)	INDEPENDENT AGENT	16850	14%	689	11%
B. SALE BY CONTRACT		10514	9%	1213	19%
C. OTHER SALES		29993	17%	1374	22%
TOTAL STOCK SOLD		120409	100%	6343	100%

Sales were also analyzed with respect to the proportion of stock that went to through one agent.

  # 20 of the 37 farmers used a meat company agent to sell their sheep. Of these 20, 9 sold almost all 81-100% of their stock through this agent.

  # Likewise for cattle, 20 farmers used meat company agent to sell their cattle and 11 of these farmers sold 81-100% of their stock through this agent.

Contracts were more likely to be used to sell a small proportion of the sheep of the 13 farms that used them. 6 of the 13 sold 1-20% of their sheep on contract.

7 of the 37 farms used contracts to sell cattle and 4 used them to sell 81-100% of their stock on contract.

The study also looked at the method of sale given the size of the farm. The study showed that meat company agents tend to deal with a high proportion of the stock off the large farms. Medium size farms were more likely to use a stock and station agent and contracts to sell sheep were used most frequently by farms less than 500 hectares in size.

The responses to the questions regarding the length of time the farm had dealt with a particular agent showed that the average length of a relationship with a meat company agent was 7 years, with a stock and station agent, 5 years and with an independent agent, 6 years.

60% of farmers used only one agent in the past year to sell cattle and 40% used only one agent in the past year to sell sheep.

The respondents believed that their agent had a good knowledge of when their stock was likely to be sold. 67% said their agent was very to moderately important to deciding when was the best time to sell their sheep.

Almost 70% of the respondents said that their agent is a very important source of information regarding current prices, however regarding long-term trends and industry information the agent was considerably less important.

A statistical analysis of the data showed that the age of farmer and the technology adoption score correlate with farmers that have strong relationships with one agent and/or enter into a contract. This part of the analysis was however very preliminary and inconclusive.

My conclusion to this study considered the role of the agent as a co-ordinator between producers and processors. Formal contracts may not suit all farming operations in New Zealand but this study showed that the meat company agent can and does operate on an informal contract with many farms. This, I believe, is probably as efficient as a formal contract but requires an atmosphere of loyalty, goodwill and the mutual dependence of both parties.

Again, thank you for participating in the study. I wish you well.

Sincerely

M. Jozefa Wylaars