

Public Policy Responses to Increased Vertical Linkages in Agri-food Supply Chains

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1. INTRODUCTION

The agri-food sectors of both Canada and the United States are experiencing a trend towards closer vertical coordination. This can take a myriad of forms including contracting, strategic alliances, quasi and vertical integration (Hobbs and Young, 2000). Questions over the implications for public policy of closer vertical ties have existed since the 1950s, when changing technology and the nature of price and production risks were instrumental in driving some U.S. agricultural sectors, such as broilers, towards closer contracting and vertical integration. In 1997 about one third of the value of U.S. agricultural sales were produced under contract. While lack of data makes it impossible to be precise about the extent of contracting in Canada, contracting has increased and this trend is expected to continue. For example, an increase in contracting is expected in the Canadian hog-pork sector following the removal of single desk selling agencies in several provinces in 1997. Identity preserved supply chains for value-enhanced crops produced on contract are emerging in both countries and co-exist with bulk commodity grain marketing systems. Genetically engineered corn, soybeans and canola have provided a further impetus for close vertical relations between producers, processors and retailers. Crops with enhanced quality characteristics must be produced to tight guidelines and identity preserved in order to capture their value.

Changing consumer preferences, biotechnology, information technology, environmental pressures, credit and risk issues and the reduction of global trade barriers are cited as some of the driving forces behind changing vertical coordination. Previous work has explored the forces behind closer vertical coordination (Hobbs and Young, 2000; Schertz and Daft, 1997; Henderson, 1998; Bureau, Gozlan, and Murette, 1998; and Kalaitzandonakes and Maltsbarger, 1998). Changes in the agricultural system and the extent and nature of increased vertical coordination have been discussed by Mighell and Jones (1963) and Banker and Perry (1999). Conceptual models exploring the economic reasons for closer vertical coordination have been explored by Williamson (1979), Sauvé (1998), Grossman and Hart (1986), Hodgson (1998) and Teece et al. (1994).

This paper investigates the implications for public policy of the move towards increased vertical coordination in agrifood sectors. The increased importance of contracting brings with it a host of public policy questions, including legislation affecting contract transparency, terms and negotiation and dispute settlement. Questions of market power, and associated issues of price discovery and public price reporting are considered. Finally, the paper discusses how changes in the agricultural sector due to

increased vertical coordination affect the role of government in addressing information asymmetry, sponsoring research and development and in regulating marketing institutions.

2. PRICE FORMATION AND ASSOCIATED ISSUES

2.1 The Evolution of Agricultural Markets

To be able to discuss the implications of increased vertical coordination in agriculture we need an idea of what agricultural markets will look like in the future. Most analysts propose that the future will bring a mix of market types whose importance will change overtime as agriculture continues to industrialize. Boelhje (1998) suggests that there will be three categories of goods: generic commodities, enhanced component commodities, and specific attribute raw materials. Boelhje believes that these products will be produced by at least three categories of agricultural producers. First, he predicts that the role of multiple plant entrepreneurs will increase, as advances in technology enable skilled producers to manage sizable operations in multiple locations. Secondly, he believes that some growers will become franchise growers operating with a system similar to that of McDonald's fast food chains. Thirdly, he sees networks of qualified suppliers for particular processing operations, such as already exists in the broiler or pork industry. In Boelhje's opinion, *interdependence* between components of the supply system, not *independence*, will be the keyword of the future.

Hamilton (1997) also proposes three categories of agricultural producers. The first will be an industrialized portion similar to the broiler industry, where the role of traditional family-sized farms will be limited. Instead, many farmers will have the status of employee in a sector that is increasingly concentrated, owned by corporations and vertically integrated. The second sector will be made up of traditional family farms, probably larger than before, who are attempting to compete within the industrialized system. Producers may increase their role in downstream activities through marketing cooperatives or networks. A third group of producers, devoted to producing and marketing high quality food in nontraditional ways, is likely to grow. This group will include smaller scale diversified producers and niche marketers.

Brester and Penn (1999) also foresee a role for large family farmers that will continue to produce bulk (generic) commodities. They also suggest that the number of producers of differentiated and identity preserved goods will continue to grow.

None of these forecasts are likely to be entirely accurate, yet they all appear to concur with respect to a broad trend for the agriculture sector. In general, the evolution of the agricultural sector to-date suggests that agriculture will be composed of a variety of products, both generic and highly

specialized, and that the role of specialized products is likely to increase for some time. It is likely that there will be no standard form of agricultural production and that the concept of a representative farm will continue to decline in usefulness. A mix of organizational forms will exist at the farm level and within the entire marketing chain.

2.2 Bulk Commodity Markets

Price discovery in spot markets for homogenous commodities is well understood. For the purpose of this research, the relevant question is the extent to which the useful properties of spot markets can be maintained as the portion of production entering the spot markets shrinks relative to the portion that is priced through contracts or through other mechanisms. The question then, is what is the minimum number of transactions needed to maintain a viable spot market. Although this question has been addressed in the past (see for example, Tomek, 1980) it may be difficult to answer on the basis of past research due to changes in technology. The use of the Internet vastly reduces search and information costs for buyers and sellers. It expands our traditional notions of the boundaries of a spot market and the number of potential buyers and sellers. For example, if one were interested in rice, a casual search of the Web brings up a newsletter on rice with international prices at different locations and with specific quotes for numerous qualities and varieties of rice (<http://www.creedrice.com>).

2.3 Contract Production Pricing and Associated Issues

With the increase in contract production issues have emerged including price discovery and fairness, possible abuse of market power, producer access to the supply chain, and other issues related to contract scope and conflict over contract terms. This section briefly explores these issues.

2.3.i Formula Pricing

An increasing proportion of agriculture is produced under contracts in both Canada and the United States. In 1997, in the United States, around one third of agricultural sales were produced under contract, making issues associated with contract pricing important. Formula pricing schemes are common for production under contract and involve transactions where the price is determined by formula and may be tied to a specific market price. In contract grain production, such as for high-oil corn in the United States, payment is based on No. 2 yellow corn, with premiums based on the oil content of the corn. For corn, and several other commodities, the spot market plays a key role in providing a base price to which quality premiums are added. However, in other commodities, a spot market price is not used. For example, for live turkeys in the United States, the price received by producers from processors is not related to the spot market price, but to a price quotation by the U.S. Department of Agriculture for frozen, ready-to-eat turkeys (Hayenga and Schrader, 1980).

In the United States, formula pricing is used for eggs, both between the producer and first-handlers, and between the handlers and retail and food service sectors. Hayenga and Schrader (1980) report on the complicated arrangements that exist:

“Most contracts do not have a clear cut base price or premium established, just a handler’s commitment to use his “best efforts” to achieve a “competitive price” for the producer.” (p.755)

The egg price quotations typically used in formula-pricing arrangements are based on Urner-Barry *Producers’ Price Current*, which does not represent any specific graded-egg market transaction, rather it is based on changes in egg prices at other levels of the marketing system, changes in inventory levels and other factors. These examples lead to the conclusion that formula pricing schemes use a variety of mechanisms, including but not limited to the spot market price as a basis for their transactions.

2.3 ii Performance Incentives

The structure of contracts for U.S. broilers usually consists of a payment system containing three components: (1) the base payment; (2) an incentive or performance payment; and (3) disaster payments (Perry, Banker, and Green, 1999). The base payment is a fixed payment per pound of meat produced. The purpose of the performance payment is to reward producers who perform better than average, either through a bonus for higher than average quality or for a higher than average volume of production. In these cases, the contract may be structured as a “tournament” between a comparative group of producers (Knoeber, 1989). Examples of broiler contracts can be viewed at (<http://www.web-span.com/pgs/contracts/index.html>). Similarly, in this case, payment is not related to a spot market price.

2.3 iii Price and Quality Information

One frequently cited concern over the increase in the use of contracts for agricultural production is the impact on the viability and existence of a spot market price. The concern is that as the percentage of production under contract increases the spot market becomes thin, thus, the market clearing price more volatile and less representative of the value of the good (usually a generic good). While spot market prices provide useful information, it is important to note that price is only one aspect of contract production. In many cases, production under contract will differ from generic commodity production, as contracts are often used to ensure that tight quality specifications are met. In addition, the contractual relationship may include many facets not captured by production of a bulk commodity, where the spot market provides a market clearing price. Access to new technology and to the opportunity to produce new commodities is one motivation to participate in contract production (Boelhje, 1998). In fact, producers may grow several different grains on contract in order to remain on the lists of qualified

producers for different companies. This may improve future opportunities to produce new products under contract and be part of a specific value-added supply chain.

Contract production is frequently associated with different costs and benefits to the producer than production for the spot market. For example, closer vertical linkages with processors may provide producers with access to additional information about the requirements of consumers, thereby enhancing the flow of market information back down the supply chain. This benefit is hard to quantify but it represents a reduction in information or search costs for the producer. At the same time, however, the producer is faced with a more complex transaction situation involving long-term contractual obligations and may have to choose between a number of potential contractual relationships. This raises information and negotiation costs for the producer. In general, spot market prices become increasingly irrelevant as contracts between producer and processors change the nature of their relationship and the specifications of the product produced.

It is helpful to keep in perspective what spot market prices provide to agricultural producers. The interaction of many buyers and sellers assures them that the price is the result of many transactions, and that a buyer with market power is less likely to have lowered the price. However, this does not mean that all producers will necessarily earn normal profits, or that they will be able to stay in production over the long run. Witness the exit over the years from agricultural sectors with viable spot markets. It also does not guarantee that producers will regard the price as “fair.” In some cases, producers regard a spot market price as unfair due to subsidies to production given by governments throughout the world. The international sugar market is often accused of being simply a dumping ground for product, and the spot market price is not regarded as “fair.” At other times the spot market price is not regarded as fair simply if it is low.

2.3.iv Access to Supply Chains

Concern is expressed over issues of market power held by commodity handlers and processors. One concern is that, in the future, some producers may have difficulty gaining entry to tightly coordinated supply chains. Difficulty in gaining entry could be caused by requirements for sophisticated production skills or the need for equipment or capital. The inability of certain producers to gain entry to supply chains for these reasons would be a continuation of the forces that have prompted producers to exit from agriculture historically. Another reason why producers might have difficulty gaining entry is that processors prefer to lower their transactions costs by dealing with only a few producers, who contract to provide large volumes of the commodity in question. This might give rise to the “multiplant entrepreneur” that was envisioned by Boehlje (1998). This highly skilled farmer would act as a manager,

hiring other farmers to assist in production at various locations. Finally, a third reason that entry might be restricted could be that a dominant processor with market power could act as a monopsonist and purchase less of the input than would occur in a competitive market. The likelihood of this occurrence depends on the market's elasticities, the contestability of the market, and therefore the degree of the processors' market power, as well as the firm's overall marketing and/or purchasing strategy. Discussion of the implications of market power for public policy is continued in a subsequent section.

2.3v Efficiency Gains

An example of the potential benefits of vertical coordination is provided by the U.S. broiler industry (Martinez, 1999). Due to increased vertical coordination, the broiler industry has been able to increase its efficiency significantly. Farm production costs declined with the adoption of cost-reducing technology, facilitated by the use of production contracts. Market efficiencies were gained from vertical integration of the feed, hatchery, processing and feeding stages. With tighter control the industry was able to meet consumer needs for high-quality, convenient, and branded products. In addition, contracting and vertical integration enabled integrators to meet the needs of large scale supermarket chains and restaurants due to greater control over volume and quality. Martinez (1999) illustrates the shift out in the supply curve that has occurred, and suggests that there has been a shift out in the demand curve as well.

2.3 vi Collective Bargaining and the Role of Commodity Groups

While there have been clear efficiency gains in some industries due to increased vertical coordination, the possibility remains that large contractors will use their power to depress the prices paid for inputs, and to make other contract conditions disadvantageous for producers. This has motivated producers to form associations to bargain collectively with the processor, in a manner similar to labour unions. This is a role frequently assumed by producer organizations in Europe. In the United States the Agricultural Fair Practices Act (AFPA) of 1967 offers some protection to farmers and ranchers who form associations in order to bargain with handlers and processors for better prices and terms. The AFPA prohibits handlers and processors from discrimination against or intimidation of producers due to membership in any organization or due to exercising their right to organize grower associations. (Hamilton, 1997).

The protection given to producers through the AFPA is perceived to be inadequate by some producers and their state governments. For this reason the U.S. states of Maine and Washington have passed state laws to further protect producers' right to organize. In addition, the National Contract Poultry Growers Association (NCPGA) has attempted to pass legislation to extend the protection given to growers to organize under the AFPA and the Packers and Stockyards Act of 1921 (RAFI, 2000). Other

groups, such as the Farmer's Legal Action Group, of St. Paul, Minnesota, have played a role in helping to organize and educate growers. There is some evidence of success from their efforts.

“Contracts also have changed as a result of the grower's cooperative approach...before, the companies would not negotiate..contractors have become much more flexible in recent months” (Brown, 1992; Marbery, 1993).

In Canada, producers' rights to organize are protected by provincial legislation.

In addition to collective bargaining, Hamilton argues that commodity groups can play a key role in the development of fair contract terms. Commodity groups are well situated to bring together large and small producers, processors, integrators, attorneys, and others to jointly address the development of contracts that will serve the needs of all parties (Hamilton, 1995). In Great Britain, the National Farmers' Union, the Grain and Feed Trade Association and the United Kingdom Agricultural Supply Trade Association have been involved in developing standardized commodity contracts. Hamilton states that the involvement of producers and trade organizations in developing contracts has facilitated standardized industry practices and has improved contracts (Hamilton, 1995). The involvement of producer organizations is also likely to generate greater “buy-in” on the part of producers faced with the option of joining a closely coordinated supply chain by producing under contract for a specific processor. This reduces the processor's transaction costs in locating and negotiating with suitable suppliers.

2.3 vii Transparency and Dispute Settlement

Another concern over the increase in contract agriculture is a potential lack of transparency regarding the terms used in contracts. This concern can be addressed by requiring that contract terms be made public. Hamilton (1995) discusses regulations used to achieve transparency in producer-processor contracts by several U.S. states. For example, South Dakota requires all packers with gross annual sales of more than \$100 million to submit copies of standard contracts, as well as statistics on the method of purchase, the price and other contract terms (Hamilton, 1995). In addition, producer groups have taken measures to increase contract transparency. For example, the U.S. National Contract Poultry Growers homepage (<http://www.web-span.com/pga>) has contracts posted from numerous poultry integrators.

Accompanying the increase in the use of contracts has been an increase in the number of legal disputes between producers and processors over the terms of the contracts. For example, poultry growers have instigated a number of lawsuits against processors over disputes in contract law (Marbery, 1993).

One response by U.S. states to the increase in producer-processor disputes over contracts has been to require mediation before allowing a court to hear the case. This approach has been taken by Iowa

for disputes involving livestock production contracts and by Wisconsin for vegetable contracts. Another method of dealing with disputes which avoids potentially costly legal battles or the strategic use of the threat of litigation by firms, is to have the contract specify the arbitration procedures to be followed in the event of a dispute.

Avoidance of costly disputes may also be facilitated by ensuring that contracts between producers and processors are complete (in so far as is possible) and equitable to both parties. Hamilton (1995) discusses a long list of questions that arise with the increased use of contracts, and suggests that many contracts currently in use do not adequately address these issues. In some cases involving grain production the question of who owns the grain, and the type of contractual arrangement entered into is important in determining if producers can participate in U.S. farm programs. Who bears the risk of loss during planting, growing, harvesting, storage and delivery, potential liability for environmental damages, and eligibility for worker compensation are other important questions which are often inadequately addressed. This increases the transaction risk for both parties. Writing fully contingent contracts, on the other hand, imposes a different set of transaction (negotiation) costs on the parties.

Another important question is how performance is evaluated, as payment of premiums may depend on meeting quality standards or achieving target volumes. If disputes arise over the performance evaluation, will they be resolved through litigation, arbitration, mediation or administrative fiat, wherein the party with the greater relative bargaining power decides? Finally, questions exist over the timing of payment, particularly when title to the goods is passed before payment is made.¹

An evaluation of issues associated with the growth of contract farming should note the evidence that many farmers are happy with their contracts and plan to continue contract farming (Lewin-Solomons, 1999), and that many integrators have waiting lists of growers who wish to obtain contracts but cannot (Hamilton, 1995). Hamilton argues that one problem with contracts is that growers expect too much. If the processor is providing the technology and marketing strategy that leads to increased profits, and the grower is not, then it is unrealistic for the grower to expect a portion of those increased profits. He suggests that the goal of government involvement in contract law should be limited to facilitating a fair and informed business relation:

“If the laws are designed to make the parties equal in their economic power, or to make them share the economic benefits of the contract, then their purposes are not likely to be achieved...if laws try to make

¹ See Lang (1980) for an insightful discussion of this issue and an examination of how collective bargaining altered the incentive structure of various buyer-supplier relationships, leading to a change in behaviour.

companies share the benefits, the companies will look for alternatives to do it themselves...” (Hamilton, 1995).

2.4 Franchises

Some economists, concerned with how agricultural production is likely to evolve, have suggested that franchises may become important in agriculture due to the potential advantages of these business relationships to producers (Hayes, 1998; Boehlje, 1998). In most franchising relationships, the franchisor (or chain) contracts with a small party (the franchisee) to sell a product or provide a branded service to customers (Lewin-Solomons, 1999). A franchisee pays an initial fee to cover training and site development fees, which can be quite substantial, and a regular royalty on revenues. It is customary for the franchisor and the franchisee to have a long-term contract, however, the franchisor usually reserves the right to change the standards of operation with which the franchisee must conform.

One advantage of agricultural franchising is that the product is branded (Hayes, 1998). Hayes asserts that funds spent on generic commodity advertising may be better invested in promotion of branded products. Both Boehlje (1998) and Hayes (1998) argue that franchising may present a middle ground for producers. While producers may not be able to maintain complete independence, acting as a franchisee provides more opportunity for profit, skilled decision making and risk sharing than operating as a low-wage “piece-meal” contractor.

Franchisees are vulnerable to hold-up from franchisors, as franchisors may act opportunistically and change the standards of operation, or they may simply decide that a franchisee is not in compliance with standards and terminate the franchise. The hold-up problem results from the large and specific assets that the franchisee has invested—it is a highly relationship-specific investment. Lewin-Solomons (1999) investigates the arguments for, and the consequences of, government regulation of both franchisor-franchisee and grower-processor relationships, and notes many parallels between the two. Lewin-Solomons concludes that direct regulation interferes with the parties’ attempts to optimize their contractual relationship. Collective bargaining by franchisees may address the problem of unequal power while maintaining flexibility in contract terms.

2.5 Monopolistic Competition

It is likely that high-quality and specialty agri-food products will continue to increase in importance. The forces behind this growth are primarily consumer concerns about food safety, their interest in other “process” attributes, their desire for locally grown and fresh products, and a continued increase in the demand for diverse products. For example, one analyst predicts that “microfarmers”

(small producers of specialty products) could reach 12-18 percent of agricultural markets in the next twenty years, serving up to 25 percent of consumers (Smith, 1994).

To the extent that these products are considered to be differentiated goods, this agricultural sector may be represented by the model of monopolistic competition. In a monopolistically competitive market, firms face downward sloping demand curves because consumers view a firm's product as different from others in the industry. This allows a firm to price its products above its rivals (and above marginal cost) without losing all its customers. However, as entry is possible, firms are unable to make economic profits in the long-run. In some instances customers may prefer products whose attributes are linked to location, such as locally grown produce, or "Big Sky Beef" or "Alberta Beef." If consumer loyalty to brands is weak, this sector becomes similar to perfect competition.

There are relatively few policy issues related to price formation in these markets. Some prices are determined in the spot market, as is the case with farm-gate sales. Others are the result of one-on-one negotiation between specialty producers and (often small-scale) specialty processors or retailers. However, there may be policy issues with respect to the labelling or product claims which producers use to differentiate their products. For example, if claims are made about production methods (organic) or about the location of production ("Made in Saskatchewan"), there may be a role for industry or public standards to verify this claim, thereby enhancing the public credibility of the firm's differentiation strategy and preventing misrepresentation of products to consumers.

3. IMPACT ON EXISTING AGRICULTURAL POLICY ARRANGEMENTS

3.1 Canadian Income Support Policy

In Canada, policy emphasis has shifted towards income support and away from commodity-based programs. For this reason, a move towards closer vertical coordination likely has fewer direct implications for the application of existing support programs. The Net Income Stabilization Account (NISA) provides farmers with a means of protecting their incomes against fluctuations and is not commodity-specific. To the extent that closer vertical relations might reduce price—and therefore revenue—fluctuations and provide producers with improved information with which to plan production and estimate costs, arguably it could reduce the need for income stabilization policies such as NISA. In general, though, farmers will still have access to the NISA program and its provincial counterparts, regardless of their involvement in vertically related marketing channels or input supply relationships.

3.2 Marketing Institutions

Policy implications with respect to regulated marketing systems offer more scope for comment. Much has been written, debated and disputed about the role of the Canadian Wheat Board (CWB) and its impact on international markets. It is beyond the scope of this paper to wade into the policy discussion of the relative pros and cons of the CWB. Instead, it is useful to examine the role of regulated marketing institutions, such the CWB, from the perspective of their transaction cost impacts and the implications for vertical coordination.

Historically, the rationale for the CWB and other non-supply management marketing institutions was the need for countervailing market power for producers faced with oligopoly/monopoly power in downstream grain handling or food processing sectors and monopsonistic/oligopsonistic power in upstream input supply markets. In a sense, these producer marketing organizations were put in place to prevent upstream and downstream firms (e.g. railway companies, grain handling firms, food processors) from capturing rents from the vertical market system, enabling instead these rents to be divided among producers. Where does this rent come from? If one accepts, for the moment, that the CWB does not have market power in world markets, then this rent must come from the Board's ability to lower transaction costs in the supply chain and pass these cost savings back to farmers in the form of higher returns for their grain.

How, then, might the CWB lower transaction costs? Ostensibly, through its coordinating role in Canadian wheat and barley export markets. The CWB has a number of departments which contribute to market intelligence and analysis of market demands and the availability of supplies (e.g. Weather and Crop Surveillance, Market Analysis, Risk Management, Transportation, Country Services, Planning and Coordination departments). Information costs are reduced by the ability to coordinate market development activities with sales functions and with supply predictions. Negotiation costs may be lower collectively by funnelling export sales negotiations through CWB negotiating teams, who are backed up by an extensive system of industry information collation and analysis. Monitoring and enforcement of downstream transactions in export markets is facilitated by the organization's extensive information base. For example, because it has a more extensive resource base of personnel and expertise in international markets, it may be easier for the CWB to determine whether a buyer is acting opportunistically and renegeing on a contractual commitment to purchase Canadian wheat or barley at the pre-agreed price or whether failure to honour a contractual agreement is for reasons beyond the control of the buyer. Similarly, non-supply management marketing boards have a transaction-cost reducing role in

coordinating marketing activities, conducting market research, reducing information and negotiation costs, etc.

If regulated marketing institutions were the transaction cost efficient method of coordinating downstream marketing activities and exporting, however, it could be argued that they do not also need statutory monopoly power to achieve their objectives. The rents gained from savings in transaction costs and from countervailing power would be available to producers without the need to also control the volume of supply. The extent to which this is the case is an empirical question. Central to this question is the identification of transaction costs in the downstream marketing of the products and an assessment of the extent to which the marketing institutions are transaction-cost economizing compared to less regulated forms of marketing. Further research, with a focus on transaction costs, would help inform this debate.

In most cases, regulated marketing systems have been established for relatively homogenous agricultural commodities—wheat, barley, eggs, milk, etc. One of the justifications for these institutions is that market failure results in an under-investment in research and development, market development and promotion because of the unbranded, commodity nature of the products. This prevents a private firm from capturing the rents from investing in R&D, market development or promotional activities. Therefore, these activities are undertaken collectively by the marketing institution on behalf of the entire industry. However, a major change occurring in agri-food markets is the increased demand for highly differentiated food products servicing different consumer segments. For example, so-called “designer eggs” high in essential omega-3 fatty acids are now on the market. In the UK, a brand of eggs has been launched that differentiates the eggs on the basis of their guaranteed “salmonella-free” status. The eggs are sourced only from flocks vaccinated against salmonella and each egg is stamped individually with the company’s brand logo. The example of U.S. corn and soybeans indicates ways in which these industries are differentiating what have traditionally been commodity crops, resulting in a move towards vertical coordination through contracting.

This raises an interesting question—will Canadian regulatory marketing institutions, such as the CWB, remain (assuming that they currently are) the transaction-cost economizing method of vertical coordination as differentiated agricultural products gain in importance relative to bulk commodities? Would coordination through contracts or strategic alliances between independent firms and individual (or groups of) farm firms be better placed to reduce transaction costs in the markets for highly differentiated food products with quality attributes which are “variable and invisible”? Changes in product characteristics are likely to alter the characteristics of the transaction, resulting in closer vertical

relationships between farmers and downstream food firms. Whether regulatory marketing institutions still have a role to play in this scenario is open to debate.

On one hand, it could be argued that the ability to collect and collate information about market needs and coordinate vertical marketing activities means that these institutions are still transaction-cost efficient, albeit with a need to adapt quality measurement, payment methods and producer contractual relationships to reflect the new realities of the food industry. For example, contractual arrangements between the UK bread manufacturer Warburtons, Agricore and prairie wheat farmers appear to be successful within the CWB structure (Kennett et al., 1998).

On the other hand, it may be that the current regulatory structure in some Canadian industries inhibits the closer producer-processor relationships necessary for efficient information flows and the further development of value-added products to service specific market needs. Further research into this issue would make a useful contribution to the ongoing debate over the future of regulatory marketing agencies in Canada.

4. WHAT IS THE APPROPRIATE ROLE FOR GOVERNMENT?

Governments have a role to play in correcting market failure. This therefore begs the question, is there market failure in closely coordinated agri-food sectors, and if so, what is the appropriate role for governments? If one categorizes market failure into externalities (positive and negative), public goods, information asymmetry and monopoly/monopsony power, it is most likely the last three categories in which the market failure question is most relevant for tightly coordinated supply chains. The chief public good issue in agriculture is the role of public versus private R&D; there may be numerous information asymmetry issues, including price discovery and product quality; long-standing questions of the existence of monopoly/monopsony power in vertically related markets remain. Each of these is discussed in turn below.

4.1 Public Vs Private R&D

Economic theory predicts that there will be under-investment in research and development activities if private firms cannot reap the full return from their investment due to free rider problems created by lack of exclusivity and rivalry of the technological advancement. This has long been an argument in favour of public R&D expenditure to develop new grain varieties, etc. In the past, once the germplasm had been released in the form of seed, the developer of that variety could not prevent his or her intellectual property rights from being appropriated by others in a subsequent crop year, e.g. by the saving of seed, etc. Furthermore, as discussed earlier, the bulk commodity nature of much of agricultural

production did not lend itself to branding and product differentiation, so that firms could realize returns from their investments in R&D. In these circumstances, we expect market failure to result in under-investment in R&D.

The biotechnology revolution and the differentiation of food products on the basis of intangible attributes (food safety, process attributes, etc.) has changed this situation in two ways. First, it has motivated the identity preservation, branding and differentiation of agricultural products. Second, technological change has enabled the protection of intellectual property rights, for example, the ability to “switch-off” a plant’s reproduction capabilities means that farmers must purchase new seed for each crop year, rather than saving seed and re-using the same genetic material. In this way, “life-science” companies who invest in new crop traits are able to capture the value from this investment to a greater extent than was possible previously. For example, in the U.S. corn and soybean industries private sector investment had introduced new input and output trait varieties. The resulting increase in contracting between seed companies, farmers and grain processors enables those who have invested in the technology to capture the resulting rents. Of course, the advent of Plant Breeders’ Rights legislation has also been important in fostering increased private sector R&D expenditure.

The Dutch potato industry provides an interesting illustration of the incentives for R&D which are created by a closely coordinated supply chain. Rademakers and McKnight (1998) describe close cooperation between potato processors and seed potato merchants in the Dutch industry. An important part of this relationship is the processors’ investment in R&D into new seed potato varieties to suit the needs of specific markets serviced by the processor. This gives the processors a competitive advantage over their rivals. The contractual relationships between seed potato merchant, farmer and potato processor enable the processor to capture the rents from their investment in R&D. This close cooperation between different sectors of the potato supply chain is cited as one of the reasons behind the exporting success of the Dutch industry.

Recent technological developments may enable firms to realize returns from their investments in research and development in a manner not previously possible. For this reason it may be important to reevaluate public and private sector roles in research and development. Due to the uneven nature of technological change, this reevaluation would need to be focussed on the level of individual industries.

4.2 Dealing with Information Asymmetry

Market failure due to information asymmetry may impede the formation of closely coordinated supply chains, thereby reducing the international competitiveness of the Canadian or U.S. agri-food sectors. This suggests a role for government policy in reducing or eliminating information asymmetry.

For example, in the provision of information about quality, in the accreditation of quality assurance schemes and in providing producers with advice about different supply chain alternatives.

A key issue in closely coordinated vertical markets is price discovery. The public price reporting role traditionally performed by governments is both less important and less feasible in a closely coordinated system in which “average prices” are not relevant and price information is not readily available to public agencies. The argument that “average prices” are no longer a relevant indicator of efficiency or a relevant guide to production and investment decisions assumes that, in a closely coordinated system, products will be highly differentiated. Since quality is not “average,” then “average” prices cannot be used to describe that quality. For a producer, evaluating whether he or she is being offered a “fair” market price depends on the quality produced. Similarly, for processors, the price offered a producer depends on the quality attributes of the differentiated product. Both parties face information costs in setting/evaluating price. If these transaction costs are sufficiently high, the transaction may not occur and market failure results. This suggests a role for a third party in providing an independent, objective assessment of the quality attributes of the product to reduce information costs for producers and processors, thereby facilitating the development of closely coordinated supply chains.

In a sense, this is the role played by the existing public grading schemes for agricultural commodities. While existing grading schemes reduce information and negotiation costs, by and large, they are based on broad, easily measurable, commodity attributes. Reducing information asymmetry in a sector with highly differentiated agri-food products, will require the provision of far more detailed information on relative quality attributes (including intangible attributes) than those typically measured in traditional commodity grading schemes. Thus, although the principle is similar, the application is likely more complicated.

Technological advances may reduce measurement costs by enabling firms and/or government representatives to measure quality attributes more accurately. In some cases, experience and credence attributes are important to end-users—these are characteristics than cannot be evaluated by visual inspection or testing prior to purchase. Experience attributes are detectable after purchase and consumption, whereas credence attributes are those whose quality (or, even, presence) cannot be determined even after consumption and purchase. Very often these are “process attributes,” such as whether the product was produced in an environmentally friendly manner, or to certain animal welfare standards or the presence of genetically modified organisms in a product. Technological developments may transform experience and credence attributes into search attributes—for example, the ability to detect the presence of GMOs in a processed product or the texture, taste and palatability of meat

products. Others will remain credence attributes (e.g. whether the meat originates from animals reared in welfare-friendly production systems).

There are two roles for a third party, such as the government, in reducing information asymmetry. The first is the support of R&D into technologies which reduce quality measurement costs for experience and credence attributes. A second role is in verifying private sector supply chain audits to assure the presence (or absence) of credence attributes. In other words, if these attributes cannot be evaluated through measurement, their presence or absence can be assured through close control and coordination over the supply chain. For example, suppose retailer A provides a guarantee to consumers that the pork chops it sells were produced using environmentally friendly and/or animal welfare friendly production practices. Consumers wishing to purchase pork chops with this attribute will use this assurance in evaluating the quality of the product. There may be a role for the public sector in verifying that Retailer A has sufficient supply chain audits in place to validate this assurance. Alternatively, this role could be played by an independent private sector third party. Some quality assurance schemes feature verification or audits by independent private firms.

What, then, is the appropriate role for government? At what stage should verification of quality information or supply chain audits be the purview of government or be a function which can be performed by an independent 3rd party private sector player? This is a difficult question. Fundamentally, economic theory suggests that governments should become involved when markets fail to allocate resources efficiently. With the revolution in information technology and other technological advancements in measurement technology, markets in information provision and accreditation have become a reality. The public sector may continue to have a role in establishing licensing procedures, industry standards for the provision of information and accreditation, and facilitating the development of industry-wide quality assurance schemes. The result may be a common set of industry standards to improve and verify quality. This reduces information asymmetry, to the extent that downstream buyers can be assured that a base-level of quality has been achieved by all products receiving the industry-wide quality assurance mark. However, additional quality requirements specific to that buyer would still result in some information asymmetry, providing a motivation for closer vertical coordination in order to control for, or detect, additional quality attributes.

The changing nature of vertical coordination has altered the information, negotiation, monitoring and enforcement costs facing producers who must find an appropriate buyer and evaluate supply chain alternatives. By contrast, in the past, the “marketing” of a traditional agricultural commodity was fairly straightforward. The producer shipped his/her grain to the local elevator, it was graded according to a

recognized grading scheme and shipped to market as a bulk commodity. The producer shipped a truck load of cattle to the local packer, or perhaps could choose between a number of local packers depending on the prices they were offering at the time.

Consider instead the scenario in a closely coordinated sector, in which the producer must decide which vertically-linked supply chain to join. Perhaps this involves a five or ten year contractual commitment, with specific obligations on the part of the producer with respect to the quantity, quality and timing of deliveries. Payment might be based on a combination of product quality attributes, the quantity or quality targets achieved by the producer relative to other producers in a “tournament” and/or as a residual of the market return for the final processed product. Access to the market (membership of the supply chain) may require investment in specific assets. The producer may have to follow proscribed cultivation or feeding methods, with detailed documentation and on-farm audits an integral part of the relationship. Periodic consultations with and/or inspection by downstream partners may be involved. The producer’s ability to improve net farm income through changing the input mix may be constrained by contractual obligations with respect to input use or choice of input supplier. All of this requires a very different set of skills for producers. These include skills in contract evaluation and negotiation, and management skills relevant to being part of a closely coordinated supply chain where the producer’s autonomy to make decisions is restricted but where he or she has access to more information with respect to consumer and downstream buyer requirements.

How does this provide a new role for public policy? There is a need for education and advice to assist producers in obtaining the skills necessary to evaluate different contractual alternatives—where the risks lie, how performance will be assessed, etc. Alternatively, this is a role which could also be performed by industry associations or producer commodity groups.

4.3 Dealing with Monopoly/Monopsony Power

In many cases, closer vertical coordination of the agri-food sector has been accompanied by rationalization and increasing concentration in the input supply, processing and retailing/distribution sectors. Monopsony or oligopsony power in downstream sectors and monopoly or oligopoly power in input supply sectors puts producers at a relative bargaining disadvantage and results in the well-known economic outcomes of an inefficient allocation of resources and a loss in social welfare. This has long been an issue in agricultural markets, and in this sense it is nothing new. It was one of the reasons behind the establishment of the Canadian prairie Wheat Pools early in the Twentieth century, to provide countervailing power to producers facing geographical monopsonies in grain handling and transportation. Recently, however, concentration has increased in other sectors—meat packing and processing, the seed

industry, genetics, agricultural chemicals, etc.—due to a host of factors, including changing technology and the globalization of markets. Supply chains consisting of vertically related oligopolies have emerged. For example, hog packing and processing firms vertically related to hog genetics firms and feed mills—either through ownership, strategic alliances or contractual relationships. This presents a challenge for governments in ensuring that a competitive environment is maintained and the social welfare losses and misallocation of resources which result from an abuse of market power are avoided. Competition and anti-trust regulations have a pivotal role to play. This is by no means an easy role, however, given the absence of market price information in a vertically-linked system. Transfer prices between vertical stages will likely be proprietary information. The role of independent farm producers in this system and the impacts on consumers in terms of prices and product availability are relevant policy considerations.

In applying competition regulations to agri-food markets, however, a balanced approach should also consider the potential efficiency gains from a more closely coordinated system. Williamson (1985) discusses the evolution of anti-trust law over the past forty years. He states that in the past anti-trust law was based on the concept of the firm as a production function, with the corresponding idea that the efficient boundaries of the firm were determined by technology. The emphasis of anti-trust investigations was whether or not entry was possible, neglecting benefits from possible gains in efficiency. Nonstandard methods of contracting were considered to be anti-competitive, as true economies were assumed to take a technological form. Williamson discusses how the acceptance of Transaction Cost Economics moved the focus of the analysis used in anti-trust investigations to the transactions the firm undertakes as the focus of analysis, with an understanding of how organizational variety arises in order to minimize transaction costs. He concludes that the greater understanding of the firm as a governance structure increased tolerance of nonstandard, or unfamiliar, business practices that departed from autonomous market contracting. In addition, a greater appreciation of the efficiency gains from other forms of organization has led to a more balanced appraisal of the public interest in the evaluation of anti-trust cases.

Collective bargaining may be another vehicle to use to address potential monopsony or oligopsony power. Further research would need to address the questions of: (1) the conditions under which collective bargaining is appropriate, (2) who would undertake it, and (3) current institutional and legislative obstacles to collective bargaining.

4.4 Regulatory Incentives

In the past, governments have exerted direct control over some facets of the agri-food sector, for example, commodity price support policies, regulated transportation rates, etc. Recently, policy has become less interventionist and more indirect as a result of a number of factors including a change in philosophy regarding the appropriate role for government policy, in response to budgetary pressures and as a result of globalization and international trade obligations. This does not mean that there is no role for government policy, on the contrary, there appear to be a number of areas in which government action can mitigate market failure.

Government policy cannot “regulate” an ideal vertically coordinated agri-food system—in essence, this was the approach tried in the centrally planned command economies—an “experiment” which eventually failed miserably. What governments can do, however, is create a regulatory environment with the requisite incentives for consumer protection and the reduction of information asymmetry. For example, this might include an evaluation of the costs and benefits of strengthening and extending product liability laws along the entire agri-food chain and/or requiring full traceability of products and their ingredients. Sometimes these regulatory requirements in themselves provide the motivation for closer vertical coordination. This was the case with the 1990 UK Food Safety Act which increased the legal liability of downstream firms for the safety of all food which they sold—in effect making them liable for the practices of upstream firms. This led to tighter supply chain control and coordination as downstream retailers sought to reduce their risks by auditing the practices of upstream suppliers more closely (Hobbs and Kerr, 1992).

In other cases, public sector monitoring and enforcement costs can be shifted onto the private sector. If these monitoring and enforcement activities can be carried out more efficiently and effectively by the private sector, then there should be a gain to society. One could argue that this is what has occurred in public sector meat inspection in Canada and the United States. Previously, federal government employees inspected carcasses for food safety hazards using organoleptic techniques (sight, smell, touch) which were insufficient to detect microbial hazards. An alternative method of assuring food safety is to require meat packing plants to follow management procedures which reduce biological, chemical and physical hazards and include microbial testing by the companies themselves. In essence, this is the Hazard Analysis, Critical Control Points (HACCP) system which the US government has mandated for all US meat and poultry and seafood processing plants and which is recommended by the Canadian government. Properly applied, a HACCP system—combined with microbial testing of samples—should be a more effective method of delivering safe food to consumers than the previous

public visual inspection system. Although HACCP is not currently mandatory in Canadian meat packing plants, it has been widely adopted because of the importance of the U.S. export market and, in other cases, because downstream further processors or retailers have made it a requirement of their suppliers.

With respect to contract agriculture, there are a number of issues that benefit from action by different levels of government in the regulation of contracts and relations between producers and processors, including producers' rights to organize, and requirements to increase the transparency and adequacy of contracts. It is important to raise the question of the most productive venue for these actions. If large regulatory discrepancies exist between provinces in Canada, or between states in the United States, companies may have an incentive to change location. This same concern exists in terms of discrepancies in the laws governing producer-processor relations between Canada and the United States. These types of laws and regulations could affect the competitive advantage of firms to the extent that they would be motivated to change location. While it is beyond the scope of this paper to assess the costs and benefits of a harmonized system of laws and regulations on producer-processor contracts, efforts to tackle these public policy concerns in a proactive manner should be considered.

5. CONCLUSIONS AND FURTHER RESEARCH

At the same time that the rapid changes discussed in this paper present challenges to producers and other industry stakeholders, they also present many opportunities. The agricultural sector that is emerging promises to be diverse in terms of farm and market organization. This means that producers may have choices in terms of the niche they fill and how to best realize their comparative advantage.

Agricultural economists need to reevaluate their traditional preference for a particular form of farm and market organization for agriculture. Ronald Coase points out that:

“Contemplation of an optimal system may provide techniques of analysis that would otherwise been missed, and in certain special cases, it may go far to providing a solution. But in general its influence is more pernicious. It has directed economists' attention away from the main question, which is *how alternative arrangements will work in practice*. It has led economists to derive conclusions for economic policy from a study of an abstract of a market situation” (Williamson, 1985, p. 327).

Analysis on the actual impacts of increased vertical coordination will continue to be helpful to policymakers.

Vertical linkages in agriculture are evolving dynamically, and new research questions are continually emerging even as we seek to answer existing ones. By design, this paper has taken a broad

approach to vertical coordination across the agri-food sector. While there has been a fair amount of research focussing on vertical coordination in U.S. agriculture, in Canada, industry-specific studies of vertical coordination are few and far between. In the livestock sector, the Canadian beef and pork sectors would benefit from an in-depth study of these issues. On the grains and oilseeds side, an analysis of the canola and specialty crops sectors would provide a valuable comparison with the Canadian wheat industry. The role of regulated marketing institutions in facilitating or impeding vertical relationships deserves further attention. Other fruitful areas for research are issues associated with the increased use of contracts, including potential inadequacies of current contracts and the need for producer education on evaluating contracts. The potential use of collective bargaining by producers raises a host of research questions.

The lack of basic data describing the nature of vertical relations, including the extent of contracting, in Canadian agriculture seriously impedes the ability of policy-makers, industry stakeholders and researchers to monitor and evaluate developments in the sector. The collection and analysis of primary data on the nature of vertical linkages in the Canadian agri-food sector should be a priority for the federal government.

The analysis presented in this paper and the conclusions we have drawn, are far from definitive. They are intended to suggest that, in upcoming years, producers, downstream processors and retailers, academics, and policymakers will need continually to reshape their thinking about the organization of agricultural supply chains and associated policy issues.

REFERENCES

- Banker, D. and Perry, J. (1999) More Farmers Contracting to Manage Risk. *Agricultural Outlook*. Economic Research Service, U.S. Department of Agriculture, January-February: 6-7.
- Boehlje, M. (1998) Contracts and Alliances in the Food Supply Chain: The Challenges and Consequences. Conference presentation transcript, Center for Agricultural and Rural Development, Iowa State University, September 4. <http://www.card.iastate.edu/about/fallpolicy>.
- Brester, G.W. and Penn, J.B. (1999) Strategic Business Management Principles for the Agricultural Production Sector in a Changing Global Food System. *Policy Issues Paper No. 11*, Trade Research Center, Montana State University-Bozeman.
- Brown, R.H. (1992) Contract Poultry Growers Begin Nationwide Organizing. *Feedstuffs* September 7.
- Bureau, J.C., Gozlan, E. and Marette, S. (1998) *Food Safety and Quality Issues: Trade Considerations*. Organisation for Economic Co-operation and Development (OECD), Paris.
- Grossman, S.J. and Hart, O.D. (1986) The Costs and Benefits of Ownership: A Theory of Vertical and Lateral Integration. *Journal of Political Economy* 94:691-719.
- Hamilton, N. D. (1995) State Regulation of Agricultural Production Contracts. *University of Memphis Law Review* 25(1051).
- Hamilton, N. D. (1997) Reaping What We Have Sown: Public Policy Consequences of Agricultural Industrialization and the Legal Implications of a Changing Production System. *Drake Law Review* 45(289).
- Hayenga, M.L and Schrader, L.F. (1980) Formula Pricing in Five Commodity Marketing Systems. *American Journal of Agricultural Economics* 62(4):753-59.
- Hayes, D. (1998) Interaction of Risk Management, Finance, and Contracting. Conference presentation transcript, Center for Agricultural and Rural Development, Iowa State University, September 4. <http://www.card.iastate.edu/about/fallpolicy>.
- Henderson, D.R. (1998) Between the Farm Gate and the Dinner Plate: Motivations for Industrial Change in the Processed Food Sector. *The Future of Food: Long-term Prospects for the Agro-Food Sector*, Organisation for Economic Co-operation and Development (OECD), Paris: 111-140.
- Hobbs, J.E. and Kerr, W.A. (1992) Costs of Monitoring Food Safety and Vertical Coordination in Agribusiness: What Can Be Learned from the British Food Safety Act 1990? *Agribusiness* 8(6): 575-84.
- Hobbs, J.E. and Young, L.M. (2000). Closer Vertical Co-ordination in Agrifood Supply Chains: A Conceptual Framework and Some Preliminary Evidence. *Supply Chain Management*, in press.
- Hodgson, G.M. (1998) Competence and Contract in the Theory of the Firm. *Journal of Economic Behavior & Organization* 35(2):179-201.

- Kalaitzandonakes, N. and Maltzbarger, R. (1998) Biotechnology, Identity Preserved Crop Systems, and Economic Value. *Proceedings from the 3rd Annual Conference on Chain Management in Agribusiness and the Food Industry*, Management Studies Group, Wageningen Agricultural University, Netherlands, May.
- Kennett, J., Fulton, M., Molder, P. and Brooks, H. (1998) Supply Chain Management: The Case of a UK Baker Preserving the Identity of Canadian Milling Wheat. *Supply Chain Management* 3(3):157-166.
- Lang, M.G. (1980) Marketing Alternatives and Resource Allocation: Case Studies of collective Bargaining. *American Journal of Agricultural Economics* 62(4):760-765.
- Knoeber, C.R. (1989) A Real Game of Chicken: Contracts, Tournaments and the Production of Broilers. *Journal of Law and Economics* 21(2):374-389.
- Lewin-Solomons, S.B. (1999) Asset Specificity and Hold-up in Franchising and Grower Contracts: A Theoretical Rationale for Government Regulation? Working Paper No. J-18 487, Iowa Agriculture and Home Economics Experiment Station, Iowa State University, July.
- Marbery, S. (1993) Poultry Growers Suing Contractors, Organizing for Clout. *Feedstuffs* January 18.
- Martinez, S.W. (1999) *Vertical Coordination in the Pork and Broiler Industries: Implications for Pork and Chicken Products*. U.S. Department of Agriculture, Economic Research Service, Agricultural Economic Report No. 777, April.
- Mighell R.L. and Jones, L.A. (1963) *Vertical Coordination in Agriculture*. U.S. Department of Agriculture, Economic Research Service, Agricultural Economic Report No. 19, February.
- Perry, J., Banker, D. and Green, R. (1999) *Broiler Farms' Organization, Management, and Performance*. U.S. Department of Agriculture, Economic Research Service, Agriculture Information Bulletin No. 748, March.
- Rademakers, M.F.L. and McKnight, P.J. (1998) Concentration and Inter-firm Co-operation within the Dutch Potato Supply Chain. *Supply Chain Management* 4(3): 203-213.
- Rural Advancement Foundation International (RAFI). (2000) Contract Agriculture. <http://www.rafisua.org>, March 28.
- Sauvé, L. (1998) Toward an Institutional Analysis of Vertical Coordination in Agribusiness. In Royer, J.S. and Rogers, R.T. (eds.), *The Industrialization of Agriculture: Vertical Coordination in the US Food System*, Ashgate Publishing Ltd, Aldershot, UK: 27-71.
- Schertz, L.P. and Daft, L.M. (1997) *Food and Agricultural Markets: the Quiet Revolution*. U.S. Department of Agriculture, Economic Research Service.
- Smith, R. (1994) Microfarmer, 'Clean Foods' Could Reach 25% of Consumers. *Feedstuffs* July 11.

Teece, D., Rumelt, R., Dosi, G. and Winter, S. (1994) Understanding Corporate Coherence: Theory and Evidence. *Journal of Economic Behavior and Organization* 23(1):1-30.

Tomek, W.G. (1980) Price Behavior on a Declining Terminal Market. *American Journal of Agricultural Economics* 62(3):434-444.

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

Williamson, O.E. (1979) Transaction Cost Economics: The Governance of Contractual Relations. *Journal of Law and Economics* 22:233-262.