Reversing the road to super farms

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ABSTRACT

The organization of primary agriculture is dependent upon whether the institutions of a country allow for reverse franchising by farmers. If the transaction costs of managing a farm can be minimized by farmers conducting a form of collective action, such as cooperatives, then the size of farms will be smaller. If farms have to make the products in the firm, which are subject to very large economies of scale than super farms will be the result. The key is the existence of institutions, such as collective action and property rights, that allow for the minimization of costs. For this reason the organization of primary agriculture is, among other things, a public policy issue. In this paper we develop this argument, we sketch a theoretical framework based on a model of adaptive relational contracts, and we present two illustrative examples: the Danish cooperative system, and the Canadian Wheat Board.

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1. Introduction

A unique feature of world agriculture is that production takes place on a large variety of farm organization types, often for the same agricultural product. We define organization to include farm structure, farm size, farm ownership, and economies of scope. Countries or regions have their own culture and set of institutions, as well as factors such climate conditions and soil typology, which create a type of path dependency in determining the type of organization. In the Middle East farms have moved from being feudal to small family farms or share cropping, parts of Africa have tribal rights over agricultural land use, while in North America farms which were initially organized as family operations are now a mixture of corporate farms (much of the hog, poultry and parts of the dairy sector) and large family operations (grain and oilseed sector).[1] In many countries agricultural production is dependent upon industrially produced inputs, such as fertilizer, chemicals, and farm machinery, which is where the term industrialized farming originated. Closed-loop agriculture production is increasing, which occurs when the same firm provides the inputs, purchases the output, and often sets management benchmarks that must be achieved. By way of comparison the manufacturing sectors around the world have a spectrum of the small family operations up to large multinational enterprises (MNEs). Institutions such as trust are seen as playing a large role in the structure of manufacturing (Fukuyama, 1995). In this paper we are interested in explaining the role economics plays in determining the evolution of the farm organization.

There are at least three important global phenomena that are influencing the changing the structure of production agriculture. First, is the growing importance of multinational enterprises in the primary agriculture sector. The spread of technology is increasingly a result of MNEs, international research agencies, and freer trade. The MNEs play a large role in new seed technology, crop and animal protection technologies, and in many cases farm equipment. For example, the use of genetically modified plants is largely the result of research commercialized and marketed by MNEs. University researchers developed some of the basic research for GMOs, but the transnational marketing of these seeds is the purview of MNEs. MNEs are increasingly the mechanism used to trade agricultural products, both agricultural commodities and food products. MNEs play a large role in the supply chain management of the food sector in every thing from food inspection to labelling. There has been a corresponding decline in the role of state trading enterprises and farmer owned cooperatives in agriculture and food trade. As a result of the growth in MNEs farmers in many developed and developing countries have access to the same production technology. This suggests that agriculture production is becoming more homogeneous over time and across countries.

A second global phenomenon is the standardization of institutions, such a property rights, use of science to arbitrate food safety issues etc. Globalization through free trade agreements has reduced the set of institutions a country can use to affect the structure of primary agriculture. The World Trade Organization's (WTO) drive to reduce agriculture protection and trade distortions (for example, by allowing more market access) make many institutional incentives a form of unfair trade practice. An example is the pressure by the WTO and others to remove the monopoly powers of farm marketing organizations.

A third global phenomenon is the changing consumer product demand, consumption of food outside the home, and the demand for increased food safety. Consumers want more variety in the products they consume. This implies countries must import more of the average food basket. Consumers are eating more food away from home as incomes rise. Finally, consumers are increasingly concerned with food security and how their food is produced. The rise of the organic industry is in part the result of the consumer concern over food production.

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[1] In some countries the structure of agriculture is determined by government fiat (for example Cuba, and N. Korea).

The objective of this paper is to demonstrate that the structure of farms is determined in part by how the large external economies to the farm are managed. External economies are those market forces that a farm must interact with as part of the management. We draw on the notions suggested by Stigler (1951) and show that the size of farms is not solely a function of the degree of specialization within the farm or how the farm deals with informational problems. How farms arrange their business such as marketing through reverse franchising, making within the firm, or buying from another firm determines the structure of the farm. We argue that super farms are the result of the efficiencies gaining from making business decisions inside the farm, whereas family farms gain the greatest efficiency through reverse franchising the same business decisions. Which system is most efficient depends upon the institutional structure of the country.

2. Literature

We are by no means the first economists to have an interest in explaining the structure of primary agriculture production using economic theory. In his classic 1962 paper Breimyer, divides agriculture into three economies, "primary production from soil"; secondary, or "conversion of feedstuffs into livestock products"; and the "marketing of products from farm to retail" (Breimyer, 1962: 679). What distinguishes the three economies is their dependence on fixed inputs. The primary economy is highly dependent on the fixed input – land, whereas the marketing economy is highly dependent on social capital which is not fixed in the long run. The livestock economy depends on feedstuffs (an output of the primary sector) and capital. He also identified the "industrialization" of agriculture as the transition from an agriculture based on fixed land resources to an agriculture based on variable (manufactured) inputs. He characterized the first economy as the least industrialized; the marketing and agribusiness as the most industrialized and the animal production as intermediate. In a nutshell, an industrialized economy is "*totally self-contained and self-sustained* […] *in which no factors are fixed, but all are variable* (Breimyer, 1962: 681). He added later "[…] *all factors are perfectly mobile and divisible*" (Breimyer, 1978: 39). This definition and consequent analysis is therefore based on the presence of increasing returns and economies of size. Breimyer even predicted that the primary economy is catching up in the industrialization process: "*Production on U.S. farms has been shifting at fast pace to an industrial, capital-using character*" (Breimyer, 1962: 685).

Naturally, more recent approaches to the problem of the farm have been influenced by evolutions in economic theory – especially in new institutional economics. Roumasset (1995) provided one useful description of why we observe different structures of agriculture. He focused on explaining the choice between rent, wages and share contracts as dependent upon the degree of specialization between labor and management. He proposed a constitution type of relationship between the owner and workers and applied agency theory to show how share cropping etc can be efficient. In the models presented by Roumasset specialization of labor and management occurs within the firm.

Allen and Lueck (1998) explain the predominance of the family farm as a result of the trade-off between moral hazard, which occurs because of the biological nature of agricultural production and the gains from specialization. In the Allen and Lueck (1998) framework production information is asymmetric and to avoid the results of moral hazard the most efficient form of agricultural production is the sole proprietary system i.e. the family farm where specialization occurs within the farm. They apply their argument on farming systems in North America but do not explain why many farms with intensive livestock production have a corporate structure, at least were it is not disallowed by legislation.

Although not directly focusing on the farm problem, a related line of literature concerning economies of size and vertical integration dates back to the work of A. Smith (1776) and G. Stigler

(1951). Smith developed the idea of external economies, which are economies outside the firm, with the magnitude of the external economies determined by the size of the market. This led to the expectation that the creation of monopolies would be the natural outcome of a firm as markets grew. This was not an appealing result and the question of external economies was largely forgotten about until Stigler's 1951 paper. Stigler (1951) developed a life-cycle theory of the firm, where in young industries firms tend to be highly integrated. As the industry grew and matures, firms disintegrate capturing economies of specialization and division of labour. As the industry moves down the cycle again, re-integration of firms will occur, since eventually "*the division of labour is limited by the extend of the market*". Williamson (1975) argued that the processes hypothesized by Stigler will occur if transactions are frictionless, i.e. there are no transaction costs. Karantininis, McNinch and Brown (1997) use Williamson's argument to show that the type of organization that maximizes the profitability of cattle production in Canada can be determined by minimizing the sum of production and transaction costs. Using three stages of cattle production, cow-calf, backgrounding, and feedlot they demonstrate that the optimal organization for beef production is a result of the difference in the economies of scale in the three stages. In the Karantininis et al. (1997) example, the economies of scale in a related stage of production affects the governance rules in another stage so as to minimize transaction costs and maximize profits.

The question of the industrialization of agriculture, re-appeared in the literature in the 1990s (Barkema, 1994; Rhodes, 1995; 1998). Two strands of arguments can be identified here: demand-driven and supply driven industrialization. Barkema (1994) and others that followed, are the main proponents of the demand-driven industrialization hypothesis. We focus here on the latter, because there is yet no good empirical support for the former, but most importantly because our approach fits within the latter.

Focusing on the pork sector (2nd economy in Breimyer's classification) Rhodes (1993) argues that the motivation for the drive towards industrialization is efficiency, innovation, and economies of size. Furthermore, the industrialization of the pork industry in the U.S.A. is not driven by vertical, but rather by horizontal integration. Rhodes (1995) suggests that the franchising model is useful in explaining this process:

"*The approximate model may be the fast food franchise in which a franchisor such as McDonald's saves on capital while obtaining highly-motivated local managers and greatly increasing its sales by contracting with individual franchisees. Likewise, the hog contractor can employ all, or most, of his capital on hogs and feed, rather than on land and facilities while the grower avoids certain market risks and obtains a key role in a hog operation that he could not capitalize on his own.*" (Rhodes, 1995, p. 113)

We propose to add to above literature in two ways: First, we return to the question of scale economies and integration, that was initially raised by Adam Smith (1776) and later discussed by Stigler (1951), and others. Secondly, we expand on the new institutional economics literature and continue to use the argument of franchising.

3. Reverse Franchising and the farm

If the franchising process (Rhodes, 1995) contributes to what some may call the "demise of the family farm", we argue here that "*reverse franchising*" may actually reverse - or at least impede - the process of this demise. What is "reverse franchising"? Instead of individual small firm operators (franchisees) buying into a large firm's (franchisor) brand name, under "reverse franchising" small firms through collective action create an entity (a firm, a cooperative, a marketing order, a joint venture, a strategic alliance, etc.) which undertakes certain activities on behalf of the members-franchisees. These activities may be marketing, input procurement, up-

stream or down-stream bargaining, research and development, advisory service, or simply the creation of brand name capital through advertising and promotion.

This process, of course, is not unique to primary agriculture. Cox, Mowatt, and Prevezer (2003), show that some retailers in the U.K. subcontract the management of their distribution centres. Similarly, doctors in Australia are involved in reverse franchising which involve doctors creating a franchise from existing solo practices and then benefiting from a consolidated brand and shared services and administration costs (AustralianDoctor.Com.Au, April 5, 2006). This is what a farmer cooperative does as well. Perhaps the difference between the Australian doctors franchise practice, or Sainsbury's warehouse management network on one hand, and a farmers' cooperative on the other, are the particular bylaws governing the decision-making (one-member, one-vote) process, or the share of surplus (patronage dividend). But this is not what we are concerned with here. What these organizational initiatives have in common is that they allow their primary owners/patrons to *outsource* certain activities. In doing so, they are able to specialize on their core activities (farming) while they can attain services or inputs at a lower cost via the franchise. Some examples will help illustrate the argument.

The sources of efficiency through this reverse-franchising process are the following:

1.   Better realization of economies of size through rationalization. This follows the Stigler (1951), Williamson (1975) and Karantininis, McNinch and Brown (1997) line of argument.

2.   Market power. Through collective action, farms may attain better bargaining position, and they can extract rents from upstream and downstream industries. At least, through collective action they may prevent other firms to take advantage of them ("countervailing power", Galbraith, 1958).

3.   Network externalities. Although related to #2 above, this is not pure rent-seaking. Instead, these are externalities created through large numbers in the network. These include, information sharing, and trust development.

In what follows, we develop an elementary model of the farm, based on adaptation theory, where we show how the division of labour between the farm and the network is determined.

4. Theory

A fundamental question concerns the division of labour between the farm and the franchise. How much will the firm produce internally, and how much will it outsource from the network (*franchise*) ? The question can be answered in various ways: Following the (frictionless) neoclassical (Stiglerian) view, simply vertical economies of size and scope determine the optimal allocation. The transaction cost view emphasizes the importance of ex-post opportunism and haggling due to idiosyncratic assets. We resort here to yet another theory -- adaptation theory -- that we believe helps better understand the division of labour between the farm and the network, and help illuminate the *the boundaries* (and hence: *the nature*) *of the farm.*

4.1 From Stigler to Williamson

Let the cost structures of two vertically related processes be illustrated by the two sets of curves with subscripts 1, and 2 in Figure 1. The output of process 1, is input to process 2 in fixed proportions. For example, suppose that process 1 is pork production and process 2 is pork marketing. The figure is drawn to scale so that $SAC=SAC_1+SAC_2$, and $LAC=LAC_1+LAC_2$. For example the cost to produce q is at point A: $Oc=Oc_1+Oc_2$. The minimum total average cost OC is reached at point B with total output Q, however, at this point neither of the processes is at the

efficient scale: SAC''_1 and SAC''_2. In fact, the pork operations are smaller than the efficient scale $OQ>Oq_1$, whereas the marketing operation operates at a scale larger than optimum: $OQ<Oq_2$. In the jargon adopted in this paper, the farm could actually be a "super farm".

Ideally, the absolute minimum total cost could have been reached if both operations were operating at L_1 and L_2 respectively, where the outputs are drawn such that $Oq_2=2Oq_1$. In other words, the optimum marketing scale Oq_2 is one that handles the output of two pork operations with Oq_1 each. This is illustrated in Figure 2, where the firm operates at point B' on the LAC' and at output Oq_2. The average total cost is $OC'=Oc'_1+Oc'_2$. This requires, however, that the marketing operation now handles the output of two (identical) pork farms. Whether the firm will operate at A, B, or B', will depend on the "extend of the market" (Stigler, 1951). Williamson (1975), argued that B' can be reached only in the absence of transaction costs. In our example, it would be costlier to manage and coordinate, the output of two pork farms instead of one, or because this would require some specific investments that the firm is not willing to undertake out of fear of holdup. The difference $QB-q_2B'$ could be the level of such transaction costs. In the case of integration, the marketing firm could also realise some further economies due to scope, and move to LAC'' and B'' (Willig, 1979; Teece, 1980).

What would be considered a *super farm* in the light of this article is an integrated entity that operates at output OQ. It is also possible that a *super farm* is one that operates at Oq_2. In this case the operation is a *franchise*, like the ones described by Rhodes (1995). The alternative organizational form is a *reverse franchise* where farms of size Oq_1 or less, form a cooperative, or marketing order, or a joint venture, or simply a network that performs the marketing operation on behalf of the individual farms. Which form will prevail ? In other words, what will determine whether we will have a lateral integration, where the marketing firm will be integrated upstream into farming; or a number of farms integrate downstream into marketing? The transaction cost (Coasian) answer is: the total of production plus transaction costs. In fact, transaction cost theory is not very clear about this type of integration, since its main preoccupation is the "firm (integration) versus the market" question, and not the "forward versus lateral integration". To answer this question we must turn to property rights theory of the Grossman and Hart (1980) type.

4.2 From property rights to adaptation

To understand the "nature of the farm" and its uniqueness – if any – we need to see the farm with the lens of the theory of the firm, that is, to see the farm through the lens of the (incomplete) contract. In this way, the special features of the farm organization may become apparent, and through this we can derive relevant policy implications.

Organization theory predicts that the survival of organizations depends on their ability to adapt to environmental disturbances. "Only when the need to make unprogrammed adaptations is introduced does the market versus internal organization issue become engaging" (Williamson, 1971, p. 113).

The survival of the family farm depends on the relative efficacy of this form of organizing farm production compared to other forms of organization, such as large integrated fi(a)rms and/or hybrids. Also, parallel to this challenge, is the question of the scale and scope of the farm. Although, the so-called "family farm" has been the dominant form of organization in agriculture production (Allen and Lueck), both, the size and form of a representative farm varies between regions, and between sectors within agriculture. What then determines the size and form of the family farm?

4.2.1 The Adaptation Theory of the Fi(a)rm

To clarify the ground of discussion here, we refer to the theory(ies) of the firm post-Coase (1937), i.e. we view the firm in the context of what determines the boundaries of the firm, or the "make-or-buy" decision, which today has been synonymous with the theory of the firm.

In the modern microeconomic theory, there are at least four formal theories of the firm (Gibbons, 2005):

1.   Rent seeking theory. Also referred to as the Transactions cost approach, it is based on the existence of Appropriable Quasi Rents (Williamson, 1971, 1985). In the presence of AQRs, vertical integration (make) may be more efficient than the market (buy).

2.   Property rights (or incomplete contracting) theory (Grossman and Hart, 1986). Based on the idea that contracts are always incomplete, the PR theory focuses on unspecified property rights and hence non-contractible specific investments and decision rights ex-ante. The firm in this context consists of the portfolio of ex-ante investments, such that total surplus is maximized, given efficient ex-post bargaining.

3.   Incentive systems. The firm in this theory is seen as the device which solves the incentive problems between a principal (the owner) and agents (the manager and other employees).

4.   Adaptation theory. This theory is closer to organization theory (it can be traced back to work by Simon, 1951). The firm here is the devise that allocates "authority" (or "control") in the best way to facilitate "adaptive, sequential decision-making" (Williamson, 1971, p. 40). Whether the "authority" is in the hands of the "boss" or the employee, is what the firm is all about. This is different from the rent-seeking theory, where the driver is mainly safeguarding against potential appropriation of rents attributed to specific assets. It is also different from the agency theory, where the question is about incentives – not control. The adaptation theory, can be seen however, as being closer to the incomplete contract theory, in the sense that the latter also looks at control, but mixes control with incentives, whereas, adaptation theory is purely a theory of control and decision rights.

Another element of adaptation theory, and very relevant to our discussion in this paper, is that it constitutes a useful instrument to examine relations across firm boundaries. For example, Richardson (1972) gave a rich description of "industrial activity … the dense network of co-operation and affiliation by which firms are inter-related." Cheung's (1983) description of contractual structures between firm and market, Eccles's (1985) work on quasi-firms, and Powell's (1990) discussion of networks, are also such examples.

The many governance structures between firms and markets are sometimes summarized as "hybrid" governance structures; see Williamson (1991; 1996) and Menard (2004). One particular strand of this hybrids literature is especially relevant to our analysis here: the (largely empirical) work in which firms have fixed boundaries but pass decision rights across these boundaries by contract. These contracts can be seen as the "bridges": "firms may be islands, and the boundaries of these islands sometimes shift (via changes in asset ownership), but a useful map of the industrial terrain must include the "dense network of [bridges] by which firms are inter-related." (Baker, et. al., 2004, p. 4).

4.2.3 A formal model

Following Gibbons, (2005); Baker, Gibbons, Murphy (2002; 2004; 2006), (henceforth BGM), let a single decision right that can be assigned to one of two risk-neutral parties, A and B. The parties have private (inalienable) benefits π_A and π_B, respectively, which depend on the state of nature s, drawn from the finite set S according to the probability density f(s). The states are observable but not verifiable by both parties. The benefits π_i depend also on the decision $d \in D$ which is chosen after the state *s* is revealed. The decision d is not contractible even after the state s is revealed. However, the *decision right* is contractible. For example, the decision on *how* to market pork, or *how* to lobby for pork producers, is not contractible, whereas it is contractible *who* will have the right to market pork, or *who* will do the lobbying.

The first-best state-contingent decision is given by:

$$d^{FB}(s) = \underset{d \in D}{argmax}\ \pi_A(d,s) + \pi_B(d,s) \tag{1}$$

This produces the total payoff in state s:

$$V^{FB}(s) = \pi_A(d^{FB}(s),s) + \pi_B(d^{FB}(s),s) \tag{2}$$

The expected payoff is given by taking expectations over states:

$$V^{FB}(s) = E_s[V^{FB}(s)]$$

The party that has the *decision right* will chose the decision d in such a way as to maximize its private benefit, without regard for the other party. Let party i have the decision right whereas party j does not. Party i's decision then will be given by:

$$d^*_i(s) = \underset{d \in D}{argmax}\ \pi_i(d,s) \tag{3}$$

This will produce the following total payoff in state s:

$$V^i(s) = \pi_A(d^*_i(s),s) + \pi_B(d^*_i(s),s) \tag{4}$$

The expected payoff is then:

$$V^i(s) = E_s[V^i(s)]$$

The decision is also not contractible ex-post, which implies that the parties can not negotiate ex-post by paying each other side-payments in order to take different decisions after state s is observed.

In this simple model, two governance structures are feasible: either party A or party B has the decision right. Party A should have the decision right if $V^A > V^B$, whereas party B should have it if $V^B > V^A$. Assuming that the parties' interests are not perfectly aligned, then none of the two governance structures can reach the first best. Then, the second best payoff under an one--shot game will be: $V^{SP} = \max\{V^A, V^B\} < V^{FB}$.

Although the above is true under a one-shot game, it is more realistic to expect (and try to model) a repeated game, where the parties learn and consider each other's reputation. This is the case of relational contracts.

4.2.4 Relational contracts

The optimum decision rule d^{RC} will be one that results into a sub-game perfect equilibrium of the repeated game:

$$V(d^{RC}(.))=E_s[\pi_A(d^{RC}(s),s)+ \pi_B(d^{RC}(s),s)]>V^{SP} \qquad (5)$$

Define here the *reneging temptation* R_i of party i as the difference in payoffs generated by the inteded decion d^{RC} and the self-interested decision d^*_i at each state s:

$$R_i(s)= \pi_i(d^*_i(s),s)-\pi_i(d^{RC}(s),s) \qquad (6)$$

Let us now allow for side payments after the state s is observed. Then we can envisage a situation where the parties can re-negotiate after the state is observed – hence the name of the model (*adaptation model*). Party j can pay party i in order to induce it to take a more favorable decision. It is then intuitive to expect that a relational contract is implementable if it generates enough benefits so that parties can always be induced to take the RC decisions and not-the self-interested ones. In other words, the RC must generate benefits that are at least as large as the decision maker's *reneging temptation*. If party i has the decision right, then the parties will implement decision $d^{RC}(.)$ if and only if (BGM):

$$R_i=\max_s R_i(s)\leq r^{-1} (V(d^{RC}(.))-V^{SP}) \qquad (7)$$

Where Ri is the *maximum reneging temptation* that party i faces over all states $s\in S$, r is the discount rate and $V(d^{RC}(.))-V^{SP})$ is the surplus generated by the relational contract over and above the surplus that would have been generated under the spot (short-sited) governance: $V^{SP}=\max\{V^A,V^B\}$.

In a more general model with many agents, and many decision rules many assets, and exogenous parameters, it can be shown that several governance structures are generated. Under certain sets of parameters, the spot governance is optimal. Under other sets of parameters, lateral integration, or forward integration may be optimal. Similarly, it can be shown that a number of parties can form a joint venture, or better a *reverse franchise,* where they transfer a set of decision rules to a third party or to a joint decision making body which operates under one-member one-vote rule, or one-pig one-vote, etc. Solving these models is beyond the scope of this paper. However, we can envisage several situations relevant to our discussion here.

Super farms. A party buys assets and decision rights and hires labor. Or can simply acquire decision rights over assets via a tenancy contract. This would result into a large non-integrated farm. It could be also that a downstream party acquires assets and decision rights upstream. This will be a vertically integrated firm, or a *franchise*.

Producer cooperative. Several parties transfer decision rights and assets upstream, via a certain decision rule: one-member one-vote.

Marketing order. A party acquires decision rights from a number of other parties as to marketing a product.

Several exogenous parameters can affect the generation of one versus another governance structure. For instance, certain path dependencies may create costs to some types of governance structures while they can generate cost savings to others. An environment of trust, and past experience over cooperation ease the way towards cooperative governance in some countries, whereas the opposite is true in countries where they have a history of conflict, mistrust or corruption.

Similarly, past legislation and collective action create lock-ins that make a loby organization, or a marketing order less costly in one situation than another.

5. Two Illustrative Examples

Below, we illustrate our arguments with the help of some illustrative examples: The Canadian What Board and the Danish cooperative system.

Example I: The Danish cooperative network.

Many social scientists (historians, economists, anthropologists, political scientists, sociologists) have been fascinated with the significance of the Danish cooperatives[2]. They all agree that the Danish cooperatives have contributed significantly to the development, success and survival of the Danish farms[3]. Below, we briefly illustrate the significance of the network (franchise) by exhibiting the structure and the benefits of the organization of the Danish pork industry. Following Karantininis (2006), we identify three tiers of organizations beyond the farm level: The cooperative, the federated structure and the policy network.

The cooperative

On July 14, 1887, five hundred farmers formed the first cooperative slaughterhouse in Horsens, Denmark. Today, 90% of all the pigs (a total of 22 million heads) in Denmark are slaughtered, processed and distributed by two cooperative slaughterhouses: Danish Crown (85%) and Tican (5%).

Danish Crown operates six state of the art slaughter facilities and is vertically integrated into a number of subsidiaries, many of whom are multinational entities. While hog producers remain autonomous in their primary production, the cooperatives coordinate the production, logistics, distribution and quality of the activities via relational contracts. They have established, for example, a "code of practice", where farmers who comply with certain quality and animal welfare standards receive a premium (Karantininis and Vestergaard Nielsen 2004). Similar contracts are in place for farmers who produce specialty pigs.

The federated cooperative structure

The Danish Bacon and Meat Council (DS) is a federative organization. It is, however, different from most traditional federated cooperative organizations, where the member organizations are usually cooperatives from the same level of production (for example retail cooperatives forming a federated procurement federation). The members of the Danish Bacon and Meat Council are not only the two slaughterhouses. Several other firms related to the pork chain participate as B-members (with no voting rights) .The A-members of the board are from Danish Crown and Tican.

DS has three main tasks: a. Research and development, covering all areas from primary production to slaughtering and processing, including breeding, feeding, housing systems, animal welfare, the environment, food safety, meat quality, and automation. b. Sales promotion and information. c. Service, disease prevention and control: health management, combating diseases, meat inspection, legal advice and market support.

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[2] To mention juts a few: Kindlemberger, 1958; Borish, 1991.
[3] Some researchers underline also the role of the Danish folke hoj skole, initiated and nourished by Grundvig during the end of the last century (Kindlemberger, Borish).

To facilitate these tasks, DS operates several committees and organizations. Furthermore, it is vertically integrated into breeding.

DS and its members constitute a solid inter-organizational network. In this, DS has a pivotal role in the coordination of the pork industry (Hobbs, 2001). DS has taken many initiatives. These initiatives are credible, as they develop trust by the customers, because they were undertaken by a recognized and representative industry-wide body. Also, these actions reduce agency costs since buyers of Danish pork do not need to undertake their own monitoring activities (Hobbs, 2001).

By undertaking these activities, directly or indirectly (through its subsidiaries), DS removes a large burden of transaction and agency costs from its member organizations. Many of these activities would otherwise have to be undertaken either by the slaughterhouses (for example R&D in processing, generic marketing and promotion, etc.), or by the farmers themselves.

Policy networks and board interlocks

Board interlocks are a striking phenomenon in the Danish pork industry. There are at least two levels of interlocks, at the pork industry level and at the agricultural sector level. The interlocked board members play a cooperating role, among others, of transferring information and monitoring the actions and performance of the other firms in the chain. In their "representational role" these board members represent the knowledge, and the values of the entire industry, and guarantee the continuity, legitimacy and homogeneity of values and ideas. The capabilities and social capital developed by these directors are valuable, non-tangible, non-copyable resources, and constitute a major source of the competitive advantage of this industry.

Path dependency and macroculture

After the severe decline of world wheat prices after 1870, Denmark turned from exporter to an importer of wheat (Kindleberger, 1951). Unlike Germany, France and Italy who pursued protectionist policy through export subsidies and tariffs, Denmark changed from an exporter of wheat into an importer. This happened at the same time that Danish agriculture turned from grains production to animal husbandry. It is in this time that the cooperative slaughterhouses and creameries emerged in Denmark.

Around the same time, in 1844, the "folk high school" movement originated in Denmark, by N.F.S. Grundtvig (Borish, 1991). The schools provided liberal education to mainly the rural population not in scientific agriculture per se, but instead in language, history, and economic life. The schools created a national awareness and strong social cohesion which contributed to the development of organizational knowledge and the development of a macroculture. These assisted to the organization of the strong cooperative movement (Kindleberger, 1951; Borish, 1991).

Example II: The Canadian Wheat Board

The Canadian Wheat Board (CWB) started in the 1930s as a result of war in Europe. Canadian farmers were called upon to produce grain to support Great Britain who was facing a number of financial constraints. In order to orderly manage the sale of wheat the Canadian government became directly involved in the sale, pricing, and marketing of wheat. Following World War II the CWB went through a period where its usefulness was questioned by the grain trade. However in 1945 the *Canadian Wheat Board Act* was passed that gave it permanent status. Initially the CWB focused on marketing wheat, but over the years barley and oats where added to the mandate. The CWB had a monopoly on the export of wheat, barley, and oats by 1950. By 2006, the CWB marketed wheat, durum, and barley to the export market and for domestic human

consumption (feed barley and feed wheat is marketed through a open market).[4] The CWB is the largest wheat exporter in the world.

The initial purpose of the CWB was to get a higher price for farmers, protect farmers against large international trading houses, and provide equity in delivery opportunities (Schmitz and Furtan). All of these activities are external to firm and as such are a form of bargaining or outsourcing for services. At the local level farmers developed a series of grain handling cooperatives which built elevators, inland terminals, and port terminals. The CWB had no physical an asset except the building in which it is housed. All CWB assets are in the form of human assets and the international networks which they developed.

The governance structure of the CWB was initially a board of government appointed Commissioners. The Commissioners were responsible to the Minister responsible for the CWB, which has been the Minister of Finance, Minister of trade, and Minister of Agriculture. In 2006 it is the Minister of Agriculture who speaks for the CWB in the Canadian Parliament. In 1996 the Commissioner model was replaced with a 15 member board of directors, 10 farmer elected and 5 (including the CEO) government appointed.

There a few unique features of the CWB legislation. First, the legislation made the CWB a state trading corporation with a monopoly on the exports and human consumption use of wheat, durum and barley. Second, the CWB was never audited by the Auditor General of Canada, unlike other state owned corporations until 2002. The CWB had some very favourable financing advantages provided by the federal government. These features were just part of the initial package and never really lobbied for in any manner by farmers.

The CWB is a type of *reverse franchise*. It is controlled by a group of farmers, all who have wheat, durum, and barley for export. The CWB does the bargaining for transportation services, port services and export price. In 1996, Kraft, Furtan and Tyrchniewicz showed that the CWB earned farmers an extra $13 to 20 per tonne premium for wheat, while Schmitz, Gray, Schmitz and Storey (1997) estimated the malt barley premium to be $70 per tonne. The CWB is a pure marketing board and passes all profits back to farmers. Gray has estimated that the cost of rail freight would increase by about $10 per tonne in the absence of the CWB bargaining power.

In the absence of the CWB wheat farmers would have to use a futures market contract to price their grain and have no bargaining agency to protect them from monopoly pricing on the part of rail ways. Farmers would either have to purchase such services from one of many providers or get larger and make such services in house.

6. Conclusions

The organization of primary agriculture is dependent upon whether the institutions of a country allow for reverse franchising by farmers. If the transaction costs of managing a farm can be minimized by farmers conducting a form of collective action, such as cooperatives, then the size of farms will be smaller. If farms have to make the products in the firm, which are subject to very large economies of scale than super farms will be the result. The key is the existence of institutions, such as collective action and property rights, that allow for the minimization of costs. For this reason the organization of primary agriculture is a public policy issue.

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[4] For a complete review of the history of the CWB see Schmitz and Furtan 2000.

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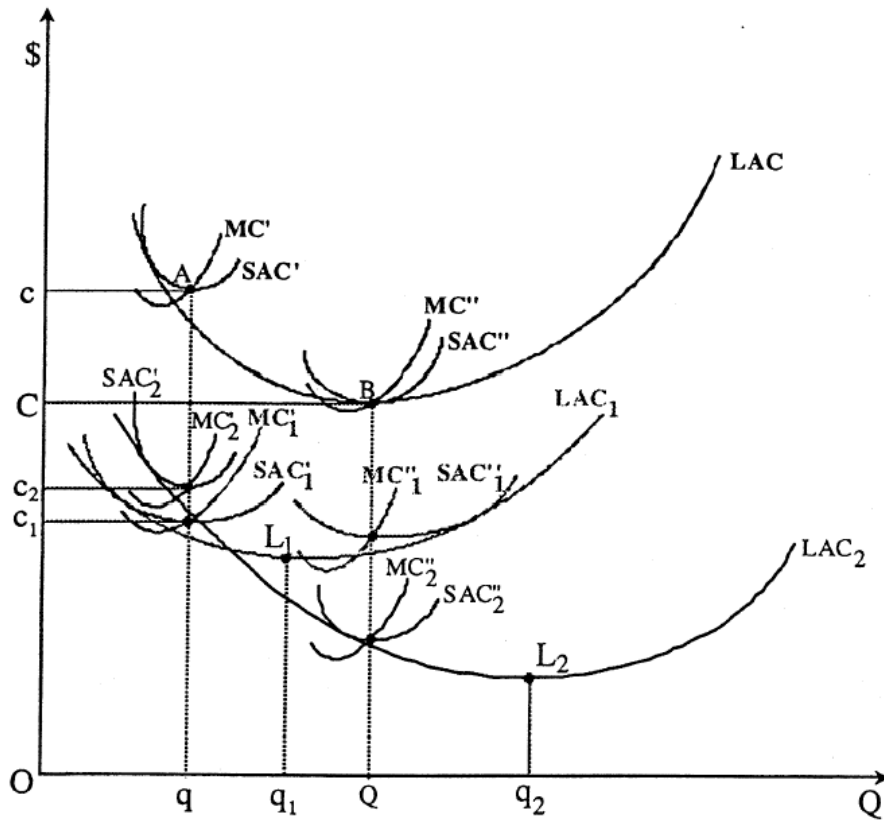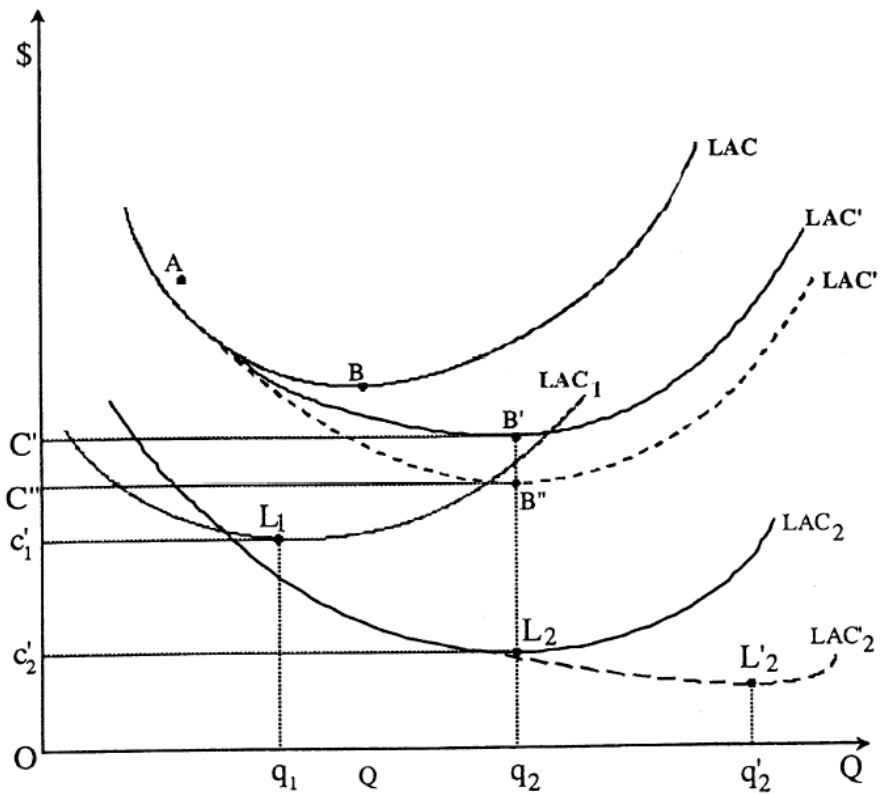
Figure 1. Economies of scale and vertical integration

Figure 2. Economies of scale and transactions costs.