

Dynamics of Network Governance: A Contribution to the Study of Complex Forms.¹

Decio Zylbersztajn

School of Economics and Business – University of São Paulo

e-mail: dezylber@usp.br

Elizabeth M. M. Q. Farina

School of Economics and Business – University of São Paulo

e-mail: emmqfari@usp.br

Abstract: The architecture of complex forms of governance is the focus of this paper. Networks are complex forms of organization designed to govern inter-firm transactions involving horizontal and vertical coordination. The choice among alternative institutional arrangements is affected by relation-specific investments, distributive mechanisms, and dynamic aspects based on relational contractual mechanisms, trust being relevant. The way in which horizontal and vertical coordination levels are connected is an important question. This paper recognizes that price incentives can keep networks structured in addition it introduces the effect of network externalities, offering likewise incentives. The paper presents a semi-formal model that considers the existence of network externalities and applies a game approach to explain the choice among alternative strategies. The concept is applied to two cases of network architecture in agro-industrial relations.

Key Words: Network governance, agro-industrial networks.

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1. Introduction.

The literature on network governance under-explores the choice among feasible alternative arrangements. There is not a clear-cut definition for the concept of network and the strategic choices involving allocation of decision rights among many agents is yet to be properly developed. Descriptive ad-hoc approaches of complex inter-firm relations are predominant and existing theories to explain hybrid organizations are under-utilized. Renaming old concepts and jargons seems to be the rule rather than applying existing theories of the firm to explain network arrangements. Little effort has been applied to explain the logic of network governance and the same applies to the empirical studies. In order to motivate the use of existing concepts, this paper proposes an explanation of network governance based on existing complementarities between transaction cost economics (TCE) and of incomplete contract (ICT) theories to explain strategic choices of complex institutional arrangements.

The focus of the study is the choice of coordination devices with the aim of augmenting the value of production, based on cooperation of independent agents in the presence of transaction-specific investments. From a TCE perspective the study employs the logic of efficient governance applied to vertical relations, considering bounded rationality and opportunism, both causing ex-post contractual hazards. From an ICT perspective the study utilizes the concepts based on the allocation of decision rights affecting the choice among alternative contractual arrangements, based on the relations between TCE and ICT as discussed in Brousseau and Fares (2000).

The key contribution of this paper relates to the connection between the horizontal and vertical coordination tools derived from the existence of co-specialized assets and network externalities. By connection we mean the allocation of decision rights and the different governance structure observed at different levels of coordination.

Mechanisms to control ex-post hazards are needed to implement joint strategies. Inter-firm governance mechanisms are needed to coordinate strategic decisions such as the definition of product quality and quantity, timing of delivery and brand specification, which result

from cooperation among independent agents operating at different levels of the network subject to the possibility of contractual hazards.

The resource-based perspective recognizes that dynamic aspects, like routines of specific nature, might evolve through time, and relational contracts affect the provision of institutional protection for ex-post hazards. The institutional environment is assumed to be exogenously determined.

This study is built on several previous contributions, particularly from Brousseau and Feres (op. cit.) and Lazzarini et al. (2001) who pose the concept of net-chain, and Sauvée (2001) who discusses networks as governance forms and distinguishes two institutional arrangements. This paper proposes a TCE-based explanation for the different features of network governance where vertical and horizontal coordination are simultaneously present and where relational aspects develop among agents. In addition this paper proposes an explanation for the choice of network arrangements in terms of their institutional architecture, opening room for empirical tests.

The study is organized as follows: Following this introduction, the second part discusses the concept of network governance. The third explores the contribution of existing theories of the firm to the study of networks and hybrid organizations. The fourth introduces a model to handle simultaneous vertical and horizontal coordination in the presence of co-specialized assets and network externalities. Part five presents evidences of cases based on the model to discuss the economic choice of alternative network arrangements and part six presents conclusive remarks.

2. About Networks.

What are networks and why do they emerge? In what dimensions do they differ from production chains? The term is applied with different meanings, usually relating to continuous relational contracts involving more than one agent. Menard (2002) defined network as "...all arrangements defining a set of recurrent contractual ties among autonomous firms." Diederer and Jonkers (2001) consider that "... a basic assumption of network relationships is that one party is dependent on the resources controlled by another and that there are gains to be had by the pooling of resources." The authors add "...the network is characterized by the specific properties of the transaction relationships, typified

by relational relationships in which formal and informal sharing and trust building mechanisms are crucial.” Omta, Trienekens and Beers (2001) suggest an alternative definition of network as “...the total of actors within one industry and/or between related industries, which can potentially work together to add value to customers.” Lazzarini et al. (op. cit), in shaping the concept of net-chain, distinguish network analysis from supply chain analysis, proposing that “...network analysis provides numerous tools to map the structure of inter-organizational relationships or ties based on the recognition that network structure contains and at the same time is shaped by firms’ actions.”

Sauvée (op. cit.) describes the literature of networks and suggests that this arrangement can be seen as a combination of governance structures, with multilevel relationships between horizontally or vertically related entities.

Claro (2004,p.37) defines network as “... the set of connected business relationships of an organization that can be separated in sub-groups and form essential sources of valuable information that offers benefits to buyer-supplier relationships in terms of internal processes, trade conditions and foreseeing actions of counterpart.”

The definitions point more or less to the same direction and most are not precise about the application of the concept and do not discuss its nature. The reason why networks emerge is still an open question. Part of the literature is directed to the application as can be seen on innovation networks (Pyka, 2002) or to agri-food networks (Sauvée, op. cit.). We sustain that a theory of network governance need to be further developed in order to allow the empirical analysis. Basically three elements are recurrent in the literature and are promising for empirical work. The first is the governance mechanism focusing efficiency based, the second, the allocation of decision rights (authority), and the third, the presence of trust and social embeddedness as treated by Granovetter (1985).

2.1. Distinctive Characteristics:

This paper is based on the following basic definitions: First, networks are defined as complex and multi-firm institutional arrangements designed to coordinate transactions in order to create and capture value, therefore the rational of efficient governance choice is elected. Second, inter-connected vertical and horizontal coordination of transactions are in place. Third, complex hybrid governance forms involving multiple agents, and multiple

periods are to be considered. Fourth, relational aspects, the role of trust and informal rules are potentially relevant. Reciprocal dependence and relational contracts are present. Fifth, strategies are jointly defined based on expected mutual gains and dispute-solving mechanisms are designed. Agents keep their identity, and define strategies ex-ante with some degree of cooperation sharing ex-post decision rights in different levels.

3. Relevant Theories of the Firm.

This section explores relevant elements of TCE and ICT. Both theories search for explanations for the same phenomena, namely the governance of vertical transactions. The first departs from the perspective of bounded rationality leading to the impossibility to draft complete contracts and raising the potential for ex-post hazards. In the presence of transaction costs and potential opportunistic behavior the institutional arrangement is designed considering the transaction-cost rational, as the explanation for the alignment between the characteristics of transactions and the governance mechanism (Williamson, 1975, 1985). Critics of TCE as Granovetter, point to limitations of the theory to embrace simultaneous complex transactions, added to the absence of social ties. Williamson (1993) reacts to Granovetter's criticisms by saying that network analysis is not beyond the reach of transaction cost economics and that the embeddedness argument is embraced by the theory. The ICT model calls attention to the impossibility to design complete contracts. Costly contracts result from the need to allocate two types of rights, specific and residual rights. The theory suggests that optimal ownership result from allocating both specific and residual rights in such a way that parties maximize the value of investments (Grossman and Hart, 1986; Hart, 1995). Grossman and Hart point to the missing issue in TCE by stating that: "...the TCE argument for integration does not explain how the scope for such (opportunistic) behavior changes when one of the self-interested owners becomes equally self-interested employee of the other owner." The same authors also criticize the lack of clear definition of integration itself, focusing the theory on the decision of integration in terms of ownership of assets, therefore the definition of firms as "a firm consists of those assets that it owns or over which it has control."

The debate between both approaches is still inconclusive. ICT cannot be seen just as a formalization of TCE, since the theories differ in assumptions and also in scope and

application. Both depart from the same consideration of contract incompleteness but with a distinct nature. For ICT it is not possible to contract ex-ante since some attributes are observable but not perfectly verifiable. The ICT model embraces both vertical and horizontal coordination while TCE places its focus on vertical coordination. As stated by Hart (op. cit.) both are close approaches, but ICT puts more emphasis on power in the form of allocation of decision rights. Second, as stated by Brousseau (2000), the differences are tangible in terms of assumptions about the causes of contractual incompleteness, to which we add the focus of TCE on vertical coordination while ICT considers lateral integration as well, as stated by Grossman and Hart (op. cit, p.695).

The dynamic capabilities perspective (DCP) as posed by Teece (1997), also contributes to explain network arrangements. The author says “ whereas the resources approach sees rents as originating from difficulty to imitate specific resources, the DCP inquires how resources are transformed into firm-specific capabilities.” Basically this study uses the concept of organizational capabilities as a source of rents where learning and complementary assets are added to transaction-cost-saving incentives.

4. A Model of Network Governance.

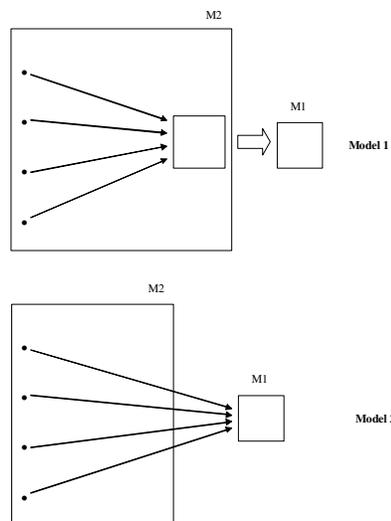
The present study explores the interfaces of the capabilities approach, ICT and TCE. The model is inspired on the literature of Incomplete Contract Theory, which is limited to deal with network governance, due to the treatment given to both the ex-post contractual flexibility and the dynamic aspects. As proposed by Gibbons (2002), “...one still hears mistaken views over what different theories actually say ...mistaken views as Grossman and Hart (1986) formalized Williamson (1986), in spite of the clear expositions by Whinston and others of the important differences between these theories.” As posed by Brousseau (op. cit.) the transaction cost approach deals with the contrasts between alternative institutional arrangements or, as Williamson calls it, discrete institutional analysis, but the theory does not perform well in dealing with individual contract design. The same author also considers the inability of ICT to deal with multiple institutional arrangements. On the other hand we add that ICT leaves no room for relational aspects to

evolve, allowing for the relaxation of the assumption of verifiability.² Even if reputation elements cannot eliminate all problems from opportunism, certainly reputation counts in some measure as a relevant governance mechanism. Nevertheless we maintain in this paper that the formalization effort present in the ICT-based literature can be an inspiration to TCE based studies.

4.1. Governance Decision at M_1 :

A proto-formalized model is developed in this chapter to capture complex governance mechanisms found in networks. The model is not general in the sense that it considers the case of specific network designed as a set of firms operating upstream (M_2), which supply a single firm downstream in a production chain. We assume that the final product has quality characteristics that demand both horizontal and vertical coordination to be produced, maintained and delivered. The production of quantity and quality attributes at M_2 depends on the design of the collective arrangement and we assume the presence of sub-activity in costs. The quality and quantity levels of production (Q) are verifiable and observable at both production stages and can be affected by firms M_1 (downstream) and M_2 (upstream). Upstream firms at M_2 choose the governance structure, reduced in this model to whether or not to define a horizontal level of decision where the collective strategy is defined (figure 1).

Figure 1: Choices of Network Design



² Hart, pp.67 states that. [...to develop a theory of the firm, , one must analyze a situation where the first-best cannot be guaranteed, i.e. where reputation forces are not strong enough to eliminate all problems of opportunism.]

There are n firms operating at M_2 , which might make specific investments for horizontal coordination or otherwise, should negotiate on an individual basis with the firm downstream, being that the strategic choice. If firms at M_2 decide for the collective horizontal arrangement it will involve positive governance costs added to transaction specific investments. Negotiations will take place to define rights over the income flow generated through the sales of the production at M_1 , giving rise to potential hold up at M_1 . Therefore this model is seen as a governance choice based on efficiency criteria, considering transaction-cost-economizing incentives, where the network companies make investment decisions to produce quality and quantity aligned with distinct levels of transaction-specific investments.

As a result, the institutional arrangement should be architected to protect agents from ex-post hazards and quasi-rent expropriation³. The model allows for the definition of a complex hybrid organization governance form that simultaneously defines horizontal and vertical coordination mechanisms in the presence of specific investments.

The decision problem, as stated, represents the typical agriculture-industry relation, given the characteristic many agents geographically dispersed and the market structure of agriculture production and food processing industries.

Consider a production network characterized by two groups of firms M_1 and M_2 , where M_2 is a set of n homogeneous and independent firms supplying M_1 with an amount Q_2 (equation 1) of an intermediary good. M_1 has no alternative option of suppliers but is willing to pay different rewards based on the high or low quality of Q_2 . Since quality is subject to variation, contracts are incomplete and it is not possible to define ex-ante the reward level, therefore P_2 will be defined after production of Q_1 takes place.

$$(1) M_2 = Q_2 \text{ and,}$$

$$(2) M_1 = Q_1.$$

³ We prefer not to call it a rent-seeking model as suggested by Gibbons(2002), in order to avoid confusion with the traditional use of this jargon, as worked in Krueger(1979).

Firms have some effect on the quality level of Q_2 , H or L, and define collectively the horizontal coordination devices to produce proportions of good/high quality, providing control mechanisms and penalties for under-performance or opportunistic behavior. The governance mechanism requires a level of specific investment at M_2 defined as $i(\cdot)$, where $i(H) > i(L)$. The managerial governance cost to produce $Q_2(H)$ is defined as $GC(H)$ ⁴. The level of transaction-specific investments at M_1 is given by $e(H)$ and $e(L)$. Therefore,

$$(3) Q_1 = Q_{1H} + Q_{1L} \text{ and,}$$

$$(4) Q_2 = Q_{2H} + Q_{2L}.$$

Production costs at M_2 are C_2 and present sub-additivity. The implication is that the sum of individual production costs is larger than the horizontally coordinated production costs, as expressed in equation (5). Sub-additivity is introduced to capture eventual network externalities.

$$(5) C_2(Q_2) < \sum_{i=1}^n C_{i2}.$$

The payoff of M_2 takes two different levels as a function of the quality supplied, $P_2(H) > P_2(L)$ being defined ex-post⁵. The model considers n periods in such a way that reputation mechanisms can evolve both on horizontal and vertical levels. The payoff level $P_2(L)$ can be obtained by direct trade without specific investments (i) with low managerial costs being the payoff for the strategy of commodity production.

Specific investments are made at t_0 by all firms. Production and trade are made at t_1 . Differently from the ICT model, here we consider that a long-term, incomplete contract be drafted, however ex-post hazards might take place, affecting both the total revenue and the share to be directed to each firm.

⁴ We assume that $C(H)$ is the same for M_1 and M_2 .

⁵ Contracts with ex-post price definition are common in agro-industrial supply relations.

M_1 chooses the level of specific investment defined as e , where $e(H) > e(L)$ if the downstream firm keeps efforts to maintain quality. The product quality level for the consumer results from independent efforts at both levels of the production chain. M_1 's net payoff is $P_1(H)$ or $P_1(L)$ for both cases and the surplus is shared between the agents under contract provided that quality is observable, verifiable, and that reputation mechanisms are in place.

Considering both production and governance costs at M_2 in the presence of network externalities and positive governance costs, we have:

$$(6) \quad GC + C_2(Q_2) < \sum_{i=1}^n C_{i2}$$

The decision to implement a horizontal institutional arrangement aligned to the production of high quality depends on the contrast between the positive governance costs added to the production costs affected by network externalities, with the alternative institutional arrangement that has neither governance costs nor captures network externalities.

The definition of the institutional design at M_2 depends on the payoffs of high and low quality. The payoff functions for high and low quality is:

$$(7) \quad R_{1H} = P_{2H} \cdot Q_{2H} - i(H) - GC - C_2(Q_{2H}), \text{ and}$$

$$(8) \quad R_{2L} = P_{2L} \cdot Q_{2L} - C_2(Q_{2L}),^6 \text{ where } C_2(Q_{2L}) = \sum_{i=1} C_{i2}$$

In the presence of sub-activity $C_2(Q_{2H}) < C_2(Q_{2L})$.

M_1 chooses high quality institutional arrangement if (7) > (8), or:

$$P_{2H}Q_{2H} - i(H) - GC - PCH > P_{2L}Q_{2L} - PCL, \text{ where } PCH = C_2(Q_{2H}) \text{ and } PCL = C_2(Q_{2L}).$$

⁶ For simplicity we are assuming that only high or low quality polar choices are made. Different proportions of high and low quality can be incorporated in the model.

Assuming that low and high quality production level are the same, and rewriting the inequality, we have:

$$(9) (P_{2H}-P_{2L}) + (P_{CL}-P_{CH}) > [GC(H)+i(H)] / Q_2$$

On the left side, the first term represents the price premium received for the high quality product. The second term captures the effect of sub-additivity and represents a premium due to the potential cost reduction associated with the horizontal coordination. The right hand side represents the average cost to produce high quality, which includes governance costs and transaction-specific investments.

Equation (9) is useful in understanding the decision of agents at M_1 , in a typical institutional comparative perspective. It also says that in the presence of strong network externalities, even with no price premium, the agents at M_1 might choose the institutional arrangement of high quality. This model explains the existence of production networks where no price premiums are observed at M_2 level.⁷

4.2. Role of Co-Specialized Assets:

Relational aspects are relevant in network analysis. The value of specific investments might be affected by dynamic effects that have origin in the generation of joint knowledge of agents at M_1 and M_2 . Co-specialized assets might appear and quasi-rents can emerge from the interaction and dependence of specialized independent agents.

In order to capture the dynamic aspects, consider a game where M_1 has a choice of e (level of transaction specific investment) and M_2 agents have a choice of i . The payoff matrix represents different outcomes provided that M_1 and M_2 make simultaneous and independent decisions.

⁷ Organic food and genetic modified free grains are good examples.

Figure 2 - Specific Investment Decision – Pay-off Matrix

		M ₂	
		i	
M ₁ e		L	H
		L	(0,0)
H	(0,0)	(R _{2H} , R _{1H})	

If neither makes specific investments, only normal commodity profits are realized. If M₂ makes no specific investments M₁ has no supply of good quality inputs (from bad grapes no good wine can be produced). If M₂ produces high quality but M₁ does not, since prices are defined ex-post and no premium will be placed on the product, M₂ will suffer a loss (the sum of governance costs and specific investments). The game presents a Nash solution of high quality without dominant strategy.

The solution is sensible to the introduction of opportunistic appropriation of quasi-rents. Specific investments and governance costs are kept at M₂, where this decision is dependent on the past behavior of M₁. So,

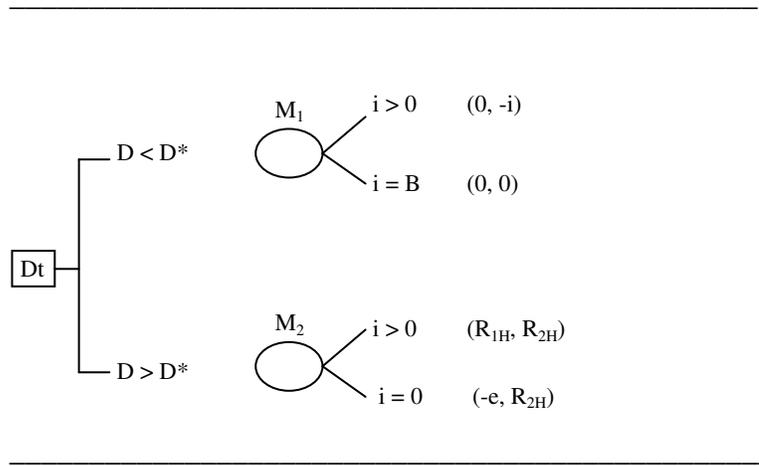
$$it = 0 \quad \text{if} \quad Dt - l < D^*$$

$$it > 0 \quad \text{if} \quad Dt - l > D^*$$

$$(10) D = (P_{2H} - P_{2L})$$

Take the decision tree represented in figure 3. Consider that both M₁ and M₂ can break the agreement. Define D as being the price premium, which is defined ex-post by M₁.

Figure 3 – Price Premium and Investments Decision Tree



If M_1 pays a low premium at t_0 , then agents at M_2 make no investments at t_1 , since it will lead to negative payoff. If M_1 pays a positive premium, M_2 might take two decisions, one is to match with positive specific investments, making possible a positive payoff for both (R_{1H}, R_{2H}) . But it is possible that M_2 cheats at t_1 , capturing the quasi rents $R_{2H}+i$, leaving M_1 with a loss of e . If we consider an infinite horizon, reputation effects will preclude this solution on a collective basis, but each participant at M_1 has incentives to cheat, so the horizontal coordination must be designed to monitor and exclude this behavior.

Dynamic effects might appear if joint specific investments show complementarities. This effect can be captured by the reduction in governance costs through time, as in:

$$(11) \quad GC_t = f(i(H), e(H)) \text{ where, } \frac{\partial GC}{\partial t} < 0.$$

If governance costs are reduced through time by learning and routines, it is possible that price premium becomes less important.

5. Empirical Evidences

Two case studies focused on network arrangements are examined under the lenses offered by the model, namely IllyCafè, an Italian coffee roaster company and Horti&Arte, an

organic production of vegetables in Brazil. IllyCafè is located in Trieste, Italy. Two versions of IllyCafè case have been developed. The first by Zylbersztajn and Neves (1997) and a second version revisited the company, made by Neves, Saes and Rezende (2002). Both studies presented IllyCafè as a network operating in many countries coordinated by the industry and coordinating a large number of specialized coffee farmers supplying high quality coffee grain. It represents a case in which farmers have no horizontal governance structure to coordinate activities at M_2 , each acting individually. About 50% of the procurement of high quality coffee grains to supply the industry is made in Brazil. The company offers price premiums and annual awards to incentive top-level coffee growers to make specific investments to up-grade the quality of high quality coffee. The award carries a high reputation to the winner, with expected effects in the market exceeding the specific transaction with Illy. Each coffee grower trades independently with the industry in Italy (M_1). The institutional arrangement is provided by Illy, which monitors the quality level of the supplies, therefore no governance costs are allocated by farmers at M_2 . In alignment with the model, the award and the price premium are the incentive mechanisms. Only yearly short term contracts are in place. If Illy brakes promises paying no premium, no farmers will be motivated to make investments, therefore reputation effects are in place. Farmers must keep the effort in order to reach the quality level in order to have a new transaction in place. The industry bears internal governance costs represented by the structure to control quality attributes and exclusion for sub-performance is made just by the decision not to buy coffee from a specific farmer.

One observes no evidences of network externalities, no evidences of horizontal organization of farmers and total allocation of decision rights with the industry. Farmers make specific investments in order to up-grade the product quality and the industry makes specific investments to keep and upgrade quality.

A second case is explained by organic production in Brazil, based on two studies by Farina et al., 2002 and Rezende, 2003. Both are focused on fresh vegetables, which raise coordination problems due to high time-specificity. In Brazil organic agriculture is still restricted to regional niches, but in recent years it has attracted the interest of major supermarket chains, notably in São Paulo. A price premium has motivated new farmers to adopt the organic technology of production. As a result of the supply grown, price premium

has quickly vanished. Surprisingly supply has continued to grow, despite higher production and certification costs and lower price premiums. This is exactly the situation addressed by the model, since farmers have made investments in horizontal coordination mechanisms in the presence of network externalities.

Based on production practices that dispense agrochemicals and highly soluble fertilizers, organic agriculture aims to produce contamination-free food. Most organic farmers operate on a small scale in Brazil. The production is generally sold and/or processed by farmer associations to explore scale and scope economies, as well as to cope with network externalities at M_2 . The horizontal coordination of farmers involves high transaction costs, since there are horizontal interdependencies and incentives to free-rider behavior. One example of farmers association is Horta & Arte – the largest supplier of organic vegetables in Sao Paulo. In order for the product to be sold as organic, the farm must undergo a certification process, which includes a period of conversion to eliminate chemical residues from conventional agriculture. This is the major entry barrier in this market, because during this period there is a drop in production and the product cannot yet be sold with the margin of a differentiated price. This period is rather variable and, depending on the crop to be implanted and the history of the area, can take from 6 months to 2 years. For tomato, for example, this period is normally 6 months.

Horta & Arte contracts ex-ante the crop variety, the quantity, and the area to be cultivated. After the market sale, the farmer receives payment for the product he delivered, but in the case of surplus, the unsold product is discounted proportionally from each farmer. (Rezende, 2003:73) Therefore, farmers transfer to the association the right to allocate rewards from organic production. So the decision rights on the income flow are allocated with the organization at the first stage of production.

Geographical proximity among organic fresh vegetable farmers is important. Working in association one farmer heavily depends on his neighbor's strategies and behavior. If one of the farmers cheats and uses agrochemicals to increase production or productivity, the whole group can lose reputation and price premiums. If the water is contaminated with chemical residues from conventional farmers that are around, the whole group of organic farmers will lose. Because in Brazil the agronomic research for organic products is still incipient, the possibility of knowledge sharing among farmers is vital to achieve productivity

increases and to respond to the challenges of diseases. Therefore, geographic agglomeration of organic producers raises positive network externalities due to lower probability of water and soil contamination, development and transmission of agronomic knowledge, and easier cross monitoring to avoid opportunistic behavior – cost sub-additivity is present in the organic production, thus explaining the advantages of geographic proximity. However, they also decide to form associations to better explore those network externalities and to avoid risks of reputation losses. (Rezende, 2003:75-76). In other words farmers have chosen a particular governance structure in order to appropriate the positive network externalities, avoiding the negative ones. The appropriation of positive network externalities, as well as the exploration of scale and scope economies allow for advantages of organic production even if the price premium declines and reaches prices close to the conventional products, as has occurred in developed countries.

6. Conclusions.

Cases show evidences of two different network governance structures based on the existence of network externalities and governance costs of network arrangement. The allocation of authority as seen in the IllyCafè case follows the theoretical proposition while the repeated transactions structure opens room for dynamic elements based on reputation to affect the costs of transaction and therefore governance costs. The organic case shows a different design where governance costs are placed with farmers, including the allocation of decision rights to produce. Allocation of decision rights to exclude farmers for under-performance and price premium are placed at M2, while in the Illy case, it is placed at M1. Organic farmers show an unexpected tradeoff between lowering price premiums traded off by cost advantages provided by network externalities.

The model allows us to place testable hypotheses with regard to several strategic decisions:

- Whether there are incentives to make transaction-specific investments depends on both price premiums and network externalities.
- Price premiums are negatively correlated with network externalities and with possible dynamic effects from co-specialized assets that cause reductions in governance costs.

- Even in the absence of price premiums it is still possible to place incentives at M_2 for specific network arrangement.
- Governance costs might be counterbalanced by network externalities, and also by the evolution of inter-firm routines, which affect costs over time.

Opportunities for empirical analysis show good perspectives.

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