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DYNAMICS OF NETWORK GOVERNANCE: A CONTRIBUTION TO THE STUDY OF COMPLEX FORMS

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ABSTRACT

The focus of this paper is the architecture of complex forms of governance, specifically, the architecture of networks. A network is a complex form of organization designed to govern inter-firm transactions involving horizontal and vertical coordination. The agent´s choice among various institutional arrangements is affected by relation-specific investments, distributive mechanisms, and dynamic aspects based on relational contractual mechanisms, trust being a relevant variable. This paper investigates how horizontal and vertical coordination levels are connected. It recognizes that price incentives are important and introduces the effect of network externalities that also offer incentives. The paper presents a semiformal model that considers the existence of network externalities and applies a game approach to explain the choice among alternative strategies. The conceptual model is applied to two cases of network architecture in agro-industrial relations.

Keywords: Network governance, agro-industrial networks.

DINÂMICA DE GOVERNANÇA DE REDES: UMA CONTRIBUIÇÃO PARA O ESTUDO DE FORMAS COMPLEXAS

RESUMO

O foco deste artigo é a arquitetura de formas complexas de governança, especificamente, a arquitetura de redes. Uma rede é uma forma complexa de organização desenhada para governar transações inter-firmas envolvendo coordenação horizontal e vertical. A escolha do agente entre vários arranjos institucionais é afetada por investimentos específicos, mecanismos distributivos e aspectos dinâmicos baseados em mecanismos contratuais relacionais, sendo a confiança uma variável relevante. Este artigo investiga como os níveis horizontal e vertical de coordenação são conectados. Reconhece-se que os incentivos de preços são importantes, e introduz-se o efeito de externalidades de rede que também oferecem incentivos. O artigo apresenta um modelo semi-formalizado que considera a existência de externalidades de rede e aplica uma abordagem de jogo para explicar a escolha entre estratégias alternativas. O modelo conceitual é aplicado a dois casos de arquitetura de redes nas relações agroindustriais.

Palavras-Chave: Governança de rede, redes agroindustriais.

1. Introduction

The literature on network governance underexplores the choice among feasible alternative arrangements within this governance model. No clear-cut definition exists for the concept of network or the related strategic choices involving allocation of decision rights among many agents. Descriptive ad hoc approaches of complex inter-firm relations predominate, while existing theories explaining hybrid organizations remain underutilized. Renaming old concepts and jargon seems to be the rule in the literature, rather than applying existing theories of the firm to explain network arrangements. Theorists applied little effort to explain the logic of network governance, and the same applies to 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 and incomplete contract theory, demonstrating strategic choices among complex institutional arrangements[1].

This study focuses on the strategic choice of coordination devices with the aim of augmenting the value of production, and is based on the cooperation of independent agents in

[1] From now on, ICT and TCE will be used to replace Incomplete Contract Theory and Transaction Cost Economics, respectively.

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 of which cause ex-post contractual hazards. From an ICT perspective, the study utilizes concepts based on the allocation of decision rights affecting the choices made among alternative contractual arrangements, based on the relations between TCE and ICT as discussed in Brousseau and Fares (2000).

This paper's key contribution 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 structures observed at different levels of coordination.

In order to implement joint strategies, network strategists need to devise mechanisms to control ex-post hazards. Inter-firm governance mechanisms enable the coordination of strategic decisions such as definition of product quality and quantity, timing of delivery and brand specification, all of which result from cooperation among independent agents operating at different levels of the network, being the agents subject to the possibility of contractual hazards.

The resource-based perspective recognizes that dynamic aspects, like routines of a specific nature, might evolve over time, and that 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 Fares (2000), as well as Lazzarini, Chaddad and Cook (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, in which vertical and horizontal coordination are simultaneously present and where relational aspects develop among agents. In addition, this paper proposes an explanation of possible 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 section introduces a model for handling simultaneous vertical and horizontal coordination in the presence of co-specialized assets and network externalities. Part five presents evidence from

cases based on this model in order to discuss the efficient 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." Diederen 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, Chaddad and Cook (2001), 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 (2001) 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 in more or less the same direction. Most are not precise about the application of the concept and fail to discuss its nature. The reason why networks emerge remains an open question. Part of the literature is directed to the application as can be seen in innovation networks (PYKA, 2002) or to agri-food networks (SAUVÉE, 2001). We maintain that a theory of network governance must be further developed in order to allow empirical analysis. Basically, three recurring elements in the literature hold promise for empirical work.

The first is the governance mechanism focusing efficiency based on transaction cost rationale; 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 principles: First, networks are defined as complex and multifirm institutional arrangements designed to coordinate transactions in order to create and capture value; therefore, we have elected the rationale of efficient governance choices. Second, interconnected vertical and horizontal coordination of transactions are in place. Third, complex hybrid governance forms involving multiple agents and multiple periods will be considered. Fourth, relational aspects, the role of trust and informal rules are potentially relevant given that reciprocal dependence and relational contracts are present. Fifth, this study will define strategies jointly, based on expected mutual gains, and design dispute-solving mechanisms. 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 of the same phenomenon, namely the governance of vertical transactions. The first explanation emerges from the perspective of bounded rationality, leading to the impossibility to draft complete contracts and raising the potential for ex-post hazards. With the presence of transaction costs and potential opportunistic behavior, the institutional arrangement is designed with the transaction-cost rationale in mind as the explanation for the alignment between transactional characteristics and the governance mechanism (WILLIAMSON, 1975, 1985). Critics of TCE, such as Granovetter, point to the theory's limited ability to embrace simultaneous complex transactions, as well as its lack of emphasis on 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 theory embraces the embeddedness argument.

The ICT model calls attention to the impossibility of designing complete contracts. Costly contracts result from the need to allocate two types of rights: specific and residual rights. The theory suggests that optimal ownership results from allocating both specific and residual rights in such a way that parties maximize the value of investments (GROSSMAN;

HART, 1986; HART, 1995). Grossman and Hart (1986) 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 become equally self-interested employee of the other owner." The same authors also criticize the lack of clear definition of *integration*, focusing on the decision to integrate vertically in terms of ownership of assets. Therefore, they say, the definition of *firm* emerges: "a firm consists of those assets that it owns or over which it has control."

The debate between these approaches is still inconclusive. ICT cannot be seen just as a formalization of TCE, since the theories differ in assumptions as well as scope and application. Both are based on the same consideration of contract incompleteness, but each treats this consideration distinctly. For ICT, it is not possible to contract ex-ante because 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 (1995), these approaches are closely related, but ICT puts more emphasis on power in the form of decision rights allocation. Second, as stated by Brousseau and Fares (2000), the differences are tangible in terms of assumptions about the causes of contractual incompleteness. We add to these noted distinctions that TCE focuses on vertical coordination, whereas ICT considers lateral integration as well, as stated by Grossman and Hart (1986, p.695).

The dynamic capabilities perspective (DCP), as posed by Teece, Pisano and Shuen (1997), also contributes to an explanation of network arrangements. The authors say, "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 interface of the capabilities approaches ICT and TCE. The model is inspired by the literature of Incomplete Contract Theory, which is limited to deal with network governance, due to the treatment given to both ex-post contractual flexibility and the dynamic aspects present in observed networks as learning and trust. 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 and Fares (2000), the transaction-cost approach deals with the contrast 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, and so it does not allow for the relaxation of the assumption of verifiability.[2] Even if reputation elements cannot eliminate all problems of opportunism, certainly reputation counts in some measure as a relevant governance mechanism. Nevertheless, we maintain in this paper that the formalization effort presented in the ICT-based literature can inspire TCE-based studies.

4.1 Governance Decision at M_1

A protoformalized model is developed in this chapter to capture the complex governance mechanisms found in networks. The model is not general in the sense that it considers the case of specific networks 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 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).

[2] Hart (1995, p. 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].

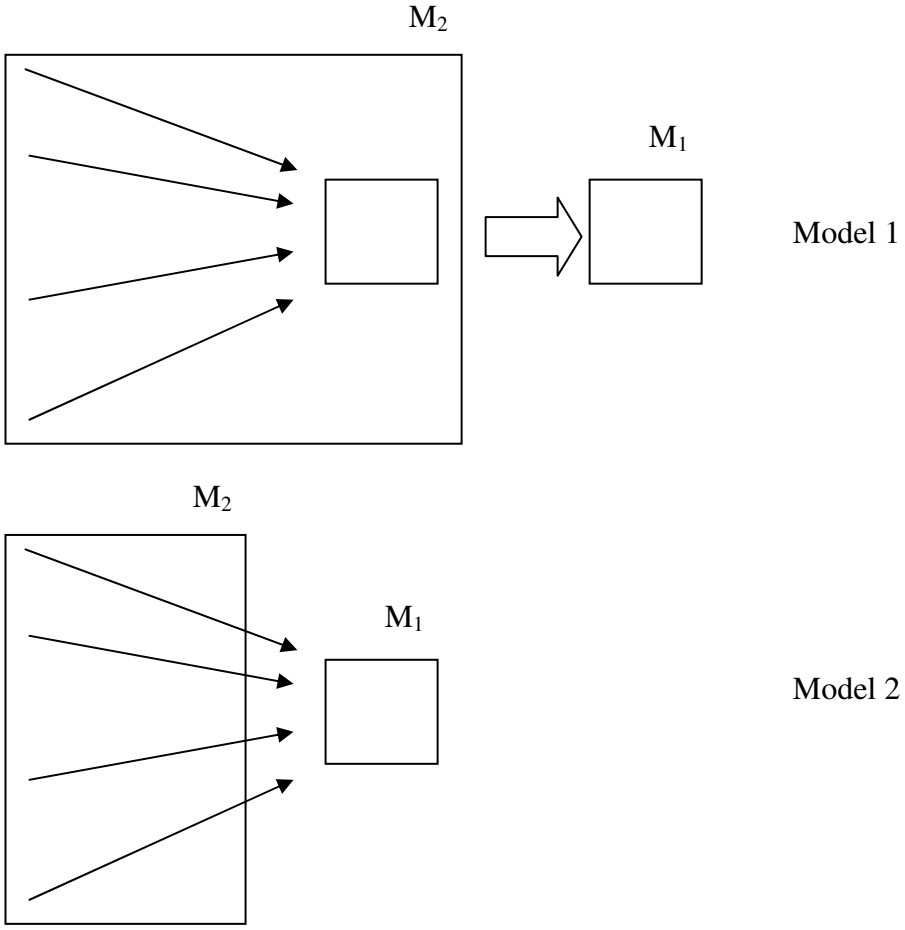

Figure 1 – Choices of Network Design

There are n firms operating at M_2, which might make specific investments for horizontal coordination or otherwise they negotiate on an individual basis with the firm downstream, that being 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 sales of the production at M_1, giving rise to potential holdup at M_1. Therefore, this model emerges 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 structured to protect agents from ex-post hazards and quasi-rent expropriation.[3] The model allows for the definition of a

[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).

complex hybrid 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 of many agents being geographically dispersed, as well as the market structure of the 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.

$$M_2 = Q_2 \text{ and,} \tag{1}$$

$$M_1 = Q_1 \tag{2}$$

Firms have some effect on the quality level of Q_2, H or L, and define collectively the horizontal coordination devices used to produce proportions of good/high quality, providing control mechanisms and penalties for underperformance or opportunistic behavior. The governance mechanism requires a level of specific investment at M_2 defined as i(.), 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,

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

$$Q_2 = Q_{2H} + Q_{2L} \tag{4}$$

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.

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

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

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-post.[5] The model considers n periods in such a way that reputation mechanisms can evolve on both 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.

All firms make specific investments at t_0. Production and trade are made at t_1. As opposed to the ICT model, here we consider that an incomplete, long-term contract be drafted; however, ex-post hazards might take place, affecting both the total revenue and the share to be directed to each firm.

M_1 chooses the level of specific investment defined as e, where $e(H) > e(L)$ if the downstream firm keeps up its 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 agents under contract share the surplus, provided that quality is observable and 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:

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

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 no governance costs and captures no network externalities.

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

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

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

$$R_{2L} = P_{2L} \,.\, Q_{2L} - C_2\,(Q_{2L}),^{6} \text{ where } C2\,(Q_{2L}) = \sum_{i=1}^{n} C_{i2} \tag{8}$$

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

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

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

Assuming that low- and high-quality production levels are identical, and rewriting the inequality, we have:

$$(P_{2H} - P_{2L}) + (PC_L - PC_H) > [GC(H) + i(H)] \,/\, Q_2 \tag{9}$$

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 from a typical comparative-institutional 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 in which no price premiums are observed at level M_2.[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 originate 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 wherein M_1 has a choice of e (level of transaction specific investment) and M_2 agents have a choice of i. The payoff matrix

[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.

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

represents different outcomes, provided that M_1 and M_2 make simultaneous and independent decisions.

M_1 e \ M_2 i	L	H
L	(0,0)	(0, - (i + GC))
H	(0,0)	(R_{2H}, R_{1H})

Framework 1 — Specific-Ivestment-Decision-Payoff Matrix

If neither makes specific investments, only normal commodity profits are realized. If M_2 makes no specific investments, M_1 has no supply of good-quality inputs (from bad grapes, no good wine can be produced). If M_2 produces high quality but M_1 does not, since prices are defined ex-post and no premium will be placed on the product, M_2 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 M_2, where this decision is dependent on the past behavior of M_1. So,

$$it = 0 \quad if \quad Dt\text{-}1 < D^*$$
$$it > 0 \quad if \quad Dt\text{-}1 > D^*$$
$$D = (P_{2H} - P_{2L}) \qquad (10)$$

Take the decision tree represented in figure 2. Consider that both M_1 and M_2 can break the agreement. Define D as being the price premium, which M_1 defines ex-post.

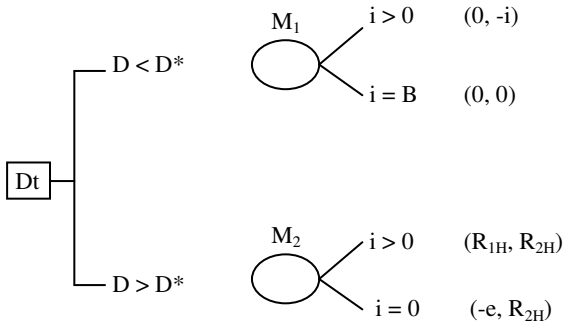

Figure 2 — Price Premium and Investments Decision Tree

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 require two decisions, one being to match with specific positive 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 specific joint investments show complementarities. This effect can be captured by the reduction in governance costs over time, as in

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

If governance costs are reduced over time by learning and routines, the importance of price premium might be reduced.

5. Empirical Evidence

Two case studies focused on network arrangements are here examined through the proposed model, namely IllyCafè, an Italian coffee roasting company, and Horta & Arte, an organic producer of vegetables in Brazil. IllyCafè is located in Trieste, Italy. Two versions of the IllyCafè case have been developed, the first by Zylbersztajn and Neves (1997) and the second 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 who supply high-quality coffee grain. IllyCafè represents a case in which farmers have no horizontal governance structure to coordinate activities at M_2, each farmer 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 incentivize top-level coffee growers to make specific investments to upgrade the caliber 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 breaks promises, paying no premium, no farmers will be motivated to make investments, and therefore reputation effects are set in place. Farmers must maintain their efforts in order to reach the quality level that allows them to have a new transaction in place. The industry bears internal governance costs represented by the structure, in order to control quality attributes, and exclusion for subperformance occurs simply through the decision of buyers not to buy coffee from a specific farmer.

One observes no evidence of network externalities, no evidence of horizontal organization of farmers, and total allocation of decision rights within the industry. Farmers make specific investments in order to upgrade their product quality, and the industry makes specific investments to keep and upgrade quality.

A second case, one involving organic production in Brazil, is based on two studies by Farina et al. (2002) and Rezende (2003). Both studies focus 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, most notably in São Paulo. A price premium has motivated new farmers to adopt organic-production technology. As a result of the supply growth, 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 adopted in this paper, 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 product 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. Horizontal coordination of farmers involves high transaction costs, in the presence of horizontal interdependencies and incentives encouraging free-rider behavior. One example of a farmers association is Horta & Arte—the largest supplier of organic vegetables in São 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 the farm experiences 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 planted and the history of the area, can take from six months to two years. For tomatoes, for example, this period is normally six 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, p. 73). Therefore, farmers transfer to the association the right to allocate rewards from organic production. The decision rights regarding income flow are allocated to the organization at the first stage of production.

Geographic 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 irrigation water is contaminated with chemical residues from surrounding conventional farms, the whole group of organic farmers will lose. Because agronomic research for organic products is still incipient in Brazil, the prospect of knowledge sharing among farmers is vital to achieving productivity increases and responding to the challenges of crop 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 organic production, which explains the advantages of geographic proximity. However, farmers also decide to form associations to better explore those network externalities and to avoid risks of reputation losses. 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, creates advantages in organic production, even if the price premium declines and reaches prices close to those of 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 wherein governance costs are placed with farmers, including the allocation of production decision rights. The allocation of decision rights to exclude farmers for underperformance and price premium are placed at M_2, whereas in the Illy case, they are placed at M_1. Organic farmers show an unexpected tradeoff between lowering price premiums and network externalities providing cost advantages.

The ICT-TCE interface model allows us to form testable hypotheses with regard to several strategic decisions:

- Whether or not incentives exist 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 arrangements.
- Governance costs might be counterbalanced by network externalities, and also by the evolution of interfirm routines, which affect costs over time.

Opportunities for empirical analysis reveal good prospects.

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