

Stability of Contracts in the Brazilian Wine Industry¹:
Improving quality attributes through chain coordination.

Decio Zylbersztajn
School of Economics and Business
University of São Paulo - Brazil
dzilbers@usp.br

Marcelo Miele
Department of Agriculture
State of Rio Grande do Sul - Brazil
mmiele@saa.rs.gov.br

August 06, 2001

¹ Authors would like to thank to Elizabeth Farina and James Wright, for the suggestions and reviews of an earlier version. Also we thank Dra. Loiva Maria de Mello Freire for providing access to the EMBRAPA database, at the Center for Research in Wines, Bento Gonçalves. The remaining errors and omissions are the exclusive responsibility of the authors.

Abstract

A variety of contracts between wineries and grapegrowers can be observed in the Brazilian principal production area. This study addresses the concept of coordination of food chains, particularly the stability of contractual relationships.

A qualitative analysis of contracts between the industry and farmers is presented, followed by a quantitative analysis testing transaction cost economics-based hypothesis. Scale, location, age of vineyard, and the cooperative organizational form are addressed in terms of the effect of the stability of contracts. Vertical and horizontal coordination are addressed.

A sample of 139 grapegrower and the 10 most important wineries provided the data. The results show that more stable contracts or vertical integration are characteristic of high quality wine production, where the need for strict contractual coordination is more relevant, i.e. risk of hold up losses is larger.

Site specificity and quality-related investments are associated with more stable contractual architectures. Farmers' cooperatives present poorer performance but tend to hold more stable relationships with their members. Adverse selection is present since specialized farmers prefer to maintain contracts with investor-owned wineries, instead of farmers' cooperatives. Conclusions are presented in the final part.

Key words: Stability of contracts, coordination, food quality.²

² This version was written for the Congress of the International Society for the New Institutional Economics, held in Berkeley-CA, September 2001. Not to be quoted without the permission of the authors.

Introduction:

Coordination of contractual relationships in the presence of specific assets is usually addressed in the literature on vertical integration or long-term contracts as presented in Klein (1978), Williamson (1985), and Joskov (1985). The literature on contracts has an unexplored dimension represented by the stability measures of the contractual relationship. Different from contract duration, stability relates to the frequency with which parties re-contract when alternatives are available.

The stability becomes still more relevant when the focus is the food chain. The reason is that this industry is undergoing deep institutional and organizational changes. Food safety and specific quality attributes are more pertinent today than in the past due to two factors. First, at the institutional environment level, liability related to consumer rights imposes the design of new tools to coordinate entire food chains. Second, at the institutional arrangement level, strategic alliances link specialized agents throughout the production and distribution chain. Firms have incentives to cooperate, sharing common goals and developing specific tacit knowledge, in order to assure a specific level of quality. Langlois (1992) considers the concept of chain analysis in his paper on capabilities.

The observation of strategies in the food industry points to the growing importance of quality-related aspects and, therefore, the need to architect stable contractual relationships among different and specialized agents, in the production and distribution chains.

Agro-food systems are characterized by a high level of asset specific investment. Changing quality standards, food safety concerns, time specifications, specific legislation protecting consumer rights, and environmental awareness are examples of why it is more difficult to rely on autonomous adaptations.

What makes the food industry particularly interesting to study is the fact that quality attributes are seldom one-dimensional, most of the time being the result of collaborative strategies involving several agents throughout the production and distribution chain. The design of a strictly-coordinated system of contracts (Zylbersztajn and Farina, 1999) is necessary in order to reach the desired quality attributes, whether in terms of food safety or other aspects demanded by consumers.

The wine industry is a good example of why strict coordination is necessary in order to transform the regional technical potential to produce high quality wines in real performance. As suggested by Goldberg and Daniels (1998) in the study of the Marquesi di Frescobaldi case of Chianti wines, the competitive structure of high quality wines tends to change rapidly worldwide. The successful example of Californian, Australian, and Chilean wines indicates that new organizational architectures are as important as specific regional characteristics in producing quality attributes. Both traditional countries and the new players have made significant investments in the high quality systems of wine production (Geene et al. 1999).

In some cases, the emergence of a wine industry in non-traditional countries has important social impacts, as in the example of the state

of Rio Grande do Sul, in Brazil, where 13 thousand small families are engaged in viticulture. The stability of such an industry is subject to different sources of disturbing impacts, ranging from the need to improve technology by the introduction of varietal high quality grapes (technical coordination), to fluctuations in exchange rates that tend to change the relative prices of imported substitutes, exposing farmers and industries to a risky environment, and also the need to build new coordination architectures among the agents of the production chain.

The organization of the Brazilian winery presents an interesting example to study strictly-coordinated food systems in search of quality improvement. The focus of the present paper is a particular dimension of the contractual analysis, namely the stability of contractual relationships between farmers and the wineries. The paper shows that, even lacking long time series data on contracts, it is still possible to test transaction cost-based hypothesis.

The paper is structured in five parts. Following this introduction the institutional environment and the institutional arrangement are described, always focused on the Brazilian emerging system of top-level varietal wines. The study explores the contrasts between the governance architecture adopted by low and top quality wine production. Special attention is given to the differences in the contractual architecture adopted by different agents engaged in the production of top quality wines, particularly the farmers' cooperatives, whose importance appears to have declined in recent years.

Part three introduces a discussion of chain coordination, especially focused on the recent literature, deriving the basic regularities expected to be found in the contracts between agents.

Part four presents the empirical analysis, first defining a proxy for contractual stability and then testing transaction cost-based explanatory variables, which are different measures of asset specific investments. In part five a conclusive discussion is presented. Extensions of the approach for addressing specific aspects of quality in the food industry are suggested.

2. Institutional Analysis:

2.1. Organization of the World Industry:

The production of specialty wines³ results from the existence of specific physical conditions characterized by climate and soils, added to the capacity to architect mechanisms that promote horizontal and vertical coordination of the production and distribution chain. The need to match both horizontal and vertical analysis jointly has been addressed by Lazzarini et al. (2000), presenting the concept of netchain analysis. The case of wine production and distribution is a good example of the concept based on the joint coordination of horizontal and vertical relationships.

Examples of such mechanisms are found in the traditional wine production areas, namely France and Italy, where the system of denomination of origin is based on federal legislation and

³ We define specialty wine as the product obtained under strict control of origin, based on classic traditional grape varieties.

international conventions. Studies by Chaucher et al. (1998) and Soler and Tanguy (1998) stress the need to promote cooperation in order to protect and appropriate the value of the final top quality product.

The latter authors consider that excessive price variation of the raw material related to instability in the vintage makes it difficult to implement a long-term policy related to prices and image of the product. The absence of cooperation is especially an obstacle to strategies with focus on quality.

In traditional producing countries the institutional environment shapes specific arrangements of the agents, with the predominance of small and family-owned vineyards, strong governmental regulation added to horizontal forms of organization. The French example of *Dénomination d'Origine Contrôlée* (DOC) and the inter-professional agreements are designed to control the supply of grapes, monitor quality, and therefore function as a device to control price fluctuation. For Soler and Tanguy (*op. cit.*), the agreements do not emerge spontaneously, but have been strongly affected by the government policies.

European agriculture policy (PAC) also affects the world wine industry. The budget to support the industry doubled between 1990 and 1995, reaching 5% of the total budget of the community agricultural program (Lapolli et al.1995).

In Europe the classic varieties are not expanding, due to control mechanisms provided by the system of DOC (Rabobank, 1996). However, the production of classic varieties is growing elsewhere, as can be seen in Australia and USA where the market structure of

production is much more concentrated than in Europe, both at the farm level as well as in the processing industry. The result is that private coordination mechanisms are more important with long-term contracts or vertical integration. In USA about 50% of the wine production is made under vertically integrated governance (Rabobank, op. cit.) or long-term contracts ranging from 5 to 30 years.

As stated by Frank and Henderson (1992), the US wine production system was based predominantly on long-term contracts (41%), followed by vertical integration (27%), and the remaining 32% on market coordination.

2.2: Organization of the Brazilian Industry:

Winery was introduced in Brazil by the Portuguese colonization, but only at the beginning of XX century was it organized by the Italian immigrants that settled in the State of Rio Grande do Sul. During the 30s the producers' union (Sindicato Vitivinícola do Rio Grande do Sul) was organized under strong governmental influence, being allowed the monopoly of the wine commerce for the domestic market (Jafim, 1991). It has been followed by the first independent association of producers, which deepened the role of coordination in terms of standards and technological innovation. The Brazilian structure of production is more like the European, based on small vineyards, in contrast with the larger scale seen in USA or Australia. The development of the industry shaped the organization found nowadays, in which 90% of the production is made on 13 thousand small farms. The production of grapes is directed to the market of

juice or to the production of wines, while production for fresh consumption is organized in the warmer regions, especially in the northeast area under irrigation (table 1).

<table 1 – insert here>

The wine industry is being challenged by several factors. First, the declining production of classic varieties causes a problem of stability in the supply of good quality grapes to the industry. Between 1990 and 1997 about one thousand farmers are reported to have left the activity (Miele, 2001). Second is a persistent problem of horizontal coordination and controls, due to the opportunistic behavior of some firms, represented by the addition of other products to the wine. Cheating is possible since the monitoring costs are high, no central authority is “de facto” responsible for the control, leading to a problem, where good and bad quality products dispute the market place. Third, the climate in Rio Grande do Sul is at the margin to allow for regularity in quality attributes, with implications for the farmers who make specific investments in classical varieties under risky conditions. Fourth, the absence of specific legislation for denomination of origin does not provide incentives for farmers to make quality-related specific investments. Fifth is the high level of interest rates, precluding the intentions of farmers to reform their vineyards. Sixth is the absence of a system to monitor quality with power to exclude underscored production, and seventh is the high cost of inputs due to the small scale of production.

The Brazilian production system involves 13 thousand small vineyards with an average scale of 1.9 hectares with a production of 385 million tons of grapes in 1999, 14% of which are classical vinifera varieties. The traditional production area is located in the mountains of (the Serra Gaúcha viticultural region, State of) Rio Grande do Sul, with very irregular topography, imposing difficulties to the introduction of mechanization. New, flatter (therefore appropriate for mechanization) areas are located further south, and are being developed and explored by large multinational companies, characterized by larger scales.

The wineries are organized as 276 processing industries, 22 farmers' cooperatives, and 133 small winegrowers, exploring small scale, family-made wines, some with well-recognized local brands. Winegrowers are exploring a diversified set of activities, including restaurants and rural tourism.

Based on official data, 8 among the 22 farmers' cooperatives and 63 among the 276 industries are producing wines from classic varieties, showing a reduction in the participation of cooperatives and an increase in investment-owned firms (table 2).

<table 2 – insert here>

Total wine production in 1999 was 311 million liters, of which 15% was from classical vinifera varieties. The industry shows a highly heterogeneous technological level, with a declining number of cooperatives, exports increasing amounts of low value-added grape juice, and an increase in domestic demand for fine wines.

This situation leads to a natural question: how to develop incentives for the improvement of local production of classic wines, considering the obstacles introduced previously. If, on one hand, technology adoption is important, this paper suggests that coordination tools must be considered relevant in order to transform potential into real market participation. This specific aspect will be addressed in the following chapter.

3. Coordination Aspects:

3.1. Coordination in food systems:

The original literature on food chain coordination relies on price coordination. Such was the focus of the study of Davis and Goldberg (1957) and the followers, at the Harvard school. The literature on contractual coordination applied to agro-food systems replaced the price-based approach, and has grown steadily, both theoretically and empirically. With different degrees of quantitative formalization, Jones (1971, apud Spurlender, 1992) discusses the process of industrialization of agriculture, introducing a classification of coordination based on the degree of control the industry has over the farmer. Studying the hog industry in USA, Lawrence et al. (1997) discusses the relationships between pig farmers and the processing industry, stressing the role of risk and quality as the motivation for coordination. Mariotti and Cainarca (1986), Frank and Henderson (op. cit.), and Barkema (1993) deepen the discussion on coordination and present a classification of vertical coordination structure in US agriculture. Menard (1996),

studying poultry production in France, discusses three types of governance forms, namely a horizontal network of poultry farmers, a cooperative of poultry farmers, and vertical integration. Brousseau and Codron (1997) discusses the harmonization between supply and demand for fresh fruits, considering both quantity and quality as the incentive for contracts between supermarkets and traders of perishable products in France. Sauvèe (1998) presents a wide literature review on transaction cost economics and agro-food coordination. Zylbersztajn and Farina (op. cit.) introduced the concept of strictly coordinated supply system based on the classification proposed by Williamson (op. cit.), related to contract coordination. Lazzarini, Chaddad, and Cook (op. cit.) introduced the concept of netchain analysis, which explores both horizontal and vertical analysis for chain coordination, not necessarily limited to agro-food systems.

The convergence of the literature relies on the motivation for contracts replacing markets, due to risk management and contractual hold-up in the presence of specific investments. As stated by Spolender (op. cit.), provided a particular situation, the decision that must be considered is weaker cost control against lessened holdup possibilities.

Studies applied to the wine industry can be found in Giraud-Héraud et al. (1998), which discusses the regulation of the production, with emphasis on the problem of contractual breaches. In a similar approach, Soler and Tanguy (op. cit.) discuss the incentives present in the French wine industry. The authors point out that the common

element of the world wine industry is the increasing interdependency between grapegrowers, wineries, and distribution.

In the literature applied to the Brazilian wine industry, most of the studies are related to production cost analysis and industrial organization, as in Lapolli et al. (op. cit.), Mattuella and Rohr (1993), and Souza (1994). The only institutional analysis is by Chaddad (1996), on the legislation of denomination of origin.

3.2. Institutional Arrangement of the Brazilian Wine Industry

The existence of two distinct sub-systems in the Brazilian wine industry is an important aspect in shaping the private strategies focused on quality. Specialty wines demand strictly-coordinated systems of transactions in order to fulfill the quality needs of the wineries, which are tied to distributors through long-term contracts. Some specific features of the industry are germane to this study.

Asset Specific Investments: In order to architect contract arrangements capable of coordinating the production and distribution of high quality wines, specific investments must be made by specialized agents through the production and distribution chain. New equipment is demanded by the processing industry, followed by specific investments in brand development, which in the Brazilian case is not supported by a legislation of denomination of origin. Vineyards should make new investments in classic varieties, and also in human capital upgrading related to best agronomic practices and managerial skills.

For the farmers, the specific investment will have a much lower value than the alternative allocation, which is production of unbranded bulk wine or selling to the growing grape industry.

For the industry, investments in equipment and brand development, especially related to the establishment of long-term relationships with the supermarket channel, are necessary in order to guarantee specific signals from final consumers, transmitted through the retail chains.

Site and time specificity are relevant, since many contracts must be coordinated with a large number of small farmers and because the product is highly perishable, leaving a narrow flexibility window between harvest and processing.

Risk: Local climatic conditions of rain and other natural characteristics can be adverse to maintaining stable quantity and quality of vintages. This introduces a risk element that must be considered in the design of the contractual relationships between farmers and industry.

Land Ownership Structure: Land tenure is based on small family-owned and managed vineyards. This aspect, added to the hilly geographical characteristics, precludes the exploration of scale, which requires different organization between farmers and industries.

Departing from the institutional characteristics, transaction cost considerations suggest the need for strictly-coordinated contracts, in order to protect the value of specific investments. Table 4 provides

the expected governance alignment considering both farmer and industry perspectives.

The theory suggests the existence of vertical integration or long-term contracts to cope with the characteristics of transactions, which is in accordance with the observed institutional arrangements. A number of small winegrowers are forward integrated into distribution, with their own brands offering their small-scale production for tourists and local supermarkets. Small farmers also tend to show forward integration through cooperatives, improving the ability to coordinate the production both horizontally and vertically. Long-term contracts are difficult to set, due to the high instability in the farmers' production, therefore they are replaced by annual recursive contracts.

< insert table 3 >

Table 3 contains information on the institutional arrangement found in the 10 wineries studied. The total production represents 41.2% of the procurement of quality wine-grapes in 1999. Three different institutional arrangements can be seen, namely cooperatives, vertically-integrated companies, and market transactions, the supply being complemented by annual contracts between growers and wineries. Cooperatives are showing poor performance and the data suggest a declining participation in the industry. Different degrees of backward integration into grape production can be found, ranging from zero to 92.6%. Market transactions complement the supply needs of the wineries.

Cooperatives are important forms for architecting vertical and horizontal relationships. If, on the one hand, important improvements in horizontal and vertical coordination can be provided by marketing cooperatives, other costs tend to emerge, mostly related to governance and capital allocation (Cook, 1994).

3.3. Incentives and Monitoring:

Different devices have been introduced in order to provide incentives for quality enhancement. Payment for quality attributes is one, based on the sugar content, the maturity stage of grapes, the sanitary conditions, and the acidity of the product. Other aspects are important, such as the historic files of farmers with details on the mode of transportation, cultivation technology, and storage conditions, also kept by the industries, introducing important reputational elements in the contract.

Most of the wineries provide technical assistance to farmers, as a way to maintain long-term informal contracts with important suppliers. This incentive provides relevant information about the adoption of good practices by farmers. Table 4 provides the goals of each of the 10 wineries studied, and the incentive mechanisms built in to the contracts with suppliers, in terms of price differentials, controls, monitoring, technical assistance, and supply of clone seedlings.

<insert table 4>

Even with the incentives provided by the wineries, the production of varietal clones is declining in 5 of the 10 industries. The largest decline appears in farmers' cooperatives. Winery A has shown a decline of 35% in processing, contrasting the period of 90-93 with 94-99. This specific company does not adopt incentive mechanisms of price and quality and is showing signs of moving to low quality, commodity wine, sourcing the product from other wineries.

On the other hand, the wineries that have shown increases in production are the most vertically-integrated and those that adopt incentives to maintain stable relationships with farmers.

Provided that the qualitative analysis indicated the importance of specific investments associated to incentive standards or other mechanisms for vertical integration, the next part of the paper will search for quantitative evidence on the stability of contractual relationships between farmers and wineries.

4. Empirical Analysis:

We apply a simple regression model to relate a proxy for stability of the transaction between the vineyard and the processing winery. The idea is to capture the average frequency of the contracts among the same agents considering the period of five years (t), the 10 wineries (j), and a sample of 136 farmers (i), taking into account that the vineyards are free to renegotiate the annual contracts at the end of each period. In this way, we are capturing the effects of explanatory variables on the farmers' decision to re-contract with different wineries.

4.1: Description of the variables:

We defined MSV as the average of vintages made between a farmer and a winery within the sample of 10. The variable MSV is defined by the ratio b/a , a being the number of wineries contracted during the five-year period, and b being the total number of transactions (sequential or not) made by the farmer with the high quality wineries. The dependent variable is a proxy for stability of the transaction. Therefore the following definition holds:

$MSV = b/a$, where $1 < a < n$, and $1 < b < 5$, with n being the total number of wineries.

Since we have five years of observations,

$b = 5$ if the farmer transacts with a different winery each year, and

$b = 1$ if the farmer chooses a single winery.

In this way, $n =$ the number of wineries and can exceed 10, since farmers can supply any winery in the market. However the number usually varies between 3 and 4 during the five-year period.

MSV captures the average number of transactions, sequential or not, ranging from 5, if the farmer re-contracts with the same industry during the five years, to 1, if the farmer contracted a different industry each year. We named this dependent variable the mean vintages per vineyard.

The dependent variable is based on the observation of transactions between farmer i and winery j , in year t . For each farmer the average of vintages per winery was calculated.

Explanatory variables are different measures of asset specificity, namely:

Age of vineyard: The age is directly related to the quality of the product. The local research station specializing in grape and wine research suggests that the first economic vintage should be made on the fourth year, but the quality improves after the 6th year. The production period lasts until the 15th year and the highest quality of the product is expected to be reached between year 6 and 15. In order to capture this condition, a quadratic function was defined as:

$K_t = a + b.ivt + c.ivt^2$, where ivt is the age of the vineyard.

Distance (dmv): This variable captures the existence of site specificity and measures its effect on the frequency of the contract. A table of distances between the specific vineyard and the industry has been calculated. Standard distance logistics softwares could not be used for this purpose, since our intent is to measure the distance between the specific farm and the vineyard, and the softwares offer only distances between cities. The dmv variable was defined based on the distances table.

Size (apv): This variable intends to capture the effect of winery scale on the stability of the transaction. Scale here is measured by the annual production of the winery.

Cooperative (dc): Due to the importance of farmers' cooperatives in Brazilian agro-food industry and specifically the results of the qualitative analysis, which indicated the declining importance of cooperatives in the wine industry, a dummy variable has been defined, in order to capture the relationships between the farmer and the cooperative in terms of the frequency of the contractual relationship. Since farmers tend to transact with more than one industry, the dummy is considered to equal 1, if the largest vintage in the five-year period was made with a cooperative.

4.2: TCE-based Hypothesis:

A simple multiple regression model has been run, defined as follows:

$$MSV = a + b \text{ ivt} + c \text{ ivt}^2 + d \text{ dmv} + e \text{ dc} + f \text{ scale} + u ,$$

where u denotes the error term with the well-behaved characteristics assumed. Based on the theory, we can define some hypotheses on the effects of the explanatory variables on transaction stability, measured in terms of msv .

The variable ivt captures the asset specific investment related to the vineyard age, and it is expected that the range between 6 and 15 years should relate positively to the dependent variable and negatively outside. We expect that wineries prefer to re-contract with vineyards that are more likely to offer good quality grapes, in the age range defined above. Too young or too old vineyards are not expected to offer the desirable quality to produce fine wines. It

therefore follows that b is expected to be positive and c should be negative, indicating the shape of the quadratic function.

The distance variable, dmv , is expected to be negatively related to stability, since the larger the distance, the larger the risk exposure during the transportation of the grapes from the fields to the industry. Therefore, this variable captures the effect of perishability, very common in some food industries, resulting in the expectation of a negative effect on the dependent variable.

The dummy to capture the cooperative effect must be carefully considered. On the one hand, since the farmers are owners of the cooperative, a more stable relationship is expected in this type of organization in contrast with non-cooperatives. On the other hand, the qualitative analysis suggests that the number of cooperatives is declining in importance, specifically the ones engaged in the production of fine wines. As can be observed in many other food industries in Brazil, the relative importance of farmers' cooperatives is declining, especially in the production of differentiated products.

As a result, one can expect that the best farmers have left the cooperative system, preferring the investor-owned industries, which offer extra incentives in the presence of quality attributes. So, adverse selection applies, with the remaining farmers expected to hold stable relationships with the cooperative. Another argument to support a positive relationship between farmer members and the cooperative has to do with the strong commitment to the cooperative, based on tradition and ideological incentives. So, the members feel like real owners, and therefore prefer to trade with

their cooperative, resulting in an expected positive sign for parameter e.

Scale of production is expected to be negatively related to quality. This is associated to the difficulty in coordinating a large number of small suppliers and controlling quality attributes. The smaller wineries, mostly vertically integrated backwards, are expected to show better capacity to coordinate the production to reach specific quality attributes. Therefore we expect that the smaller the winery is, the higher the incentives to keep stable relationships and re-contract.

In summary, the following signs are expected for the estimated parameters b, c, d, e, and f.

<Insert table 5>

4.3. Empirical Results and Analysis:

Basic statistic results are presented in table 6. The two parameters related to age specificity are b and c. The first did not present a statistically significant result, but for the second, the quadratic measure is positive and significant. That can be interpreted as the wineries tending to prefer to contract with farmers that have “good” vineyards, not too old, not too young.

<Insert table 6>

The parameter related to site specificity has shown a significant negative relationship with the dependent variable. The interpretation is that the shorter the distance, the larger the expected stability of

the contracts between farmers and wineries. This result has to do with the increase in the risk related to transportation effects on the quality of the highly perishable product.

The dummy for cooperatives has shown a positive and significant parameter, leading to the conclusion that cooperative members show more stable relationships with the cooperative. This implies that the macro-hierarchy (Lazzarini, et al. op. cit.) represented by the cooperative does show superior capacity to coordinate both horizontally, among farmers facilitating the introduction of new varieties and the adoption of technology in general, and vertically, facilitating the coordination between farm and industry, and also with farm suppliers, usually intermediated by the cooperatives. Other reasons, related to the negative incentives provided by this organization arrangement, however, preclude the exploration of the coordination capacity. The qualitative analysis has shown that farmers' cooperatives do not adopt the same standards of incentives as observed by non-cooperatives. Also, other incentives related to horizon and political problems, as explored in the literature on the new generation of cooperatives (Cook, op. cit.), are possibly related to the findings of this study. The result leads to further discussion on the tradeoffs shown by farmers' cooperatives, mixing the advantages provided by the personal informal interaction with cultural ties relating the agents. However, the benefits of the named aspects are crowded out by the costs associated to the disincentives in terms of property rights on the residuals, causing each individual farmer to prefer to leave the cooperative and choose to contract with for-profit companies.

Scale has shown a positive significant parameter. This can be explained by the correlation between the size and the cooperatives, therefore interfering in the parameter estimates, since independent variables are correlated. On the other hand, the smaller firms are expected to show larger capacity to coordinate the production.

Unbundling the information on the time series and applying alternative statistical models of panel analysis might bring new information. The data are being collected in order to allow for that.

5. Conclusions:

Quality attributes are essential to the food industry in general and their control introduces important elements for vertical coordination. This study has shown that the concept of stability of sequential contracts measured by the frequency of transactions between the same agents, when choice is possible, can be explained by traditional measures of transaction cost analysis.

Since the evolution of food industries can show important social impacts in developing countries, the case of Rio Grande do Sul indicates that institutional aspects must be considered. First, market-augmenting institutions might be introduced or improved, with the law of denomination of origin and agencies for monitoring quality, for example. Also the farmers' cooperatives deserve closer examination, since their importance is considerable and yet they seem to be losing strength as an institutional organization.

Further analysis should be developed relating vertical and horizontal aspects of coordination.

Finally, since long-lasting relationships evolve in stable contracts, especially in food chains, an interesting opportunity rests in the exploration of the concept of dynamic capabilities, developed among independent but contract-related agents throughout the food chain.

Bibliography

- BARKEMA, A. D. (1993). "New Roles and Alliances in the US Food System". Paper presented at the Spring Meeting of the Federal Reserve System Committee on Agriculture and Rural Development. Kansas City.
- BROUSSEAU, E. e CODRON, J. M. (1997). "The Hybridization of Governance Structures: Supplying Supermarkets with Off-Season Fruit". Prepared for the SFER Congress Modern Food Retailing, May 22-23, Montpellier-France.
- CHADDAD, F. R. (1996). Denominações de Origem Controlada: uma alternativa de adição de valor no agribusiness. São Paulo. Dissertação de Mestrado - FEA/USP.
- COOK.M.(1994). The Evolution of US Agriculture Cooperative Financial Strategies. International Agribusiness Seminar. PENSA-University of São Paulo.
- DAVIS, J. H. e GOLDBERG, R. A. (1957). A concept of Agribusiness. Harvard University Press, Boston.
- FRANK. S. D. e HENDERSON, D. R. (1992) "Transaction Cost as Determinant of Vertical Coordination in the U.S. Food Industries". American Journal of Agricultural Economics, november.
- GEENE, A., HEIJBROEK, A., LAGERWEST, A., WATIR, R. (1999). "The world wine business. Market study". Food and Agribusiness Research. Rabobank International.
- GIRAUD-HÉRAUD, E., SOLER, L. G. e TANGUY, H. (1998). "Regulation de l'Offre et Interprofessions Viti-Vinicoles: Questions Theoriques et Problèmes Empiriques". OIV, XXIII Congrès Mondial. Lisbonne, Portugal.
- GOLDBERG, R. A. e DANIELS D. (1998). "Marchesi De'Frescobaldi: Integrating Traditions and Change in One of Italy's Oldest Industries". Case for class discussion. HarvardBusiness School, N9-599-074. Boston.
- JALFIM, A. (1991). "Elementos para o estudo da agroindústria vinícola: uma abordagem da Indústria Vinícola Rio-Grandense". Ensaio FEE, Porto Alegre, 12(1): 229-247.
- JOSKOW, P. L. (1985). "Vertical integration and long term contracts. The case of coal burning electric generation plants". Journal of Law Economics and Organizations, p. 33-79.
- KLEIN, B., CRAWFORD, G., ALCHIAN A. (1978). "Vertical integration. Appropriable rents and the competitive contractings process". Journal of Law and Economics, n.21, p. 297 - 326.
- LANGLOIS (1992). "Transactions cost economics in real time". Industrial and Corporate Change, v.1, n.1, p. 99-124.

- LAPOLLI, J. N. *et al.* (1995). A competitividade da vitivinicultura brasileira: análise setorial e programa de ação com destaque para o Rio Grande do Sul. Porto Alegre, RS: BANRISUL / EMBRAPA-CNPUV/SEBRAE/RS. 200 p.
- LAZZARINI (2001). Integrating supply chain and network analyses: The study of netchains. *Journal on Chain and Network Science*. Vol 1, n. 1, p. 7-22.
- LAWRENCE, J. D. *et al.* (1997). "Vertical Coordination in the US Pork Industry: Status, Motivations and Expectations". *Agribusiness*, Vol. 13, nº 1, p. 21-31.
- MARIOTTI, S. e CAINARCA, G. C. (1986). "The Evolution of Transaction Governance in the textile-Clothing Industry". *Journal of Economic Behaviour and Organization*, pp. 351-374 (I).
- MATTUELLA, J. L. e ROHR, E. J. (1993). "A produção de uva no contexto do Mercosul" in Congresso Brasileiro de Economia e Sociologia Rural. Ilhéus, BA, Anais.
- MENARD, C. (1996). "On clusters, hybrids and other strange forms: the case of the french poultry." *Journal of Institutional and Theoretical Economics*. 152 (1). 154 - 183.
- MIELE M. (2001). Análise da da transação entre produtores de uva e agroindústria vinícola: o caso dos vinhos finos no sistema agroindustrial vitivinícola do Rio Grande do Sul. São Paulo. Dissertação de Mestrado - FEA/USP.
- RABOBANK (1996). The world wine business. Developments and strategies. Netherland.
- SAUVEÉ (1998) " Toward an Institutional Analysis of Vertical Coordination in Agribusiness". In *The Industrialization of Agriculture*. Royer,J.S. and Rogers,R.T. eds.
- SOLER, L.G. e TANGUY, H. (1998). " Contrats et Négotiations dans le Secteur des Vins de Champagne" In Annales de Mines, mar.
- SOUZA, N. J. de (1994). "O complexo agroindustrial e a produção brasileira de vinhos, milho, aves e soja no contexto do Mercosul". Texto para discussão nº94/06, Curso de Pós-Graduação em Economia, UFRGS. Porto Alegre.
- WILLIAMSON, O. (1985). The Economic institutions of Capitalism: Firms, Markets, Relational Contracting. The Free Press, New York, pp. 450.
- ZYLBERSZTAJN, D. e FARINA, E. M. M. Q. (1999). "Strictly Coordinated Food Systems: Exploring the Limits of the Coasian Firm" *International Food and Agribusiness Management Review*. Vol 2, n.2.

Table 1: Grape Production in Rio Grande do Sul (Annual Average and percentual variation)

	(kg)		
Wine Grapes	1990-93	1994-99	% variation
Red	21,548,304	19,162,127	-11.1%
White	56,677,233	43,194,498	-23.8%
Total classic	78,225,536	62,356,625	-20.3%
Common	288,623,857	314,761,025	9.1%
Total	366,849,394	377,117,650	2.8%

Source: Uvibra

Table 2: Wine production in Rio Grande do Sul

	Year	Number of Firms	Commodity	Speciality	Total
Cooperatives	1999	22	25%	31%	26%
	1992	23	28%	50%	34%
	1988	26	38%	46%	40%
Wineries	1999	276	70%	68%	69%
	1992	233	66%	49%	62%
	1988	200	44%	40%	43%
Small "Cantinas" ⁴	1999	133	-	-	5%
	1992	148	-	-	5%
	1988	168	-	-	3%

Source: Uvibra

⁴ Cantina is the small scale vertically integrated wineryard

Table 3: Governance structure of wineries in Rio Grande do Sul (Sample)

	Form	Area (ha)	Production (kg)*	Procurement (kg)**	VI(%)***	Scale****
Winery D	Cooperative	-	-	1,976,994	0.0%	3.4%
Winery E	Cooperative	-	-	1,221,140	0.0%	2.1%
Winery C	Cooperative + VI	17.00	238,000	7,735,700	3.1%	13.2%
Winery A	M + VI	12.00	168,000	3,046,277	5.5%	5.2%
Winery H	M + VI	33.00	462,000	6,225,507	7.4%	10.6%
Winery B	VI + contracts	30.00	420,000	1,778,342	23.6%	3.0%
Winery F	VI + contracts	1.5	21,000	64,368	32.6%	0.1%
Winery J	VI + M contracts	50.00	700,000	1,345,136	52.0%	2.3%
Winery I	VI + M	10.00	140,000	187,573	74.6%	0.3%
Winery G	VI + M	40.00	560,000	605,048	92.6%	1.0%
Total sample		193.50	2,709,000	24,186,085	11.2%	41.2%

* more than 14000 kg/ha

** varietals in 2000

*** only varietals

**** consider all processing (capacity specialties and commodities)

Source: Uvibra

Table 4: Observed Coordination Tools

Winery	Goals	Incentives	Contracts	Technical Support	Loans
D	<ul style="list-style-type: none"> Quality improvement Varietals 	Market prices	<ul style="list-style-type: none"> individual files joint planning of production 	0.62	278
E	<ul style="list-style-type: none"> quality diversification 	Quality Premiun	<ul style="list-style-type: none"> individual files joint planning of production 	0.38	57
C	<ul style="list-style-type: none"> quality specific varietals 	Quality Premiun	<ul style="list-style-type: none"> individual files joint planning of production 	0.72	72
A	<ul style="list-style-type: none"> quality self-sufficiency 	Market prices	<ul style="list-style-type: none"> individual files joint planning of production 	0.57	154
H	<ul style="list-style-type: none"> quality specific varietals 	Quality Premiun Reputation	<ul style="list-style-type: none"> individual files joint planning of production classification by quality levels 	0.27	100
B	<ul style="list-style-type: none"> specific varietals self-sufficiency 	Quality Premiun	<ul style="list-style-type: none"> individual files joint planning of production 	1.20	479
F	<ul style="list-style-type: none"> quality self-sufficiency 	Market prices	<ul style="list-style-type: none"> files follows individual performance 	14.29	• none
J	<ul style="list-style-type: none"> quality self-sufficiency 	Quality Premiun	<ul style="list-style-type: none"> files monitor technology 	5.00	3,200
I	<ul style="list-style-type: none"> quality self-sufficiency 	Quality Premiun	• none	• none	• none
G	<ul style="list-style-type: none"> quality self-sufficiency 	Market prices	• none	• none	• none

Source: authors

Table5: Model - Hypotheses

H^1_0	$b > 0$	H^1_A	$b \leq 0$
H^2_0	$c < 0$	H^2_A	$c \geq 0$
H^3_0	$d < 0$	H^3_A	$d \geq 0$
H^4_0	$e > 0$	H^4_A	$e \leq 0$
H^5_0	$f > 0$	H^5_A	$f \leq 0$

Table 6: Linear Regression Statistical Results

Variable	Parameter	Average	S.E.	T	P (t)	Part. R ²
Constant	A	2.2514***	0.4284	5.2560	0.0000	0.1720
Ivt	B	0.0830	0.069994	1.185	0.2379	0.0105
ivt2	V	-0.0042*	0.0027004	-1.538	0.1265	0.0175
Dmv	D	-0.0667***	0.0138	-4.8500	0.0000	0.1503
Dc	E	0.5270**	0.2382	2.2120	0.0286	0.0355
Scale	F	1.6464 e- 007***	4.1381 e- 008	3.9790	0.0001	0.1064
R ²		0.3658				
N		139				

* 15%

** 5%

*** 1%