Factors Determining Organizational Form: The Wine Industry in Spain

Marta Fernández Olmos[a], Jorge Rosell Martínez[b] and Manuel Espitia Escuer[c]

Department of Business Economics, University of Zaragoza, Zaragoza, Spain.
[a] maferno@unizar.es, [b] jrosell@unizar.es, [c] espitia@unizar.es

Abstract

The purpose in the current study is to test the transaction cost theory's propositions regarding the options of market, hybrid and hierarchy through surveying wineries in DOC Rioja. First, we examine the impact not only of asset specificity and uncertainty on governance structures but of measurement of quality as well. Second, this study extends the empirical literature on transaction cost theory by examining governance modes in an agrarian industry. Finally, we analyze the effect of experience on the governance mode decision using a data set from Qualified Appellation of Origin (DOCa) Rioja wine market, an industry with a wide variety of vertical relationships and a considerable variation among types of wines.

By using a generalized ordered logit, we find evidence to support the view that the higher the transaction costs relative to market governance, the more it is likely that the governance mechanism will move towards hierarchy. However, this framework is by no means a complete explanation. Our results indicate that other variables outside the framework, such as production experience and quality play an important role in the governance mode decision.

Introduction

The assertion of Williamson (1991, p.234) that "the question of why there is so much vertical integration remains interesting, but no more so than the question of why there are so many market - (and quasi-market) mediated transactions" constitutes the central premise of empirical research that examines transaction costs and the governance modes market and hybrid. This research focuses on asset specificity and uncertainty as the basis for the governance mode decisions (e.g., Coles & Hesterly, 1998; Buvik, 2002; Bigelow & Argyres, 2007). Empirical evidence confronting risk-sharing and transaction costs actually favours the transaction-cost framework. As Allen & Lueck (1995, p.447) more strongly assert, despite the theoretical prominence of risk aversion, empirical contract studies tend to ignore risk preferences and focus exclusively on transaction costs, thus stressing specific incentives, enforcement costs and transaction-specific assets.

Rooted in transaction cost economics, asset specificity and uncertainty have clearly been the focus of empirical research. Somewhat overlooked in transaction cost research, however, has been how the imprecision and inaccuracy in measuring input quality impact the firm´s governance mode decisions. This is particular important issue in agrarian industries where standard methods for measuring whether the observed input meets the quality requirements or even whether supplier's procedures and efforts comply with those demanded by the firm hardly ever exist. When input quality is an important feature of the processor´s product, and input quality measurement is a source of tension, then firms will resort to more coordinated mechanisms to better control the input production process.

Transaction costs- whether they stem from asset specificity or uncertainty are central to understanding the continuum between hierarchy and market, but the impact of these factors should not be examined in isolation (Williamson, 1981). As Williamson (1985) points out, "The economic actors have the capacity to look ahead and recognize contractual hazards and investment opportunities. Often, however, the requisite recognition will come as a product of experience" (p. 1104), where experienced firms will react to such knowledge by taking actions that investigate future hazards and more fully realize future gains.

This paper seeks to extend our understanding and build on the existing literature of how transaction costs influence the governance mode choice- market, hybrid, and hierarchy- in at least three major areas. First, we examine the impact not only of asset specificity and uncertainty on governance structures but of measurement of quality as well. Second, this study extends the empirical literature on transaction cost theory by examining governance modes in an agrarian industry. Empirical work in the area of transaction costs has given little attention to agrarian industries (Bhuyan, 2005). Yet, scholars who focus on agrarian industries imply that the dynamics of vertical coordination may be different in agriculture. The main focus of this difference is that quality uncertainty tends to play an increasingly important issue in agrarian inputs relative to manufacturing (Chambers & King, 2002). Our sample is drawn from the wine market industry. This is an ideal industry for studying the impact of quality on the governance mode choice because it brings together both significant quality concerns and measurement difficulty. Quality is particularly critical in its consequences in this industry and a winery´s reputation for providing high quality wines is an important dimension of competition in this market (Goodhue, Heien, Lee & Sumner, 2003). At the same time, performance measurement is particularly difficult in an industry such as this where grower´s effort may not be perfectly and costless observable due to uncertain factors outside his control and it is difficult to assess objectively the grape quality. In the formal literature, this problem is cited as *moral hazard* problem. Thus, wineries engage in highly differentiated wines where subsequent effects of poor quality are an important competitive distinction among them will resort to more vertical coordination to insure that an acceptable level of quality is maintained.

Finally, we analyze the effect of experience on the governance mode decision using a data set from Qualified Appellation of Origin (DOCa) Rioja wine market, an industry with a wide variety of vertical relationships and a considerable variation among types of wines. Additionally, wines in many regions of Europe are a cultural matter, strongly interlaced with gastronomy and tradition, and so particularly happens in the case of Rioja.

The remainder of the paper is divided into four sections. The following section provides the theoretical background and hypothesis for governance mode choices. In section 2 the measures and data collection procedures are described. An empirical section follows that describe the findings of several models and how these relate to the hypotheses. A final section presents a discussion of the implications of the study and suggestions for future research.

Theory and hypotheses

Since the publication of Coase´s article, "The Nature of the Firm" (Coase, 1937), transaction cost economics (TCE) has become one of the leading perspectives in the study of structures of economic organization. In its origins, this approach positioned the market and the firm as alternative mechanisms that could be chosen to conduct a transaction.

Further research by Williamson (1991) responds to the critics of this dichotomic character by identifying three alternate forms of transaction governance: market, hybrid and hierarchy. Each form can be distinguished on the basis of its contract law, and each employs its own coordination and control mechanisms. Market governance is supported by classical

contract law, in which the identity of the parties of the transaction is irrelevant and no dependency relations exist between them. Neoclassical contract law, which applies to the hybrid forms, better facilitates continuity and adaptation than classical contract law. In this regime the parties to the transaction maintain autonomy but are bilaterally dependent in a nontrivial way. By contrast with a market contract, this contract foresees unanticipated disturbances, provides a "tolerance zone" within which misalignments are absorbed, requires information disclosure if adaptation is proposed, and provides for arbitration (prior to resorting to the courts) in the event of disagreement. The internal organization, hierarchy, is still a more elastic and adaptive mode of organization. Bilateral adaptation effected through fiat characterizes this structure. Rather than relying on the courts, which is denied, the parties must resolve their differences internally, being the hierarchy its own court of ultimate appeal. This implicit contract law of internal organization is known as contract law of forbearance.

Given this characterization of governance mechanisms, TCE maintains that there are "rational economic reasons" for choosing among them (Williamson, 1985, p.52). This is captured in what Williamson (1991, p.277) called the "discriminating alignment hypothesis", which holds that opportunist and limitedly rational agents align transactions, which differ in their attributes, with governance structures in a discriminating (i.e. transaction cost economizing) way. In other words, economic agents will choose that form of governance that reduces any potential exchange problems created by bounded rationality, on the one hand, and by the threat of opportunism, on the other, at the lowest cost. The principal attributes of transactions, according to TCE, that make bounded rationality and opportunism problematic are asset specificity, uncertainty and frequency.

First, the asset specificity refers to the degree to which assets "can be redeployed to alternative uses and by alternative users without sacrifice of productive value" (Williamson, 1991, p.282). As investments in asset specificity increase, parties incur in small-number conditions with considerable exposure to opportunism. This contractual hazard is denominated as hold-up, whereby the party whose investments in the transaction have significant value in alternative use expropriates quasi-rents from the party who invested in transaction-specific assets that have low value in alternative use (Klein, Crawford & Alchian, 1978; Williamson, 1985). Williamson argues that as bilateral dependency sets in, assuming uncertainty exists in some intermediate degree, the high-powered incentives of markets impede coordinated responses among transaction parties, incurring in maladaptation costs. Accordingly, asset specificity increases the relative attractiveness of hierarchies and hybrids- despite their additional costs. As we mentioned earlier, the hybrid mode is located between market and hierarchy with respect to incentives, adaptability and bureaucratic costs. Then, we predict that, in presence of uncertainty, transactions with low asset specificity will be undertaken in the market, those with intermediate asset specificity in hybrid forms, and those with high asset specificity in hierarchical forms of governance (Williamson, 1985).

> **Hypothesis 1**: The greater the value of asset specificity, in presence of uncertainty, the more it is likely that a move from spot market to the hybrid mode and from hybrid mode to vertical integration will be observed.

The second important dimension of transactions is uncertainty, which refers to the unanticipated changes in circumstances surrounding a transaction. The effect of uncertainty on the choice of governance form needs to be examined in conjunction with asset specificity. Absent asset specificity, market governance should be preferred whatever the degree of uncertainty since continuity has little value for these transactions and new trading relations are easily arranged (Williamson, 1979, p.254). When asset specificity is present to a nontrivial degree, uncertainty increases the relevance associated with the continuity between the transacting parties and adaptive capabilities, rendering market governance. This is

because market mode is subject to costly haggling and maladaptiveness. Accordingly, as uncertainty increases (in the presence of asset specificity), hybrids and hierarchies become preferred over markets (Williamson, 1979, p. 254).

> **Hypothesis 2:** The greater the value of uncertainty, in presence of asset specificity, the more it is likely that a move from spot market to the hybrid mode and from hybrid mode to vertical integration will be observed.

Finally, frequency refers to the regularity with which transactions recur. For the purposes of this particular study, however, we do not measure the effects of frequency because all transactions that were examined occurred with the same frequency.

While vertical integration provides a resolution to the problem of transaction specific investments under uncertainty, there are, however, factors limiting its extent. Hierarchy comes at the cost of additional bureaucracy and lower-powered incentives, which limit the size of firms.

> **Hypothesis 3**: The greater size of the firm, the less it is likely that the governance structure will be vertical integration.

Empirical research on governance mode choice has not tended to consider the effects of product quality on these decisions. Product quality, however, is an important consideration in many industries, particularly in agrarian industries. Since quality is often dependent upon the characteristics of inputs obtained from suppliers, some authors have suggested that protecting product quality is a motivation for vertical coordination (e.g., Goodhue *et al.*, 2003).

In this paper's analysis, we proxy for the effects of product quality on governance mechanism choices using a variable that measures the degree of product differentiation in the industry in question. Our reasoning connects to the work of Coles & Hesterly (1998), combined with transaction cost logic. In their study of service firms, Coles & Hesterly (1998) showed empirically that hospitals are more likely to integrate those services that have a significant potential to impact quality and cause harm to a patient. Following this line of research by Coles & Hesterly (1998), we argue that wineries producing differentiated wines will seek the maximum control of the process in order to maximizing the quality of their grapes. Thus, we hypothesize that superior quality will push transactions away from the market and into more coordinated mechanisms.

> **Hypothesis 4**: The more differentiated a product is, the more it is likely that a move from spot market to the hybrid mode and from hybrid mode to vertical integration will be observed.

Williamson (1998) emphasizes the applications of transaction cost economics to the study of governance, the object being to effect an economizing alignment between transactions, which differ in their cost and competences. However, this theory is silent on the relative influence of firm-specific capabilities on governance mode decisions (Leiblein & Miller, 2003).

The resource- and capability- view of the firm provides one means to analyze the effect of the firm´s resource and capability portfolio on governance mode decisions. Arrow (1962) suggests that production experience provides learning opportunities that enhance firm's production capabilities. Moreover, it is expected that such experientially derived capabilities improve subsequent production along a given trajectory in terms of both efficiency (e.g., Rapping, 1965; Henderson, 1984) and technical performance (e.g., Dosi, 1988). As a result, we hypothesize that a firm with production experience will be more likely to integrate because it provides learning opportunities that enhance its production capabilities.

Empirical evidence has been provided to support this idea (e.g., Brouthers, Brouthers & Werner, 2003; Leiblein & Miller, 2003; Bigelow & Argyres, 2007).

> **Hypothesis 5:** The greater a firm´s experience producing the product, the more it is likely that the governance structure will be vertical integration.

Empirical data

We chose the DOC Rioja wine industry to test the hypotheses. One industry, rather than several, was chosen to detect real differences in practice that might otherwise be confounded with industry-specific effects (Anderson, 1985).

The sector under study is the Appellation d'Origin Rioja, which represents the most significant part (39.5 per cent) of the wine industry in Spain and is the most relevant one within the market of the quality wines. We chose this industry because it shows a great variety in the governance mode that each firm use for its inputs needs. Moreover, the wine industry provides an industry in which controlling all the input production process is essential to know the real level of quality of the inputs (Fernández-Olmos, 2008).

Governance mechanisms in the wine industry

In this study, our aim is to examine the motives for governance mode choice in the Rioja Designation of Origin wine industry. Hence, the first criterion in selecting the sample was that the firm belongs to the DOC Rioja and was wine-making processor. The second criterion was that they presented accounting information to the authorities.

The survey was returned by 187 participants, 88.2 per cent of the population. In order to limit the influence of a particular year, the study period refers to the past 3-year period, 2004-2006. A comparison of responding wineries with the population of all general wineries using the chi-square test ($p=0.094$) showed no statistically significant differences between the sample and the population with regards to size using the European Commission's classification of small and medium-sized firms. The largest number (68%) of wineries in the sample had less than 10 employees while 27% had between 10 and 49 employees and 5% had more than 50 employees.

Variable operationalization

Dependent variable: the adopted governance mechanism. We build the dependent variable (GOV_MECH) according to Section 2 where it is has been distinguished three basic types of governance mechanisms: spot market, hybrid and vertical integration. Consistent with prior work (e.g. Parmigiani, 2007), a 10 percent cutoff was used such that grape needs that were produced internally 90 percent or more often were considered "vertical integration", those that were acquired in the spot market 90 percent or more often were considered "spot market", and finally those that were provided with an hybrid mode 90 percent or more often were considered "hybrid mode". An exception to the use of a 10 percent cutoff was Poppo & Zenger (1998), who use the 75 percent rule. To establish the robustness of results, we also obtained a simulation exercise with the cutoff changed to 75 percent.

Independent variables

We use items on seven-point scales anchored by "strongly disagree" and "strongly agree" to measure both transaction cost dimensions, specificity and uncertainty.

This form of measuring presents the disadvantage of its subjectivity; it depends on a personal evaluation. However, subjective estimations of specificity and uncertainty have

often been used in empirical studies, mainly due to a lack of direct qualitative information (e.g. Anderson & Schmittlein, 1984; Anderson & Weitz, 1992).

Specific assets (Hypothesis 1): The degree of specificity can be measured by the difference between the cost of the asset and the value of its second best use (Williamson, 1985). Asset specificity can take several forms: physical asset specificity, human asset specificity, site specificity, dedicated assets, temporal specificity and brand name capital. For the purpose of this study, we focus on physical asset specificity and dedicated assets.

Physical asset specificity describes the situation where physical assets are tailored to a specific relationship and are difficult to re-deploy for other purposes without sacrificing productive value. Two complementary measures of asset specificity were developed. The first measure is the degree of downstream physical asset specificity, which measures the level of total fixed investment made by the processor. A second measure, the degree of upstream physical asset specificity, asked about the fixed investments made by the primary producer.

Dedicated asset specificity refers to assets which are assigned for the purpose of the current transaction only and would result in significant excess capacity if the transaction terminated prematurely (Williamson, 1983). Less attention has been paid to this type of specificity than to physical asset specificity. One exception is Adler *et al.* (1998), who operationalised dedicated asset specificity as the time to meet the buyer's requirements from contract start date to product acceptance.

Applied to our study, dedicated asset specificity refers to grapes which were grown for one particular vintner. As wine grapes are extremely perishable, the vintner could try to appropriate rents by taking advantage of the grower's need to harvest and sell his grapes in a relatively short period of time (Goodhue *et al.*, 2003). Given this definition, dedicated asset specificity was operationalised as the excess capacity that a primary producer has to support if the grapes which were grown for a particular winery are rejected by it.

All measures of transaction-specific assets are developed and scaled such that higher scores imply higher degree of specificity in the transaction.

Uncertainty (Hypothesis 2): A basic assumption of transaction cost theory is that all transactions are conducted under a certain level of imperfect information, which can preclude both the formulation of a contract ex-ante and/or the ability to verify compliance ex-post (Grover & Malhotra, 2003). The former (environmental uncertainty) appears when the circumstances surrounding the exchange cannot be specified in advance. This complicates writing contracts since parties will have to devote a lot of time trying to identify the diverse contingencies that may arise. This positive effect between unpredictability and asset specificity have been found by Anderson (1985), Coles & Hesterly (1998), Fan (2000), Leiblein & Miller (2003) and Díez-Vial (2007). In our activity of analysis, the high level of dependency of viticulture to exogenous conditions such as hazardous and risky natural environment (drought, pests, flooding, insect infestations, disease, etc) is one of the main reasons of environmental unpredictability. The scaling of this concept is based on one item that indicates respondents´ perception of input price volatility.

The latter (behavioural uncertainty), which is linked to difficulty of evaluating performance, is recognized in Williamson´s later writings (1981) as "internal" uncertainty. Contracting parties should be able to evaluate the service or product being exchanged. If performance cannot be easily assessed, the market will fail because what to reward and how is not known (Williamson, 1981). Nevertheless, although transactions will be completed less smoothly than in more certain environments, the market mode is still advantageous. Hence, uncertainty per se does not favour vertical integration, only in interaction with asset specificity (Williamson, 1979; 1985). This interaction effect between uncertainty and specificity has been found by Anderson (1985), Fan (2000), Leiblein & Miller (2003) and Díez-Vial (2007). Following Coles & Hesterly (1998), this condition was operationalised by

means of an interaction between a dummy variable (λ) and (environmental / internal) uncertainty. This dummy variable takes a value of 1 if the value of all items of specificity is above 1 (the minimal value of the scale), and 0 for values of 1.

Size (Hypothesis 3). This has been measured with a number of different variables in the literature, such as assets (Anderson, 1985), sales (Leiblein & Miller, 2003) or logarithm of capacity (Ohanian, 1994). In particular for wineries, there are two direct indicators of a winery´s size: the number of acres owned by the winery and the storage capacity of the winery (Benjamin & Podolny, 1999). It is used the logarithm of the second one because the variables based on assets owned by the winery are directly dependent upon the decision to integrate production activities (Leiblein & Miller, 2003).

Differentiation effect (Hypothesis 4): Previous studies (e.g. Coughlan, 1985) have measured product differentiation with dummy variables coded 1 for highly differentiated goods and 0 for lowly differentiated goods.

In order to examine the impact of differentiation on the integration decision we adapt the measure of quality utilised by Coles & Hesterly (1998). We divide Rioja wines into three categories according to the classification provided by the Board, which are ordered by value added. In the Spanish nomenclature, the first group includes mostly "guarantee of origin" wines, which have not been aged in oak casks. The next group of wines includes "crianza" wines, which have been aged for at least three years, with one year in oak casks. Finally, the third group comprises "reserva" and "high profile" wines, which are older and more carefully selected. As there are three groups, we code them with two dummy variables; on the one hand, *low added value* (AV_{LOW}), coded 1 if a winery produces at least 50 percent of the first group and zero otherwise; on the other, *high added value*, (AV_{HIGH}), coded 1 if a winery produces at least 50 percent of the third group and zero otherwise.

Experience (Hypothesis 5). This variable refers to the extent to which a firm has skills and capabilities for producing the good and an understanding of the underlying technology. Following prior empirical studies (e.g., Hennart, 1991; Brouthers, Brouthers & Werner, 2003), we measure experience as the number of years of experience in the wine-making activity.

Descriptive analysis

A preliminary analysis was conducted to determine the relationships between pairs of independent variables. Table 1 shows Spearman´s correlations for each pair. One strong correlation to note here is between both dummy variables of quality, which is significant and negative. Nevertheless, in whole there is no indication of major multicollinearity problems. Further evidence of lack of multicollinearity is given by the stability of the coefficients in the estimation of the models.

Table 1: Spearman´s correlations

	UPAS	DPAS	DAS	EU	BU	SIZE	AV_{LOW}	AV_{HIGH}	EXP
UPAS	1								
DPAS	0.246**	1							
DAS	0.103	0.322**	1						
EU	0.090	0.179*	0.303**	1					
BU	0.262**	0.134	0.236**	0.266**	1				
SIZE	-0.019	-0.094	-0.156*	-0.074	-0.083	1			
AV_{LOW}	-0.075	-0.020	-0.028	0.012	-0.007	-0.236**	1		
AV_{HIGH}	0.110	0.013	-0.054	0.029	0.068	0.060	-0.372**	1	
EXP	0.070	-0.092	-0.082	-0.031	-0.022	0.170*	-0.013	0.006	1

UPAS: Upstream physical asset specificity; DPAS: Downstream physical asset specificity; DAS: Dedicated asset specificity; EU: Environmental uncertainty; BU: Behavioural uncertainty; SIZE: size; AV_{LOW}: low added value; AV_{HIGH}: high added value. EXP: Experience.

Estimation and discussion

To test the hypotheses, we analysed the distribution of the dependent variable resulting in a discrete variable with three outcomes: spot market, hybrid and vertical integration. By focusing on coordination, governance structures can be evaluated based on a continuum associated with the level of coordination within the exchange relationship instead of identifying governance structures as three discrete forms. When the dependent variable is inherently ordered, the most appropriate method for estimating this model is an ordered logit. This is the reason why we began estimating an ordered logit. To test the validity of this test, we use the approximate likelihood-ratio test of proportionality of odds across response categories ($X^2(9)=33,78$ $p>X^2(9)=0.0001$) and the Brant test of the parallel regression assumption ($X^2(9)=28.61$ $p>X^2(9)=0.001$). Both tests indicate that the ordered logit model is not appropriate because the parallel regression assumption of the ordered logit is violated. Then, we search for more flexible parametric models for ordered dependent variables, in which the multinomial logit model stands at one extreme in terms of high flexibility. The multinomial logit model builds in the assumption that the choice between any pair of alternatives is independent of the availability of other alternatives. The results of the independence of irrelevant alternatives (IIA) tests were inconclusive and hence, a model which does not require this assumption is needed.

Finally, we estimate a generalized ordered logit, which is less restrictive than an ordered logit and more parsimonious than a multinomial logit (Williams, 2006). Consequently, we model a slightly modified version of ordinal logit where a series of regressions are reported predicting differences at each level of the dependent variable, holding constant those variables that do not violate the parallel regression/proportional odds assumption across the regression models. By holding constant many of the independent variables in the model, we were able to run the model without violating the assumption. We confirmed this in our data: GOV_MECH: $\chi^2(7)=5.20$, $p>X^2=0.635$.

Then, a generalized ordered logit was used as the primary technique for investigation of the hypothesis. The basic structure of the proposed model, which tests the factors with governance modes (vertical integration, hybrid mode and spot market), then, is as follows (Williams, 2006):

$$P\left[GOV\_MECH_i > j\right] = \frac{e^{(\alpha_j + X_i\beta_j)}}{1+e^{(\alpha_j + X_i\beta_j)}}, \quad j = 0,1$$

This model estimate gives results that are similar to running a series of logistics regressions, where first it is tested the category spot market versus all others (hybrid and vertical integration) and then the choice between market and hybrid versus vertical integration is estimated.

Table 2 gives the coefficient estimates and goodness of fit measures for the five hypothesized determinants of governance mode choice with the generalized ordered logit. An important issue in a model is its stability. To test for this, different models were estimated across various specifications. Model I includes only the effect of experience and serves as the baseline. Model II adds the dummy variables associated with differentiation effect. In model III, we include the measure for size. Model IV adds our measures of uncertainty, environmental and internal. Model V reports the results from our full model, which includes the measures of transaction dimensions (specificity and uncertainty), the size and differentiation. Likelihood statistics and measures of overall model fit are showed in the bottom line of the table. Our results show that likelihood ratio test statistics comparing each model to its immediate predecessor are all significantly different from zero. Likewise, the percent of observations correctly classified and the Nagelkerke-R^2 improve substantially

when the variables are included. As shown at the bottom of the column, Model V has the highest Nagelkerke-R^2.

Given the stability of our results across specifications, our discussion focuses on Model V, which includes all the variables. This model reports the results of the generalized ordered logit model examining movement across the governance mode thresholds by transaction cost dimensions and quality effect. Threshold 1 refers to a movement from "spot market" to "hybrid and vertical integration", and so on.

Consistent with transaction cost theory, hypothesis 1 predicted that transactions with low asset specificity will be undertaken in the market, those with intermediate asset specificity in hybrid forms, and those with high asset specificity will be vertically integrated. Results for threshold 1 showed that an increase in moving up a level on a producer´s asset specificity scale will increase the odds of a firm moving from the spot market to hybrid market by a factor of 1.288, or a relative increase of 28.8%. With respect to processor´s assets specificity and dedicated asset specificity, the effects are in the same sense, being the relative increase of 35.3% and 38.7%, respectively. These findings are also consistent across the threshold 2, corroborating hypothesis 1.

Environmental uncertainty, in presence of asset specificity, has a strong significant positive effect on vertical coordination. In fact, results suggest that for every point increase in its scale, the odds that a firm will move on to the next level of coordination increase by 46.2%. Contrary to our expectations, the magnitude of the effect of internal uncertainty varies by threshold. Beginning at threshold 1, the presence of internal uncertainty had not a significant effect on moving from spot market to hybrid mode. In threshold 2, however, the result presented supports the existence of a significant direct effect of internal uncertainty on vertical integration.

Hypothesis 3 argued that firms having greater size are less likely to internalize their input needs due to diseconomies of scale. The result of this variable in threshold 2 indicates that size affect negatively firms´ vertical integration decision. As we expected, it was no longer significant in threshold 1, which involves that this variable doesn't affect the choice between spot market and hybrid mode, since there are no significance of increasing costs along with size in hybrid modes of governance.

As anticipated in hypothesis 4, results indicate that producing a high quality product significantly increased the odds of firms moving from spot market to higher levels of vertical coordination in grape supply. However, being a producer of relatively low quality product does not affect the governance mode choice.

Finally, our estimated results found support for the variable of experience, consistent with previous empirical research. In accordance with hypothesis 5, production experience is likely to enhance the odds that a firm will choose a more coordinated mechanism along a given trajectory in 1.5 %. Though this is a relatively small explanation of the decision to move towards higher integration, the precision of this estimate is striking, as can be seen in the narrow range of the interval.

As we mentioned earlier, we obtained a simulation exercise with the cutoff changed to 75 percent. Qualitatively similar results were obtained using the 75 percent rule, which gives evidence of the robustness of the results[1].

Table 2: Estimations from generalized ordered logit$^{\Psi}$

	Threshold 1: Market vs Hybrid & Hierarchy				
	Model I	Model II	Model III	Model IV	Model V
Ups. Phys.					1.288*

[1] Results for 75 percent cutoff are available from the authors on request.

Asset Spec.					(1.054-1.573)
Dow. Phys. Asset Spec.					1.353** (1.131-1.618)
Dedicated Asset Spec.					1.387** (1.150-1.674)
Environmental Uncertainty				1.608** (1.307-1.980)	1.462** (1.162-1.839)
Behavioral Uncertainty				0.993 (0.775-1.271)	0.824 (0.621-1.092)
Size			0.823 (0.624-1.084)	0.814 (0.605-1.095)	0.857 (0.619-1.188)
Low Added Value		1.063 (0.579-1.952)	0.691 (0.357-1.336)	0.672 (0.337-1.343)	0.766 (0.366-1.605)
High Added Value		2.519* (1.108-5.720)	2.936* (1.186-7.265)	3.161* (1.125-8.891)	3.861* (1.293-11.531)
Experience	1.011** (1.003-1.019)	1.010** (1.002-1.018)	1.013** (1.005-1.022)	1.012** (1.003-1.022)	1.015** (1.004-1.025)

	Threshold 2: Market & Hybrid vs Hierarchy				
	Model I	Model II	Model III	Model IV	Model V
Ups. Phys. Asset Spec.					1.288* (1.054-1.573)
Dow. Phys. Asset Spec.					1.353** (1.131-1.618)
Dedicated Asset Spec.					1.387** (1.150-1.674)
Environmental Uncertainty				1.608** (1.307-1.980)	1.462** (1.162-1.839)
Behavioral Uncertainty				1.392** (1.139-1.702)	1.320* (1.058-1.647)
Size			0.440** (0.329-0.589)	0.403** (0.291-0.560)	0.371** (0.259-0.532)
Low Added Value		1.063 (0.579-1.952)	0.691 (0.357-1.336)	0.672 (0.337-1.343)	0.766 (0.366-1.605)
High Added Value		2.519* (1.108-5.720)	2.936* (1.186-7.265)	3.161* (1.125-8.891)	3.861* (1.293-11.531)
Experience	1.011** (1.003-1.019)	1.010** (1.002-1.018)	1.013** (1.005-1.022)	1.012** (1.003-1.022)	1.015** (1.004-1.025)
Crag-Uhler R^2	0.026	0.04	0.144	0.251	0.356
Likelihood ratio Test	-181.392	-178.715	-159.462	-139.582	-119.917
Chi-square statistic	0.017	0.017	0.000	0.000	0.000

$^{\Psi}$ Data are given as odds ratio (95 % confidence interval) The sample N=187. All models include intercepts. Complete model results are available from the corresponding author on request. Levels of significance: : * $p<0.05$; **$p<0.01$.

Conclusions and implications

The role of quality and the interaction of transaction costs and experience have received very little empirical attention in relation to the governance mechanism decision. The results reported here provide an important first test of these relationships in the context of an agrarian activity. The evidence presented in this paper points to the fact that the transaction cost framework appears to offer a useful explanation of the governance mode choice among spot market, hybrid forms and hierarchy in our study. This is a major contrast to the previous hybrid relationship studies, whose results have not been widely consistent with this framework (Carter & Hodgson, 2006). In our paper, the statement "TCE is an empirical success story…" (Williamson, 2000, p. 605-607) normally applied to the simple dichotomy between the decision to "make" internally or "buy" though the market may also be generalized to hybrid forms.

As we mentioned earlier, the robustness of the estimated coefficients across model specifications suggests that all the transaction costs variables are powerful factors in explaining the governance mode decision. However, this framework is by no means a complete explanation. Other variables outside the framework are related, and not all transaction costs hypotheses are supported. The evidence presented in this paper points to the fact that it is important to examine not only the production experience, but to examine the role of quality in a context of transactions where quality can not be precisely measured by observing only the outcome. Our analysis of the choice among spot market, hybrid and vertical integration suggests that more vertical coordination is associated with higher product quality. Likewise, it is interesting to note that our results partly corroborate the hypothesis regarding the relationship between behavioural uncertainty and governance mode. While our results indicate that behavioural uncertainty has effect on the make or buy decision, this variable does not explain why firms choose between market and hybrid mode. This non-significant effect obtained could be due to a particular characteristic that is associated with the hybrid mode in the current study. Contractual arrangements conditioned on bottle prices are infrequently (if ever) applied in the contracting relationship between a grape grower and a winery over the supply of fresh grapes for wine production. An illustrative example is DOC Rioja wine industry, where bottle-price conditioned contracts are never used. On the contrary, contracts in DOC Rioja rely on yield per hectare and input quality (Fernández-Olmos, 2008). Since measurement of wine grape quality is a very complex problem, our findings of the behavioural uncertainty are not surprising if we take into account that spot market and hybrid mode face the same difficulty. However, in commodities in which growers under contract receive a payment which is based on the price of the commodity in the downstream markets, such as fresh fruit and vegetables (Hueth & Ligon, 2001), the results associated to behavioural uncertainty could be different.

In addition to understating why firms choose among market, hybrid and vertical integration, this study addressed the question of whether the hybrid mode was a midpoint along the make/buy continuum or whether it was a discrete and distinct choice. While the results of the Brant test reject the make/buy continuum perspective, the test of Hausman does not support the discrete choice perspective. Thus, the superiority of the generalized ordered logit model over the ordered logit and multinomial models suggest that some variables don´t have a gradual effect on governance mode choice as we anticipated in the formulation of hypothesis 3 (relative to the effect of size) and 5 (relative to the effect of experience).

Several caveats about limitations deserve consideration. First, our study focused on governance mode choice in the viticulture industry. This, conclusions and inferences about the results may be limited to this setting and may not address the governance mode choice in other industries. However, we believe many of the factors that determinate different governance mechanisms in this study can be found in other settings in which it is difficult to

measure input quality by only observing the input. One example could be the olive oil industry.

Second, the purpose of this study was to study hybrid modes as alternative to either spot market or vertical integration. Clearly, investigators need to better understand hybrid governance structures and determinants in the context of economic theory. While this study has provided initial insight into the underlying factors that determine the choice of this type of governance mechanism, additional research is needed. Further research may find improvement not only by developing better measures, but also by including variables not covered here. One such variable is trust. Much of the management literature from a transaction costs viewpoint indicated that trust reduces transaction costs by reducing or eliminating both *ex ante* and *ex post* opportunism (Zaheer & Venkatraman, 1995).

Additionally, due to the limited nature of the scope of this study, we do not examine why firms choose among different hybrid mechanisms (short-term contracts, long-term contracts, concurrent sourcing…) along the governance continuum to its input needs. The generalizability of the findings could be enhanced with the study of different hybrid types used. A future research agenda includes overcoming some of the weaknesses and limitations of this paper.

As the first systematic empirical analysis of the choice among market, hybrid or vertical integration in the winegrape industry, we believe that our findings regarding governance mode decisions will be of interest to those industries with a variety of coordination mechanisms, and a significant degree of product differentiation.

References

1. Williamson, O.E., 1991. Comparative economic organization: the analysis of discrete structural alternatives. *Administrative Science Quarterly, 36,* 269-296.
2. Coles, J., Hesterly, W., 1998. The impact of firm-specific assets and the interaction of uncertainty: an examination of make or buy decisions in public and private hospitals. *Journal of Economic Behavior & Organization, 36,* 383-409.
3. Buvik, A., 2002. Hybrid governance and governance performance in industrial purchasing relationships. *Scandinavian Journal Management, 18,* 567-587.
4. Bigelow, L., Argyres, N., 2007. Transaction costs, industry experience and make-or-buy decisions in the population of early U.S: auto firms. *Journal of Economic Behavior & Organization XXX,* 791-807.
5. Allen, D., Lueck, D., 1995. Risk preferences and the economics of contracts. *American Economic Review, 85 (2)*, 447-451.
6. Williamson, O.E., 1981. The economics of organization: the transaction costs approach. *American Journal of Sociology, 87,* 548-577.
7. Williamson, O.E., 1985. *The economic institutions of capitalism.* New York: Free Press.
8. Bhuyan, S., 2005. An empirical evaluation of factors determining vertical integration in U.S. Food Manufacturing Industries. *Agribusiness, 21,* 429-445.
9. Chambers, W., King, R., 2002. Changing agricultural markets: industrialization and vertical coordination in the dry edible bean industry. *Review of Agricultural Economics, 24 (2),* 495-511.
10. Goodhue, R., Heien, D., Lee, H., Sumner, D., 2003. Contracts and quality in the California winegrape industry. *Review of Industrial Organization, 23,* 267-282.
11. Coase, R., 1937. The nature of the firm. *Economica, 4,* 386-405.
12. Klein, B., Crawford, R., Alchian. A., 1978. Vertical integration, appropriable rents, and the competitive contracting process. *Journal of Law and Economics, XXI,* 297-326.

13. Williamson, O.E., 1979. Transaction-cost economics: The governance of contractual relations. *Journal of Law and Economics, 22,* 233-262.
14. Williamson, O.E., 1998. Transaction cost economics: How it works; where it is headed. *De Economist, 14 (3),* 23-58.
15. Leiblein, M.J., Miller, D. J., 2003. An empirical examination of transaction and firm level influences on the vertical boundaries of the firm. *Strategic Management Journal, 24*, 839-859.
16. Arrow, K.J., 1962. The economic implications of learning by doing´, Review of Economics Studies, 29, 155-173. In *Readings in the modern theory of economic growth*, edited by J.E. Stiglitz, Uzawa, H. The MIT Press, 5th Ed. 1979.
17. Rapping, L., 1965. Learning and World War II production functions. *Review of Economics and Statistics, 47*, 81-86.
18. Henderson, R.D., 1984. The application and misapplication of the experience curve. *Journal of Business Strategy, 4 (3),* 3-9.
19. Dosi, G., 1988. Sources, procedures, and microeconomic effects of innovation. *Journal of Economic Literature, 26,* 1120-1171.
20. Brouthers, K., Brouthers, L. E., Werner, S., 2003. `Transaction costs-enhanced entry mode choices and firm performance´. *Strategic Management Journal, 24,* 1239-1248
21. Anderson, E., 1985. The salesperson as outside agent or employee: A transaction costs analysis. *Marketing Science, 4*, 234-254.
22. Fernández-Olmos, M., 2008. Why use contracts in viticulture?. *The Journal of Wine Research, 19.2*
23. Parmiagini, A., 2007. Why do firms both make and buy? An investigation of concurrent sourcing. *Strategic Management Journal, 28*, 285-311.
24. Poppo, L., Zenger, T. 1998. Testing alternative theories of the firm: transaction cost, knowledge-based, and measurement explanations for make-or-buy decisions in information services. *Strategic Management Journal 19 (9),* 853-877.
25. Anderson, E., Schmittlein, D., 1984. Integration of the sales force: An empirical examination. *Rand Journal of Economics, 15,* 385-395.
26. Anderson, E., Weitz, B., 1992. The use of pledges to build and sustain commitment in distribution channels. *Journal of Marketing Research, 29*, 18-34.
27. Williamson, O.E., 1983. Credible commitments: using hostages to support exchange. *American Economic Review, 73*, 519-540.
28. Adler, T., Scherer, R. Barton, S., Katerberg, R., 1998. An empirical test of transaction costs theory: validating contract typology. *Journal of Applied Management Studies 7*, 185-200.
29. Grover, V., Malhotra, M., 2003. Transaction costs framework in operations and supply chain management research: theory and measurement. *Journal of Operations Management, 21,* 457-473
30. Fan, J., 2000. Price uncertainty and vertical integration: an examination of petrochemical firms. *Journal of Corporate Finance, 6,* 345-376.
31. Díez-Vial, I., 2007. Explaining vertical integration strategies: market oower, transactional attributes and capabilities. *Journal of Management Studies, 44,* 1017-1040.
32. Ohanian, N.K., 1994. Vertical integration in US pulp and paper industry, 1900-1940. *Review of Economics and Statistics, 76*, 202-207.
33. Benjamin, B.A., Podolny, J.M. 1999. Status, quality, and social order in the California wine industry. *Administrative Science Quarterly, 44 (3),* 563-589.

34. Coughlan, A.T., 1985. Competition and cooperation in marketing channel choice: theory and application. *Marketing Science 4(2)*, spring.
35. Hennart, J.F., 1991. The transaction costs theory of joint ventures: an empirical study of Japanese subsidiaries on the United States. *Management Science, 37*, 483-497.
36. Williams, R., 2006. Generalized ordered logit/partial proportional odds models for ordinal dependent variables. *The Stata Journal, 6*.
37. Carter, R., Hodgson, G., 2006. The impact of empirical tests of transaction cost economics on the debate on the nature of the firm. *Strategic Management Journal, 27*, 461-476.
38. Williamson, O.E., 2000. The new institutional economics: taking stock, looking ahead. *Journal of Economic Literature, 38 (3),* 595-613.
39. Hueth, B., Ligon, E., (2001). Agricultural markets as relative performance evaluation. *American Journal of Agricultural Economics 83 (2),* 318-328.
40. Zaheer, A., Venkatraman, N., 1995. Relational governance as an interorganizational strategy: an empirical test of the role of trust in economic exchange. *Strategic Management Journa,l 16*, 373-392.