The influence of the vertical integration decision on wineries performance

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1. Introduction

One of the most important choices facing an agrarian firm´s manager is the decision to integrate or outsource one or more stages of the production process (Butler and Carney, 1983, Leiblein et al., 2002; Díez-Vial, 2007). Popular arguments concerning the absolute benefits and shortcomings of outsourcing and vertical integration generate a lack of consensus on the performance implications of governance mode decisions in the agrarian literature (Azzam and Pagoulatos, 1999). For example, vertical integration improves supply chain coordination in comparison with outsourcing but implies greater bureaucratic costs (D´Aveni and Ravenscraft, 1994).

Transaction cost theory maintains an intermediate position in which the effects of individual sourcing decisions depend upon the underlying properties of the transaction (Williamson, 1991a). This framework has been applied to governance mode selection in a growing number of studies in agrarian organization (e.g., Allen and Lueck, 1992; Frank and Henderson, 1992; Hobbs, 1997; Dorward, 1999; Hobbs and Young, 2000; Boger, 2001; Goodhue et al., 2003; Aggarwal, 2007; Fernández-Olmos et al., 2009a, b). Empirical evidence in agriculture shows strong support for the premise that firms choose governance mechanisms consistently with transaction cost predictions (Allen and Lueck, 1995). However, evidence on the performance consequences of governance choice remains in short supply (Sampson, 2004; Hubbard, 2008).

To fill this gap, the goal of this paper is to examine the performance implications of governance mode choice in viticulture. Not only do we consider the tension between the potential benefits and risks associated with outsourcing in relation to vertical integration, but also we assess comparative perspectives on the performance implications of firms´ vertical integration decisions. Specifically, we examine the "discriminating alignment" tenet of transaction cost theory (Williamson, 1985), which focuses on the performance implications of the fit between firms´ governance choices and a set of specific attributes of the transaction at hand (e.g., Leiblein et al., 2002; Sampson, 2004; Geyskens et al., 2006). The paper also recognises that a problem may arise if we analyze the influence of transactional attributes on the performance of integration versus outsourcing, since the observed performance may be conditional upon unobserved variables influencing the vertical boundary choice. In order to assess and correct for this self-selection bias, we employ a Heckman two-stage regression model (Heckman, 1979).

Our sample is drawn from the Rioja Qualified Designation of Origin[1] (D.O.Ca.) wine market, with wines among the World's top 100 in 2008 (Wine Spectator). This is an ideal sector for studying the consequences of vertical integration decisions for two main reasons. First, only

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[1] D.O.Ca. is a designation applied to wine produced in a region with high quality designation of origin status. This is the highest level in the Spanish quality system and was introduced in 1991. Rioja is currently the only region belonging to this category.

a few papers have extended transaction cost economics (TCE) to include performance implications (e.g., Masten et al., 1991, Brouthers et al., 2003; Leiblein et al., 2002) and to the best of our knowledge no study has to date been conducted on data from neither viticultural firms nor agrarian firms in general. Second, a good performance in the first step of the wine value chain (i.e., acquisition of wine grapes) is an important dimension of competition in this market (Goodhue et al., 2003).

The remainder of the paper is divided into four sections. The following section provides the theoretical background and hypothesis for our study. Then, variables and data collection procedures are described. An empirical section follows that describe the findings of several models and how these are related to the hypotheses. The final section presents a discussion of the implications of the study and suggestions for future research.

2. Background

2.1. Implications of firms´ boundary decisions

While evidence on the determinants of firms´ boundary decisions is now plentiful, evidence on the implications of such decisions remains in short supply, particularly in agro-food chain organization. This lack of attention is surprising given that the constant pressure to meet customer demands and the need to be competitive while staying profitable represents one of the fundamental questions in the agrarian organization field. While empirical evidence on the implications of firms´ boundary decisions remains in short supply, numerous conceptual papers have described the potential advantages associated with outsourcing and vertical integration (e.g., Stuckey and White, 1993).

Outsourcing not only reduces high demand on capital, but it may also gain competitive edge within the supply chain, enabling a firm to stay flexible in the presence of high demand changes and take advantage of a contract manufacturer's expertise (Wisner et al., 2008). However, vertical integration may also enhance performance, chiefly because of better supply chain coordination (Buzzell, 1983; Sudarsanam, 2003). A unified control over the supply chain provides more opportunities to innovate and differentiate by means of a more efficient exchange of information (Edwards, 1953; Ziggers and Trienekens, 1999).

The opposing conclusions reached by these two groups of arguments are explained by different sets of underlying assumptions. Academic and practitioner literature emphasizing the benefits of outsourcing assumes that in many supply markets these are significant opportunities to leverage the capabilities. In these settings, rather than attempting to replicate the capabilities of a supplier it can be more convenient to outsource, in order to fully exploit the suppliers´ investments, innovations, and specialist capabilities (McIvor, 2005). In summary, many critical capabilities reside outside the boundaries of the firm and outsourcing enables firms to access these at lower costs (Burdon and Bhalla, 2005). In contrast, others scholars explain the benefits

of vertical integration as a reflection of superior capability to perform the activity within the firm in comparison to the capabilities of external providers. That is, they argue that the most valuable capabilities reside within the firm and that appropriation problems are significant (Jacobides and Hitt, 2005).

2.2. Unobserved attributes, determinants and implications of vertical boundaries

The preceding considerations suggest that the value of choosing a particular governance mode is strongly dependent upon critical assumptions regarding the nature of underlying resources; however, it is necessary a theory of the resource value in order to close arguments completely (Leiblein et al., 2002). While previous research within the agribusiness sector (e.g., Van der Vorst et al., 2005; Furtan and Sauer, 2008) is suggestive of a direct relationship between vertical integration decisions and performance, this direct comparison is appropriate only if firms´ governance choices are not influenced by other firm-or transaction-level characteristics.

It is generally recognized that firms´ governance choices are influenced by various firm- and transaction-level characteristics. Simple comparisons of integration decisions across firms facing similar environments- such as wineries in D.O.Ca. Rioja- suggest that firms differ dramatically in their make or buy decisions (Fernández-Olmos et al., 2009a). Numerous scholars (e.g., Madhok, 2002; Jacobides and Winter, 2005) have highlighted the role that firms´ capabilities play in defining boundaries of the firm. Likewise, it is likely that many of the firm- and transaction-specific characteristics alluded to above also influence the performance of these decisions. For instance, Vagnarelli (2000) states that best quality grapes come from well-managed vineyards.

A problem arises if there are unobserved attributes that influence both governance choice as well as performance. Shaver (1998) refers to this as an endogeneity problem. Then, a correction for self-selection would alleviate this problem to some extent, as this procedure controls for unobserved features of the transaction that influence the choice of governance mode and performance (e.g., Heckman, 1979; Maddala, 1983; Masten, 1993; Masten et al., 1991). Thus, standard ordinary least square models would not be appropriate because the effects of governance mode decisions can be confounded by unobserved factors that prompted the firm to choose one governance mode over another in the first place (Nakamura and Nakamura, 1998).

The following hypothesis was used to investigate if there is an endogeneity problem:

Hypothesis 1: *Unobserved attributes influencing firms´ governance mode decisions have performance consequences*

2.3. Discrimination alignment hypothesis and performance

Although an endogeneity problem may arise in the study of the influence of governance mode choice on performance, a theoretical discussion of this topic requires researchers to identify the determinants of this endogeneity and their causal relationships (Leiblein et al., 2002). Rooted in economic theory, TCE attempts to explain specific transaction-level

characteristics that influence the efficiency of alternative forms of governance. More specifically, the main hypothesis of TCE is that efficiency will be enhanced when transactions, which differ in their attributes, align with governance structures, which differ in their costs and competencies, in a discriminating (mainly, transaction cost economizing) way (Williamson, 1991b, p.79). In this way, TCE highlights the comparative efficiency of governance forms. For example, TCE holds that vertical integration possesses distinct advantages over markets in overcoming fundamental hazards in exchange, specifically hazards which arise when desired exchange requires exchange-specific investments by buyers and/or sellers (Argyres and Zenger, 2008). Compared to the market, however, vertical integration incurs additional bureaucratic costs (Klein, 2004).

Thus, central to the issue of performance should be the alignment between the firm´s governance strategy and the underlying attributes of the transaction. As an example, for transactions characterized by small numbers bargaining, integration is said to be able to reduce the potential for such opportunistic behaviour by aligning the interests of exchange parties, providing for the reconciliation of differences via fiat, and permitting a more effective sequentially adaptive decision-making process (Williamson, 1975, 1991a). While integration implies added bureaucratic costs, these costs are offset by the bilateral adaptive gains that result. When asset specificity is low, however, there is no need for vertical integration and market governance should be preferred because it avoids a loss in flexibility and decision-making speed due to the imposition of bureaucratic controls (Williamson, 1985, 1991a). Thus, in contrast to popular arguments concerning the absolute benefits or shortcomings of outsourcing and vertical integration, transaction cost theory proposes that efficiency is the product of matching transaction cost dimensions with appropriate governance structures. Based on this reasoning and on the scant existing empirical work relating transaction cost decisions to firm performance (Masten, 1993; Masten et al., 1991), we propose the following hypothesis:

Hypothesis 2: *The fit between governance mode decisions and relevant transactional attributes, highlighted by TCE, influences performance.*

3. Data and measures
3.1. The survey
The data for this study were collected through the use of a structural survey. We sought to develop a questionnaire that was adapted to the wine industry. The population from which the sample is drawn consists of wineries that fulfil the following requisites[2]: (1) they belong to the Rioja Designation of Origin, (2) they are wine-making processors, (3) they are obligated to present accounting information to the authorities and (4) they are not cooperatives.

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[2] The population was drawn from the 2007 list provided by the Regulatory Council of the Rioja Designation of Origin.

Although the survey was returned by 187 participants, only 175 provided performance information, 83 per cent of the population. In order to limit the influence of external shocks, the study period refers to the past 3-year period. A comparison of responding wineries with the population of all general wineries using the chi-square test 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.

3.2. Measures

3.2.1. Explanatory variables

In order to examine the proposition that viticultural performance differs across the governance mechanism chosen by the wineries, we define the variable GOV_MECH (Make) based on an 80 percent rule. If a winery integrates more than 80 percent of its grape needs, we classify that winery into the "make" category. The remaining wineries are classified into the "buy" category. There is little consensus in the literature regarding the value of percent cut-off that should be established. In this sense, whereas Poppo and Zenger (1998) use the 75 percent rule, other authors such as John and Weitz (1988) and Lilien (1979) use the 90 percent rule. To establish the robustness of the results, we have also performed a simulation exercise with the cut-off changed to 70% and 90%.

It is interesting to note that the collection of data on the "make or buy" decision was performed when the choice was already made. Thus, responses could not reflect accurately the managerial attitudes that shaped the decisions at the time the decision was made. Nevertheless, they reflect an adjusted perception (Brouthers et al., 2003).

The vector of characteristics used to determine the level of contracting hazards in the first stage probit model includes transaction-level measures for the specificity of the assets, the uncertainty, as well as controls for size, differentiation and experience.

- Specific assets: 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. Given the activity of this study, physical asset specificity and dedicated assets specificity are chosen (Fernández-Olmos et al., 2009a).

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. Wine grapes can be a highly specific asset for growers if they cannot easily find alternative use for the whole grape vintage. Likewise, physical asset specificity can be high for wine makers as wineries include technological equipment and casks for maturation, which cannot easily be redeployed. Many empirical studies find support to the basic TCE assumption that physical asset specificity is positively associated with the decision to integrate. These studies have used measures as diverse as the amount of specialization in a component (Masten,

1984; Ohanian, 1994), capital intensity (MacDonald, 1985; MacMillan et al*., 1986), small numbers of suppliers and buyers (Levy, 1985; MacDonald, 1985) and research and development expenditures (Caves and Bradburd, 1988; Frank and Henderson, 1992), with all being associated with a greater probability of integration. Two complementary measures of asset specificity were developed for our study. 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 of 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.

- Uncertainty*: A basic assumption of transaction cost theory is that all transactions are conducted under a certain level of imperfect information[3], which can preclude both the formulation of a contract ex-ante and/or the ability to verify compliance ex-post (Grover and 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 vertical integration have been found by Anderson (1985), Coles and Hesterly (1998), Fan (2000), Leiblein and 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 the mathematical average of two items that indicate respondents´ perceptions of uncertainty in grape yield and quality, respectively (correlation= 0.648, p<0.001).

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[3] Imperfect information is a necessary condition for asset specificity to induce vertical integration. Without uncertainty, a perfect contract covering full contingencies could be written and hence, there would be no need for vertical integration (Fan, 2000).

Nevertheless, although transactions will be completed less smoothly than in more certain environments, the market mode is still advantageous. Hence, environmental uncertainty per se does not favour vertical integration, only in interaction with asset specificity (Williamson, 1979; 1985). This interaction effect between environmental uncertainty and specificity has been found by Anderson (1985), Fan (2000), Leiblein and Miller (2003) and Díez-Vial (2007). Following Coles and Hesterly (1998), this condition was operationalised by means of an interaction between a dummy variable (δ) and environmental 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.

The second one (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). This general prediction has gained some degree of support in empirical research (e.g. Anderson and Schmittlein, 1984; Anderson, 1985; Gatignon and Anderson, 1988; John and Weitz, 1988; Majumdar and Ramaswamy, 1994). Difficulty in evaluating performance may occur in the viticulture activity for two reasons. First, it is difficult to assess objectively the grape quality (Oczkowski, 2001). Second, responsibility for vineyard production may not be assignable to an individual grower when a team of growers have worked the same vineyard. One question adapted from Anderson and Schmittlein (1984) addressed the perceived difficulty of measuring the results of individual growers equitably.

- Size: This has been measured with a number of different variables in the literature, such as assets (Anderson, 1985), sales (Pisano, 1990; Leiblein and Miller, 2003) or the logarithm of capacity (Ohanian, 1994). In the case of 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 and Podolny, 1999). The logarithm of the latter is used because the variables based on assets owned by the winery are directly dependent upon the decision to integrate production activities (Leiblein and Miller, 2003).

We use items on seven-point scales anchored by "strongly disagree" and "strongly agree" to measure transaction cost dimensions, specificity and uncertainty. This form of measuring presents the disadvantage of its subjectivity, since it depends on a personal evaluation. However, subjective estimations of specificity and uncertainty have been frequently used in empirical studies, which is mainly due to the absence of direct qualitative information (e.g., Anderson and Schmittlein, 1984; Anderson and Coughlan, 1987; Anderson and Weitz, 1992).

- Differentiation effect: Another factor that may affect the governance mechanism choice is whether differentiation is an important feature of the delivered product. Agricultural products in general, and viticulture in particular, are extremely sensitive to differentiation effects. In the

wine grape supply industry, differentiation is a critical issue, and one which is important for distinguishing competitors. If a winery has a reputation for highly differentiated wines, given the relatively low price sensitivity of consumers, it will have a distinct competitive advantage over other wineries which do not have the same reputation. When the importance of differentiation is combined with measurement problems, contracting poses special hazards, consistent with the standard moral hazard problem. In this sense, wineries producing highly differentiated wines are exposed to serious risks of loss and damage if the quality of the grapes they use is not as expected. Consequently, such wineries will seek maximum control of the process in order to minimize the chance of losing reputation. As third party use is associated with loss of control (Fernie, 1989), we hypothesise that wineries producing differentiated wines are more likely to integrate their grape production. Coles and Hesterly (1998) tested this theory using hospital services. Their findings support the proposition that hospitals will be more likely to integrate services when there is a significant potential for causing an impact on quality and causing harm to a patient. The findings of Coughlan and Flaherty (1983) and Coughlan (1985) also support the proposition that differentiated products are more likely to be integrated.

Previous studies (e.g. Coughlan and Flaherty, 1983; Coughlan, 1985; Anderson and Coughlan, 1987) 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 used by Coles and 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, coded 1 if a winery produces at least 50 percent of the first group and zero otherwise; on the other, high added value, coded 1 if a winery produces at least 50 percent of the third group and zero otherwise.

- Experience: It can be hypothesized that a firm with production experience will be more likely to integrate because it provides learning opportunities that enhance its production capabilities, according to the resource and capability view of the firm. Empirical evidence has been provided to support this idea (e.g., Brouthers et al., 2003; Leiblein and Miller, 2003; Bigelow and Argyres, 2007). Following prior empirical studies (e.g., Gatignon and Anderson, 1988; Hennart, 1991; Padmanabhan and Cho, 1996; Brouthers et al., 2003), we measure experience as the number of years that a company has in the wine-making activity.

3.2.2. Control variables

Although our primary interest is to develop a parsimonious model of the relationship between the governance mechanisms used to manage viticulture activity and its performance, we are aware that other factors may influence our results. For example, the age of a vineyard is directly related to the grape quality in D.O.Ca. Rioja (Ruiz, 1996). Likewise, existing literature revealed that grower´s age has very contradictory results in different studies. The reason is that age can be interpreted in different ways. On the one hand it implies the level of experience as a manager; that is, the older the manager the more experience he has. Coherent with this argument, Burki and Terrel (1998) found a positive dependency between experience of entrepreneurs and efficiency of the firm. On the other hand young managers are more inclined to innovations and marketing. Corroborating this hypothesis, Bremmer (2004) and Wilson and Hadley (1998) showed that farmer´s age has negative impact on technical efficiency. Another example of a factor that may influence our results is given by Hidalgo (2003), who argues that the soil and climate conditions of each subzone in D.O.Ca. Rioja influence on grape quality.

There are several studies that have found no relationship between the size and performance in the agribusiness sector (e.g., Chen et al*.,* 1985; Kumar, 1985; Fulton et al., 1995; Wagner, 1992). Based on this literature, we have not included the size as an explanatory variable of performance[4].

In order to ensure that our estimated relationships are not unduly influenced by such factors, we include in the models a series of control variables. We defined vineyard age as the number of years that had passed since the vineyard was planted. Similar to Allen and Lueck (1992), grower age was measured using the following intervals of years: 1=<25, 2=25 to 34…, =>65 years. According to the classification established by the Regulatory Council of the Rioja Designation of Origin, there are three subzones which are distinguished by their soil and climate conditions: Rioja Alta, Rioja Alavesa and Rioja Baja. As there are three subzones, we code them with two dummy variables; on the one hand, Rioja Alta*,* coded 1 if at least 50 per cent of the grapes that a winery uses come from Rioja Alta and zero otherwise; on the other, Rioja Alavesa*,* if at least 50 per cent of the grapes that a winery use come from Rioja Alavesa and zero otherwise.

3.2.3. Performance

Consistent with previous empirical studies (Mohr and Spekman, 1994; Goodman et al., 1995; Poppo and Zenger, 1998), we measure governance mode success as the level of winery manager's satisfaction with exchange performance. This perceptual measure considers that high levels of satisfaction represent realized performance expectations (Poppo et al., 2008). Moreover, utilizing subjective measures may provide valuable insights on performance not attainable though objective financial measures (Brouthers and Nakos, 2004). We measure the

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[4] Our empirical results corroborate that this variable results insignificant in the models tested.

level of satisfaction with four common performance goals, inferred from some interviews with wineries managers, to guide the general evaluation of exchange performance (1) the overall cost; (2) price stability of the input; (3) supply stability of input; and (4) input quality (1=dissatisfied, 7=satisfied). The reliability of the performance construct was good: the Cronbach-α was 0.848.

3.3. Methodology

A preliminary analysis was conducted to determine the relationships between pairs of independent variables. Table 1 provides means and standard deviations of the variables as well as the Spearman´s correlations[5] for each pair.

INSERT TABLE 1

Heckman (1976, 1979) proposed a two-step approach to resolving the endogeneity problem underlying on the performance model specification that we use here. In the first step, Heckman recommends identifying the predictors of the decision. In step two, scholars control for the predictor variables and other unmeasured firm characteristics that affect the decision by including the predictor variables and a correction for self-selection in a performance model.

The first step involves estimation of the selection equation parameters (β) using probit model (with GOV_MECH (Make) dummy as dependent variable) by the method of maximum likelihood:

$$\text{Prob}(Y_i=1)=\Phi(\beta'X_i)$$

Where Y_i is the governance choice variable for the ith observation, X_i is a vector of characteristics that determine the transaction hazards, β is a vector of estimated coefficients for these characteristics, and $\Phi(\cdot)$ is the standard normal cdf.

The estimation gives the "inverse Mill´s ratio" (λ) from the selection equation:

$$\lambda = \frac{\phi(\beta'X_i)}{\Phi(\beta'X_i)}$$

where, $\phi(\cdot)$ and $\Phi(\cdot)$ are the probability density function and the cumulative distribution function for a standard normal random variable, respectively.

The second step involves adding the inverse mills ratio to the response equation (i.e. Performance equation) to obtain consistent estimates using OLS method.

4. Empirical findings

4.1. First-stage governance choice estimates

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[5] The Kolmogorov-Smirnov test determined that the variables are not normally distributed. So we cannot use Pearson´s correlations.

Table 2 reports the marginal effects for the probit models of governance mode choice. The models utilized in this first step differentiate wineries that buy their grape from those that internalize viticulture production for each cutoff (70, 80 and 90).

The findings in these models are generally consistent with the predictions of Transaction Cost Theory and with the other variables not based on transaction costs (see table 2). Evidence of the robustness of the results is provided by the statistical significance of the coefficients, which are similar in the presence of different cut-offs. Only two variables of our model do not affect the governance mode choice. One is the coefficient for the winery's physical asset specificity, which is not significant in any model. However, this result is consistent with the fact that a winery's profitability is increasingly not limited to winemaking (Lumbreras, 2004). The second one belongs to being a producer of relatively low quality product.

The primary argument put forth in this paper is that viticultural performance is influenced by the degree to which each particular transaction is appropriately governed. To test this proposition, we follow Brouthers et al., (2003) and developed a dummy variable, Governance Fit. To do it, we used probit analysis to separate our responding wineries in two groups: Fit wineries and Non-fit wineries. Fit wineries, those that used the governance mechanism prescribed by the model (i.e., wineries that the model correctly classified), were coded as 1. Non-fit wineries, those that used the governance mechanism inconsistent with the model´s prediction, were coded as 0.

INSERT TABLE 2

4.2. Second-stage performance estimates

Table 3 provides the results of our OLS regression analysis for examining the impact of Fit on performance, controlling for numerous other potential performance influences. To assess potential problems of multicollinearity, variance inflation factors (VIFs), conditioning indices, and variance decomposition proportions were calculated (see table 4). The maximum VIF obtained in the three models is 2.10, which is substantially less than the conservative cut-off of 10 for multiple regression models (Neter et al., 1985; Hair et al., 1998). Likewise, the maximum conditioning indices for these models was 13.31, which is well-below the cutoff value of 100 used to identify substantial variance inflation (Besley et al., 1980). These results lead us to conclude that the regression estimates presented in table 3 are not biased by the presence of multicollinearity.

All models present satisfactory indicators of overall significance, with F-Snedecor values corresponding to levels of significance lower than 0.001. The percentages of the variance in performance explained by them are over 18 and 23 percent.

As table 3 shows, we controlled the estimation for a number of variables described before, such as winery's age, grower's age, vineyard's age, subzones (using Rioja Alta and Rioja Alavesa dummy variables) and governance mode (VI, vertical integration). Elder growers and older vineyards tended to be significantly ($p<0.05$) related to better performance. The rest of these control variables were not significantly related to performance.

With respect to the self-selection correction term (λ) it was significantly negatively ($p<0.01$) related to performance, indicating that unobserved characteristics affect the make or buy decision and performance. This result suggests that the influence of governance mode choice on viticultural performance is largely driven by a self-selection process and that wineries´ governance choices for their needs of grape are appropriately treated as endogenous, corroborating our first hypothesis. The negative parameter estimate for the self-selection term further indicates that the greater the firm´s propensity to vertically integrate based on its unobserved characteristics, the higher its viticultural performance[6].

The variable Fit was a significant ($p<0.05$) predictor of performance. The positive sign supports our second hypothesis that governance mode decisions based on TCE provide firms with superior performing governance modes.

INSERT TABLES 3 AND 4

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5. Conclusions and implications

The actors in the field of agribusiness management are interested in describing and understanding why agrarian firms differ in their governance mode choices and how this affects subsequent performance. Indeed, much of the work in the field can be categorized into studies that have explained the make-or-buy decision for the agrarian firm (e.g., Frank and Henderson, 1992; Goodhue et al., 2003; Fernández-Olmos et al., 2009a), and those that have examined its performance implications (e.g., McBride, 1983; Ghemawat and Caves, 1986; Bhuyan, 2002). A majority of the papers in the first group estimates governance choice models rather than examining performance directly. These models are often used to draw normative implications under the implicit assumption of the presence of a selection environment that ensures that observed governance choices are efficient (Leiblein et al., 2002). In contrast to the previous one, the second group of studies examines the performance implications of strategic decisions. These studies need to address the endogeneity problem that may arise when such decisions are closely linked to unobserved attributes, and these decisions are made based on firms´ performance expectations (Shaver, 1998). In such situations, a two-step approach permits an integrative model that simultaneously captures firms´ vertical boundary decisions as well as the observed

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[6] See Dolton and Makepeace (1987) for an exhaustive explanation about the interpretation of the self-selection coefficient term.

and unobserved determinants of these decisions and their performance implications. In order to obtain unbiased results in these settings, empirical models must correct for endogeneity (i.e., simultaneously address firms´ governance choices as well as their drivers and consequences), which is a fundamental challenge in management literature (Hamilton and Nickerson, 2003).

This study examines the relationship between governance choice and performance while controlling for selection biases with a two-stage model in D.O.Ca. Rioja wine industry. This paper presents two main conclusions. First, our results do not support the widespread belief that production sourcing strategies have significant direct effects on performance. Based on this result, universalistic normative implications concerning to deciding on whether or not to integrate can not be drawn. Second, we found support for the performance implications of transaction cost theory. Choosing integration in response to transaction hazards increase performance. The most important implication of the significance of the self-selection term in the model is that other factors, distinct from transaction cost factors, influence governance choice and are also influencing performance. This creates empirical evidence that a convergence between TCE and resource-based view create a more satisfactory account of what drives vertical boundaries, in accordance with previous studies (e.g., Jacobides and Winter, 2005).

The paper also highlights some limitations which bring forth some interesting possible avenues for future research. Scholars suggest that perceptual measures of performance should be used where firms may be reluctant to disclose financial data (Brouthers et al., 2003) and this is the reason why our model estimation is based on a perceptual measure of performance. Hence, an attractive opportunity for research would be to test this model by using objective financial measures. Nevertheless, subjective measures of performance have been found to be highly correlated with objective performance measures (Dess and Robinson, 1984; Glaister and Buckley, 1998).

Although our study has focused on the performance implications of the simple dichotomy between the decision of internalization versus outsourcing, we are sensitive to the fact that there is a wide array of outsourcing mechanisms, such as long term contracts (Joskow, 2005). All of them share some common features, but they exhibit many distinct strengths and weaknesses that may differentially affect performance (Williamson, 1991b).

In summary, efforts to identify unobserved factors of agrarian firms´ governance choices, to examine other governance mechanisms, and to estimate with other measures of performance may contribute to build a more integrative research framework for the implications of governance mode choice in agrarian firms.

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Table 1
Spearman´s correlations

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
1	1																
2	0.298**	1															
3	0.309**	0.236**	1														
4	0.366**	0.339**	0.100	1													
5	0.461**	0.303**	0.077	0.292**	1												
6	0.401**	0.147	0.296**	0.220**	0.339*	1											
7	-0.371**	-0.084	-0.007	-0.211**	-0.305*	-0.124	1										
8	-0.046	-0.014	-0.066	0.009	0.075	0.014	-0.225**	1									
9	0.241**	0.011	0.127	-0.039	-0.019	0.065	0.108	-0.393**	1								
10	0.200**	0.022	0.118	0.032	-0.033	0.088	0.110	-0.043	0.111	1							
11	0.233**	0.057	0.034	0.136	0.077	0.084	-0.208*	-0.157*	0.259**	0.107	1						
12	-0.009	0.003	-0.031	-0.092	-0.062	0.060	0.048	-0.027	0.121	0.131	0.075	1					
13	-0.022	0.017	0.022	-0.087	-0.015	0.172*	0.031	-0.199**	0.063	0.043	-0.014	0.026	1				
14	0.108	-0.002	-0.056	0.086	0.110	0.017	-0.197*	0.062	0.038	0.146	0.143	0.076	-0.619**	1			
15	0.316**	0.092	0.148	0.141	0.200**	0.161*	-0.230*	-0.004	0.138	0.217**	0.188*	0.117	-0.131	0.158*	1		
16	-0.749**	-0.389**	-0.452**	-0.507**	-0.627**	-0.548**	0.513*	0.073	-0.332**	- 0.235**	-0.291**	0.005	-0.043	-0.151*	-0.375**	1	
17	-0.089	-0.106	0.029	-0.184*	0.036	-0.041	0.084	0.047	0.061	0.091	-0.001	-0.001	-0.052	0.093	0.143	0.085	1
Mean	0.451	4.789	4.520	3.794	4.846	3.549	14.120	0.417	0.177	34.537	29.206	2.754	0.417	0.349	5.530	1.264	0.857
DV	0.499	2.064	1.853	2.107	1.634	1.896	1.342	0.495	0.383	46.222	13.959	0.892	0.495	0.478	0.986	1.158	0.351

1. VI 2.Downstream physical asset specificity 3.Upstream physical asset specificity 4.Dedicated asset specificity 5.Environmental uncertainty 6.Behavioural uncertainty 7. Size 8.Low added value 9.High added value 10.Winery Experience 11.Vineyard age 12.Grower's age 13.Rioja Alta 14.Rioja Alavesa 15.Performance 16.Inverse Mills Ratio (λ) 17.Fit

Table 2
Marginal effects for binary logit models

Dependent variable	GOV_MECH (Make)		
	Cut-off: 90	Cut-off: 80	Cut-off: 70
Downstream physical asset specificity	0.025	0.021	0.024
	(0.024)	(0.029)	(0.039)
Upstream physical asset specificity	0.043*	0.094***	0.077**
	(0.025)	(0.033)	(0.034)
Dedicated asset specificity	0.073***	0.078***	0.073***
	(0.022)	(0.028)	(0.028)
Environmental uncertainty*δ	0.064**	0.136***	0.137***
	(0.031)	(0.040)	(0.041)
Behavioural uncertainty	0.064***	0.098***	0.121***
	(0.024)	(0.031)	(0.035)
Size	-0,167***	-0.231***	-0.258***
	(0.038)	(0.050)	(0.053)
Low added value	-0.029	-0.083	-0.227*
	(0.096)	(0.119)	(0.122)
High added value	0.385***	0.512***	0.340***
	(0.130)	(0.114)	(0.120)
Winery Experience	0.003**	0.004***	0.007***
	(0.001)	(0.002)	(0.002)
McFadden´s Adj R^2	0.332	0.441	0.454
Likelihood ratio Test	-67.089	-57.329	-56.254
Chi-square statistic	0.000	0.000	0.000
Predicted capacity	80.57%	85.71%	89.14%
Sensitivity	70.77%	82.28%	90.80%
Specificity	86.36%	88.54%	87.50%
Number of observations	175	175	175

Notes:

(*), (**), (***) indicate parameter significance at the 10, 5 and 1 per cent level, respectively

Marginal effects are computed at the sample means. Standard errors in parenthesis

Sensitivity: % of observations correctly predicted as 1   Specificity: % of observations correctly predicted as 0

δ It represents the non-trivial degree of specificity

Table 3
Marginal effects for OLS regression models

Dependent variable	Performance		
	Cut-off: 90	Cut-off: 80	Cut-off: 70
Grower´s age	0.173**	0.154**	0.165**
	(0.079)	(0.077)	(0.079)
Winery experience	0.001	0.001	0.001
	(0.002)	(0.002)	(0.002)
Vineyard age	0.010*	0.009*	0.009*
	(0.005)	(0.005)	(0.005)
Rioja Alta	-0.190	-0.264	-0.226
	0.182	(0.176)	(0.182)
Rioja Alavesa	0.086	-0.052	-0.039
	(0.192)	0.187	(0.192)
VI	0.154	0.171	0.118
	(0.184)	(0.184)	(0.193)
Fit	0.381**	0.556***	0.473**
	(0.183)	(0.197)	(0.226)
Inverse Mills Ratio	-0.253***	-0.252***	-0.289***
	(0.097)	(0.082)	(0.089)
R^2	0.179	0.226	0.224
F-Snedecor statistic	0.000	0.000	0.000

Notes:

(*), (**), (***) indicate parameter significance at the 10, 5 and 1 per cent level, respectively

Standard errors in parenthesis

Table 4
Variance Inflation Factors (VIF)

	VIF		
	Cut-off: 90	Cut-off: 80	Cut-off: 70
Grower´s age	1.04	1.03	1.03
Winery experience	1.11	1.11	1.12
Vineyard age	1.09	1.07	1.08
Rioja Alta	1.69	1.68	1.70
Rioja Alavesa	1.75	1.76	1.76
VI	1.66	1.86	1.96
Fit	1.10	1.05	1.04
Inverse Mills Ratio	1.81	2.01	2.10
Mean VIF	1.41	1.45	1.48