THE IMPACT OF TECHNICAL CONSULTANTS ON THE QUALITY OF THEIR CLIENTS' PRODUCTS: EVIDENCE FROM THE BORDEAUX WINE INDUSTRY

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Research summary: *Recent research rooted in the resource-based view of the firm suggests that resources are more likely to create value if they are effectively managed. An underlying assumption of the literature is that firms manage their resources on their own. However, many firms hire consultants to help them do so. In this study, I develop and test hypotheses regarding the impact of technical consultants on the quality of their clients' products. Using data from the Bordeaux wine industry, I find evidence that the use of technical consultants has a positive impact on relative product quality and a negative impact on the extremeness of relative product quality. Moreover, the positive impact of technical consultants on relative product quality is stronger at lower levels of relative resource quality.*

Managerial summary: *Findings from a study in the Bordeaux wine industry indicate that the decision to hire consultants should depend on a firm's strategy. If a firm wants to improve its performance, it should hire consultants. Indeed, the "best practices" of technical consultants are generally more valuable than internally generated knowledge. If a firm wants to achieve outstanding performance, hiring consultants may not be the right decision. Because the "best practices" of technical consultants have more certain performance implications than internally generated knowledge, they decrease the likelihood of extremely low performance. However, their lack of uniqueness also decreases the likelihood of extremely high performance. Finally, the decision to hire consultants should depend on the quality of a firm's resources. Firms with low-quality resources tend to benefit more from the "best practices" of technical consultants.* Copyright © 2016 John Wiley & Sons, Ltd.

"You have to remember that producers have two goals. The first is to make the best wine possible and the second is to sell it. That is the reality of today's wine market. It's not like my grandfather saying, 'well, this year isn't very good, but there's always next year.' Châteaux are just like companies, with staff overheads and taxes, and they have to make money to survive." (winemaking consultant Michel Rolland quoted in Stimpfig, 2003)

The resource-based view (RBV) of the firm is a dominant perspective in the strategic management literature (Amit and Schoemaker, 1993; Barney, 1991; Peteraf, 1993; Wernerfelt, 1984). According to the RBV, resources can only lead to superior performance if they are valuable and rare. However, owning valuable and rare resources is unlikely to be sufficient. The potential of resources will only be realized if they are effectively managed (Barney, 1995; Hansen, Perry, and Reese, 2004; Sirmon, Hitt, and Ireland, 2007). Recent empirical evidence suggests that resource management influences

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performance. Indeed, several studies have shown that the ability to manage resources is positively related to resource productivity (Holcomb, Holmes, and Connelly, 2009; Huesch, 2013; Sirmon, Gove, and Hitt, 2008). They have also shown that the positive relationship between the ability to manage resources and resource productivity is contingent on the quality of resources. Specifically, resource management seems to matter more at lower levels of resource quality (Holcomb *et al.*, 2009; Sirmon *et al.*, 2008).

An implicit assumption of the RBV literature is that firms manage their resources on their own. As Sirmon, Hitt, Ireland, and Gilbert (2011: 1403) pointed out: "To date, research on managerial action in realizing competitive advantages has assumed the actor to be the general manager (i.e., chief executive) or has not specified the manager's level." However, an increasingly large number of firms hire consultants to help them do so (Bergh and Gibbons, 2011; Sturdy, 2011). This phenomenon poses a challenge to the RBV. According to the RBV, the objective is not only to do well, but also to do better than others. Thus, performance is best understood as relative rather than absolute (Drnevich and Kriauciunas, 2011; Sirmon *et al.*, 2008, 2010). Consultants are likely to improve the absolute performance of their clients. That is, a firm may perform better after hiring a consultant than before. However, most firms have access to consultants, and it is not fully clear whether consultants can also improve the relative performance of their clients.

In this study, I make three contributions to the RBV literature. First, I examine the impact of technical consultants on relative product quality. A major distinction can be made between management and technical consultants. Unlike management consultants, technical consultants are specialists that rely on a deep expertise in activities such as engineering (Hargadon and Sutton, 1997), information technology (Ko, Kirsch, and King, 2005), or manufacturing (David and Strang, 2006; Dyer and Nobeoka, 2000). As Kirby and Jones-Evans, 1997: 158) put it: "The role of a technical consultant is the provision of expertise in specific technological disciplines, rather than in generic areas of management expertise." Provided not all firms use technical consultants, I expect their "best practices" to have a positive impact on relative product quality (Hitt *et al.*, 2001; Ofek and Sarvary, 2001). Second, I explore the impact of technical consultants on the extremeness of relative product quality. As the

"best practices" of technical consultants are more tested than internally generated knowledge, they should reduce the likelihood of extremely low product quality. However, they are less unique than internally generated knowledge. Thus, they should also reduce the likelihood of extremely high product quality (Bierly and Chakrabarti, 1996; Devaughn and Leary, 2007). Third, I explore when technical consultants matter more to relative product quality. Technical consultants have more room to leverage their "best practices" at lower levels of resource quality (Holcomb *et al.*, 2009; Sirmon *et al.*, 2008). Therefore, their impact on relative product quality should be more pronounced when relative resource quality is low.

WINEMAKING CONSULTANTS IN THE BORDEAUX WINE INDUSTRY

The empirical setting of this study is the Bordeaux wine industry. Key constructs of the RBV are difficult to operationalize (Priem and Butler, 2001). The Bordeaux wine industry provides a unique opportunity to test my hypotheses because wineries are comparable across many dimensions. However, they differ in the quality of their main productive resource (the terroir) and their use of winemaking consultants. In addition, product quality can be assessed using readily available tasting scores.

For consultants to be valuable, they must either help reduce costs or increase willingness to pay (Ofek and Sarvary, 2001; Porter, 1980). Bordeaux wineries primarily hire winemaking consultants to help them make better wines. As winemaking consultant Michel Rolland put it: "My job is to make my client's wine better. Even if the wine or the winery is awful, we have to do our best in the conditions we have" (Stimpfig, 2003). The underlying rationale is that better wines can be sold at higher prices (e.g., Benjamin and Podolny, 1999; Hadj Ali, Lecocq, and Visser, 2008; Hay, 2007, 2010; Masset, Weisskopf, and Cossutta, 2015; Roberts and Reagans, 2007). Like other consultants, winemaking consultants make recommendations. As the editors of the *Revue du Vin de France* (2014) explained, they "assist and coach the owners of prestigious and less prestigious wineries throughout the year: management of the vines, date of harvest, ageing and blending of the wines. All these elements eventually shape the taste of wines." Though winemaking

consultants can help implement their recommendations, cellar masters remain responsible for the day-to-day management of wine operations (Chauvin, 2010).

Michel Rolland, the Boissenot (Jacques and his son Eric), and Stéphane Derenoncourt are the most influential winemaking consultants in the Bordeaux wine industry. As Asimov (2006) put it: "Michel Rolland (is) the world's most famous wine consultant—perhaps the world's only famous wine consultant." While few people outside of Bordeaux have heard of the Boissenot and Stéphane Derenoncourt, they are also very influential. Clients of the Boissenot include wineries such as four of the five First Growths from the Médoc (Château Lafite-Rothschild since 1976, Château Margaux since 1987, Château Latour since 2000, and Château Mouton-Rothschild since 2005). Jacques Boissenot died in September 2014, but he had handed over most of his clients to his son Eric over the past decade. Stéphane Derenoncourt is currently working for wineries such as seven of the eighteen First Great Growths from Saint-Emilion (Château Beauséjour, Château Canon la Gaffelière, Clos Fourtet, Château La Gaffelière, Château Larcis Ducasse, Château La Mondotte, and Château Pavie Macqin). Michel Rolland and Jacques Boissenot were trained by Emile Peynaud at the University of Bordeaux. Emile Peynaud is known as the "father of modern oenology." He was also one of the first winemaking consultants. Between the 1940s and the 1970s, he advocated many of the "best practices" that are still used by winemaking consultants. They include the use of new oak barrels, smaller yields, and later harvests (Guillard, 1995).

THEORY AND HYPOTHESES

Technical consultants and relative product quality

Firms essentially hire technical consultants to benefit from their knowledge (Hansen, Nohria, and Tierney, 1999; Werr and Stjernberg, 2003). The knowledge of technical consultants has two main origins: (1) the expertise they have gained through their education and training, and (2) the experience they have accumulated working with their different clients (Hitt *et al.*, 2001; Ofek and Sarvary, 2001). Winemaking consultants are no exception to this

rule. According to Michel Rolland: "What I bring is a range of experience and a span of reference that other people here, however talented they might be, do not have" (Carlin, 1994). As Eric Boissenot also put it: "The fact that we see so many properties means that we have more of a vision than someone who knows only their property" (Robinson, 2009).

Importantly, the *raison d'être* of technical consultants is not to provide their clients with ordinary knowledge. It is to develop "best practices" and use them to improve their clients' performance (Ernst and Kieser, 2003). A "best practice" can be defined as a set of interrelated work activities repeatedly utilized by individuals or groups that a body of knowledge demonstrates will yield an optimal result (Tucker, Nembhard, and Edmondson, 2007: 894). Technical consultants often extract "best practices" from successful firms (Hargadon and Sutton, 1997). Lean production is a classic example. In the late 1980s, a team of researchers from the MIT studied Japanese carmakers. The project resulted in the identification and transfer of lean production techniques to other carmakers and firms in other industries (Wellstein and Kieser, 2011; Womack, Jones, and Ross, 1990). Alternatively, technical consultants can develop "best practices" from scratch using their expertise and experience. As Michel Rolland explained: "I studied the history of the great harvests we'd had here in Bordeaux, I looked for the common denominators. And what I found was that on those years there had been a lot of sun and low production. Very simple, very obvious. So I thought, OK, here are two factors that we can act on. What we'll do is lower the production and seek to harvest more mature grapes" (Carlin, 1994).

A potential limitation of "best practices" is that they tend to be less unique than internally generated knowledge (Bierly and Chakrabarti, 1996; Devaughn and Leary, 2007). Even if "best practices" lack the uniqueness of internally generated knowledge, I expect them to enhance relative product quality for two reasons. First, uniqueness does not guarantee success. It may also lead to failure. On average, "best practices" are more valuable than internally generated knowledge (Denrell, 2003, 2005; Drnevich and Kriauciunas, 2011; Greve, 2009). Second, prior research suggests that relative performance improves when a firm uses valuable knowledge more than its competitors (Castanias and Helfat, 2001; Drnevich and Kriauciunas, 2011; Sirmon *et al.*, 2010). Not all firms in an industry hire technical consultants. Even if "best practices"

per se are not unique, their implementation can be rare. Therefore, "best practices" may not only improve absolute performance, but also relative performance. As Drnevich and Kriauciunas (2011: 261) put it: "A firm's use of industry 'best practices,' which are superior to the practices of an individual firm … may provide firms using the best practices with competitive advantages." Taken together, these arguments suggest that the less unique but more valuable "best practices" of technical consultants enhance relative product quality.

Hypothesis 1: The use of technical consultants has a positive effect on relative product quality.

Technical consultants and extremeness of relative product quality

As explained above, technical consultants are likely to represent a valuable source of knowledge for their clients. Yet, their "best practices" are less unique than internally generated knowledge. There are clear implications for the extremeness of relative product quality (Chatterjee and Hambrick, 2007; Sanders and Hambrick, 2007; Singh and Fleming, 2010; Tang, Crossan, and Rowe, 2011).

On the one hand, the "best practices" of technical consultants are derived from their expertise and experience working with different clients. Because "best practices" are more tested than internally generated knowledge, they have more certain performance implications (Tucker *et al.*, 2007). Hence, firms that use technical consultants are unlikely to experience "big failures" (i.e., extremely low performance). On the other hand, "best practices" are less unique than internally generated knowledge. As pointed out above, uniqueness is not a sufficient condition for success. However, it is a necessary condition for success (Litov, Moreton, and Zenger, 2012). Internally generated knowledge is more heterogeneous than "best practices." While it is generally less valuable, there are exceptions to this rule (Drnevich and Kriauciunas, 2011). Outstanding performance requires the combination of extremely valuable and rare knowledge. Only internally generated knowledge can meet these two requirements. Therefore, technical consultants may prevent their clients from achieving "big successes" (i.e., extremely high performance) (Tang *et al.*, 2011).

In the Bordeaux wine industry, winemaking consultants remain somewhat controversial. While they may promote nothing more than improved winemaking techniques and greater responsiveness to the preferences of consumers, they are sometimes reproached for imparting the same style to all the wines they help make. In the *Mondovino* documentary for instance, Michel Rolland is shown as he advises several clients to "micro-oxygenate" their wines (Nossiter, 2004). Micro-oxygenation is a practice that involves injecting controlled doses of oxygen into wines during fermentation or barrel-ageing. This winemaking "best practice" softens tannins, minimizes the need for racking, and makes wines easier to drink when they are still young. However, it may also drive out the uniqueness of wines (Hay, 2007). Outstanding Bordeaux wines are often made by in-house winemakers. For instance, the owners of Petrus have never used winemaking consultants. From 1963 to 2007, wines were made by Jean-Claude Berrouet, an in-house winemaker. When he retired in 2007, his son Olivier took over as the in-house winemaker.

In sum, I expect the "best practices" of technical consultants to be a double-edged sword for their clients. Because they have more certain performance implications than internally generated knowledge, they should decrease the likelihood of extremely low relative product quality. Because they lack the uniqueness of the most valuable internally generated knowledge, they should also decrease the likelihood of extremely high relative product quality.

Hypothesis 2: The use of technical consultants has a negative effect on the extremeness of relative product quality.

Technical consultants, relative resource quality, and relative product quality

The above sections describe how technical consultants independently influence relative product quality and the extremeness of relative product quality. However, I do not intend to imply that technical consultants influence relative product quality equally for all their clients. It is important to account for the fact that clients differ in the quality of their resources. In this section, I focus on the joint impact of technical consultants and relative resource quality on relative product quality. Consistent with Holcomb *et al.* (2009), I define "resource

quality" as the value creation potential of a resource.

When relative resource quality is low, technical consultants have a lot of room to add value by leveraging their "best practices" (Holcomb *et al.*, 2009; Sirmon *et al.*, 2008). To some extent, they may even compensate for the low quality of resources. Hence, the impact of technical consultants on relative product quality should be particularly strong. In the Bordeaux wine industry, the terroir is the main productive resource. As Lewin (2009: 2) explained: "The French have a single word to describe the potential of a plot of land for wine production: terroir implies that each vineyard has a unique combination of soil, aspect, and climatic features that determine what type and quality it is capable of producing. The basic concept is pretty simple: other conditions being equal, one plot of land will always produce better wine than another, because its terroir is better." Wineries with a low-quality terroir are likely to benefit a lot from the help of winemaking consultants. Château de Valandraud is a case in point. This winery was founded by Jean-Claude Thunevin as a "garagiste" winery. "Garagiste" wineries are properties that have a low-quality terroir. They produce wines in small quantities using the most advanced winemaking "best practices." Without the help of Michel Rolland, Château de Valandraud would never have been considered as an "outstanding producer" by wine critic Robert Parker (Parker, 2003).

The impact of technical consultants on relative product quality is likely to be less strong when relative resource quality is high (Holcomb *et al.*, 2009; Sirmon *et al.*, 2008). Compared to low-quality resources, high-quality resources tend to be very productive no matter how well they are managed (Barney, 1991; Peteraf, 1993). Thus, technical consultants have fewer opportunities to enhance relative product quality by implementing their "best practices." This phenomenon can clearly be observed in the wine industry. As Michel Rolland explained: "When the raw material is good, (the) role (of the winemaker) is less important. There is no real secret: pumping over a few times, close observation during the fermentation process to avoid any accidents and the wine is naturally deep coloured and full bodied, with soft round tannin" (*Bordeaux News*, 1999).

In sum, these arguments suggest that the positive relationship between the use of technical consultants and relative product quality

decreases as the relative level of resource quality increases.

Hypothesis 3: The positive effect of the use of technical consultants on relative product quality is stronger at lower levels of relative resource quality.

METHODS

Sample

Hypotheses were tested on a sample of Bordeaux "en primeur" wines. The Bordeaux "en primeur" market takes place every year in late March or early April. Critics from all over the world come to Bordeaux to taste "en primeur" wines from the latest vintage. While the Bordeaux "en primeur" market has existed since the eighteenth-century, it has become increasingly important since the 1980s. Today, some Bordeaux wineries sell 80 percent of their output "en primeur" (Hadj Ali *et al.*, 2008).

To test my hypotheses, I created a novel database using the following data sources: (1) the *Bordeaux Primeur* online database, (2) the *BordOverview* online database, (3) the *Revue du Vin de France* online database, (4) *Bordeaux et ses vins* (Boidron, 2004, 2007), (5) *Bordeaux—A consumer's guide to the world's finest wines* (Parker, 2003), (6) the *Guide des vins de Bordeaux* (Dupont, 2011), and (7) the *Guide Quarin des vins de Bordeaux* (Quarin, 2011). While the four wine guides are not published on a regular basis, they contain a wealth of qualitative information on the history of Bordeaux wineries over the past 30 years. The database contains information on 311 wineries from all Bordeaux appellations over the 2003–2012 period. Bordeaux wineries essentially produce one wine (the so-called "first" wine). While some of them also produce a "second" wine using grapes that are not good enough for their "first" wine, the focus of this study is on "first" wines. Thus, there is one observation per firm and per year.

Dependent variables

Robert Parker and Wine Spectator *scores*

Few industries have as many publicly available evaluations of product quality as the wine industry. However, the availability of quality ratings does not ensure their validity. Two requirements must be

met for ratings to truly denote quality (Benjamin and Podolny, 1999). First, there must be some convergent validity across wine critics. Second, convergent validity must derive from the wine itself and not from external cues (such as the name of the winery and the price of the wine).

In the Bordeaux wine industry, Robert Parker's *Wine Advocate* and the *Wine Spectator* are the most influential publications (Malter, 2014). "En primeur" tasting scores were extracted from the *Bordeaux Primeur* online database. There were 1,861 tasting scores from Robert Parker and 2,008 tasting scores from the critics of the *Wine Spectator*. Both use a 100-point scale to rate wines. Because they report a range for "en primeur" wines (e.g., 92–94), I averaged the low and high value. The correlation between the scores of the 1,506 wines that were tasted by Robert Parker and the critics of the *Wine Spectator* was very high (r = 0.643, p = 0.000). In addition, a blind tasting process ensured that critics did not know the name of the winery and the price of the wine when they assigned quality ratings.

When they come to Bordeaux in spring of every year, critics taste "en primeur" wines against each other. Thus, the tasting scores used in the study are relative rather than absolute measures of wine quality. As Parker (2003: 6) put it: "I never mix Bordeaux wines with non-Bordeaux wines . . . . Remember that whether one employs a 100-point rating system or a 20-point rating system, the objectives and aims of professional wine evaluations are the same—to assess to quality of the wine vis-à-vis its peers and to determine its relative value."

Extreme Robert Parker and Wine Spectator *scores*

To operationalize the extremeness of relative product quality, I used the following technique. For each year, I computed the average tasting score across all wines in the sample. Then, I calculated a wine's absolute deviation from the mean (Chatterjee and Hambrick, 2007). Finally, I created a dummy variable set to 1 if a wine was in the top five percent in terms of absolute deviation from the mean (Singh and Fleming, 2010).

Independent variables

Use of winemaking consultants

For each winery and each vintage, this variable was set to 1 if a wine was made with the help of

winemaking consultants and 0 otherwise. The data on the use of winemaking consultants were originally derived from the *BordOverview* online database. Then, they were extensively cross-checked and refined using the four wine guides and an extensive search of the Internet (e.g., winery websites, lists of clients made available by winemaking consultants, online wine publications …). Winemaking consultants make different types of recommendations to their clients. Most recommendations have an immediate impact on wine quality (e.g., date of harvest, type of barrels used for ageing, blending of wines …). Only recommendations to plant different grape varieties have a delayed impact on wine quality. Thus, it is possible to detect a causal linkage between the use of consultants and winemaking quality without using time lags.

Terroir

In the Bordeaux wine industry, the terroir is the main productive resource. The terroir reflects natural endowments such as soil, subsoil, slopes, and exposure of vineyard (Lewin, 2009). It is fixed and nontransferable from one winery to another. For each Bordeaux winery, the quality of the terroir (relative to other Bordeaux wineries) was assessed using a three-star scale developed by the experts of the *Revue du Vin de France*. This scale originally appeared in the *Classement des meilleurs vins de France* (Bettane and Desseauve, 2004). Since then, it was included in the *Revue du Vin de France* online database. As I could not assume that the "star" categories were equally spaced, I used three dummy variables: one-star terroir, two-star terroir, and three-star terroir. In the analyses, one-star terroir is used as the reference. The quality of the terroir was measured at the winery level for two main reasons. First, wine production is tightly regulated in the Bordeaux region. The *appellation d'origine contrôlée* (AOC) system strictly forbids wineries from using grapes from off-site growers. Thus, they can only use grapes grown on their own vineyard. Second, Bordeaux wines are never made from a single grape variety. They are always blends of different grape varieties (typically cabernet sauvignon, merlot, cabernet franc, and petit verdot). Hence, wineries use grapes from all parts of their vineyard to make their wines. While all the land in a vineyard may not be of equal quality, the *Revue du Vin de France* makes clear that its measure reflects

the "average quality of the terroir" rather than the quality of a particular plot of land (Bettane and Desseauve, 2004: 13).

Instrumental variables

I used three instrumental variables in this study. *Industry use of winemaking consultants* was measured as the proportion of wineries that used winemaking consultants in the year prior to the year under study. *Local family ownership* was measured with a dummy coded as 1 for wineries that belonged to local families and 0 for wineries that were bought by industrialists and large firms. Originally, most Bordeaux wineries belonged to local families. Since the early 1980s, some of them have been bought by industrialists (e.g., billionaire Bernard Arnault) and large firms (e.g., insurance company AXA). These data were essentially derived from *Bordeaux et ses vins*. Finally, *owner-managed winery* was measured with a dummy variable coded as 1 for wineries run by owners and 0 for wineries run by managers. These data were also derived from *Bordeaux et ses vins*.

Control variables

Several control variables were included in the models. *Winery size* was measured as the log of the number of hectares owned by each winery. The bulk of the data came from the *BordOverview* online database. Prior research suggests that the status of wineries influences the quality at which they produce (Benjamin and Podolny, 1999). Thus, I controlled for the following status hierarchy classifications: (1) the classification of Médoc wines (from First Growth to Fifth Growth), (2) the classification of Graves wines (Classified Growth), and (3) the classification of Saint-Emilion wines (First Great Growth and Great Growth). The status of Bordeaux wineries also depends on their affiliations with appellations. Consistent with Parker (2003), I controlled for the following appellations: (1) Saint-Estèphe, (2) Pauillac, (3) Saint-Julien, (4) Margaux, (5) other Médoc, (6) Graves, (7) Pomerol, (8) Saint-Emilion, and (9) satellite appellations. In the analyses, satellite appellations are used as the reference. Finally, I controlled for vintage effects using 10 dummy variables (year 2003 to year 2012).

Model and estimation

An issue related to panel data is the presence of unobserved heterogeneity. Fixed-effects and random-effects models can be used to address this issue by inserting an error term that is either assumed to be constant over time for each firm (as in fixed-effects models) or vary randomly over time for each firm (as in random-effects models). In this study, I chose random-effects models over fixed-effects models for two reasons. First, fixed-effects models can produce biased estimates over short time periods. Second, fixed-effects estimators cannot be computed when some explanatory variables do not vary over time (Greene, 2003; Yin and Zajac, 2004). In this study, the key explanatory variable (use of winemaking consultants) is fixed for most firms in the sample. Other important explanatory variables such as the quality of the terroir are also fixed. Therefore, Hypotheses 1 and 3 were tested using GLS random effects models. When the probability of an event is either very small or very large, the complementary log-log specification should be preferred over the probit specification (Powers and Xie, 2000). Thus, Hypothesis 2 was tested using complementary log-log random effects models.

In this study, a concern is that the decision to use winemaking consultants may be endogeneous. This would confound the interpretation of the relationships between the use of technical consultants, relative product quality, and the extremeness of relative product quality. To control for this potential bias, I used a two-stage technique (Hamilton and Nickerson, 2003; Semadeni, Withers, and Trevis Certo, 2014). In the first stage, I linked the use of technical consultants to a set of explanatory factors using a probit model. This enabled me to calculate a control variable (referred to as the inverse Mills ratio) that captures the endogeneity of the decision to use technical consultants. In the second stage, I examined the impact of technical consultants on relative product quality and the extremeness of relative product quality, controlling for the endogeneity of the use of technical consultants.

Ideally, correcting for endogeneity requires the identification of one or more instrumental variables that impact the first-stage dependent variable without directly impacting the second-stage dependent variable. These variables must be entered in the first-stage model, but not in the second-stage model. As indicated above, I used three instrumental variables: industry use of winemaking consultants, local family ownership, and owner-managed winery.

RESULTS

Table 1 lists descriptive statistics and correlations.

Decision to use technical consultants

Results of hypothesis testing are presented in Table 2.

As can be seen in Model 1 of Table 2, wineries are more likely to use winemaking consultants when their competitors do so ($b = 2.610$, $p = 0.005$). Wineries owned by local families are less likely to hire winemaking consultants than wineries owned by industrialists and large firms ($b = -1.468$, $p = 0.000$). The underlying rationale is twofold. Local families have more winemaking knowledge and are less familiar with consultants than industrialists and large firms (Chauvin, 2010). Finally, owners that manage their wineries are also more reluctant to use winemaking consultants ($b = -0.218$, $p = 0.000$).

Impact of technical consultants on relative product quality and extremeness of relative product quality

Hypothesis 1 suggests that technical consultants have a positive effect on relative product quality. Average Variance Inflation Factors (VIF) in the models predicting the impact of technical consultants on relative product quality were 2.32 for Robert Parker scores and 2.24 for *Wine Spectator* scores. The maximum VIF was 5.73 for Robert Parker scores and 5.62 for *Wine Spectator* scores. No other VIF was above 4. Hence, multicollinearity is unlikely to be a major problem (Belsey, Kuh, and Welsch, 1980). In Model 2 of Table 2 (Robert Parker scores), the relationship between the use of winemaking consultants and quality ratings is positive and very significant ($b = 1.019$, $p = 0.000$). In Model 3 of Table 2 (*Wine Spectator* scores), the relationship between the use of winemaking consultants and quality ratings is also positive but less significant ($b = 0.446$, $p = 0.053$). These results imply that the use of winemaking consultants leads to an increase in quality ratings by about 1 Robert Parker point and 0.5 *Wine Spectator* point. While these figures may seem small, they are not. As more than 99 percent of the wines are rated between 80 and 99 points, they account for 5 and 2.5 percent of the range. Overall, these results provide support for Hypothesis 1.

Hypothesis 2 suggests that technical consultants have a negative impact on the extremeness of relative product quality. Results appear in Models 4 and 5 of Table 2. In Model 5 of Table 2, the Third Growth and the Fourth Growth variables were dropped because there were no Third Growth and the Fourth Growth wines among extreme performers. As can be seen in Models 4 and 5 of Table 2, the relationship between the use of winemaking consultants and the likelihood of extreme quality ratings is negative and significant for Robert Parker scores (-0.928, $p = 0.013$) and *Wine Spectator* scores (-0.705, $p = 0.040$). These results imply that the use of consultants decrease the likelihood of extreme quality ratings by about 2.5 percentage points for Robert Parker scores and 2 percentage points for *Wine Spectator* scores. Hence, Hypothesis 2 is also supported. To assess the robustness of the results, I also operationalized the extremeness of relative product quality using the same technique as Chatterjee and Hambrick (2007). For each year, I calculated a wine's absolute deviation from the average tasting score across all wines in the sample. The relationship between the use of winemaking consultants and this measure of the extremeness of relative product quality was negative and significant for Robert Parker scores (-0.614, $p = 0.001$) and *Wine Spectator* scores (-0.383, $p = 0.019$).

Finally, Hypothesis 3 predicts that the impact of technical consultants on relative product quality is contingent on relative resource quality. To test this hypothesis, I re-estimated Models 2 and 3 after dividing the data into three groups (one-star terroir, two-star terroir, and three-star terroir). In Models 8 and 11 of Table 2, the Pomerol appellation is used as the reference as there was no winery from other Médoc and satellite appelations in the subsample. As can be seen in Tables 6–11 of Table 2, the relationship between winemaking consultants and tasting scores is positive and very significant for one-star terroir ($b = 1.716$, $p = 0.000$ for Robert Parker scores; $b = 0.917$, $p = 0.001$ for *Wine Spectator* scores). More than 99 percent of the wines are rated between 80 and 99 points. Thus, the increase in quality ratings attributable to winemaking consultants accounts for 8.5 and 4.5 percent of the range. On the other hand, the relationship between winemaking consultants and tasting scores are not significant for two-star terroir ($b = 0.498$, $p = 0.198$ for Robert Parker scores; $b = 0.401$, $p = 0.288$ for *Wine Spectator* scores) and three-star terroir ($b = 0.676$, $p = 0.346$ for Robert

Table 1.   Descriptive statistics and correlations

Variable	Mean	S.d.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1. Robert Parker score	90.43	3.48															
2. *Wine Spectator* score	89.84	3.54	0.64														
3. Extreme Robert Parker score	0.05	0.22	0.03	0.22													
4. Extreme *Wine Spectator* score	0.05	0.21	0.09	−0.06	0.12												
5. Use of winemaking consultants	0.70	0.46	0.13	0.03	−0.08	−0.06											
6. Winery size	3.01	0.93	−0.01	−0.01	0.05	0.03	0.08										
7. One-star terroir	0.46	0.50	−0.39	−0.36	−0.01	0.03	−0.09	−0.10									
8. Two-star terroir	0.44	0.50	0.12	0.09	−0.08	−0.10	0.05	0.07	−0.83								
9. Three-star terroir	0.09	0.29	0.36	0.37	0.13	0.11	0.07	0.05	−0.30	−0.29							
10. Industry use of winemaking consultants	0.70	0.03	−0.03	0.19	0.00	−0.21	0.06	0.06	0.00	0.00	0.00						
11. Local family ownership	0.69	0.46	−0.01	0.03	−0.02	0.00	−0.34	−0.23	0.03	−0.04	0.02	−0.04					
12. Owner-managed winery	0.48	0.50	0.00	−0.04	0.02	0.05	−0.05	−0.08	−0.03	−0.02	0.09	0.00	−0.01				
13. Inverse Mills ratio	0.49	0.32	−0.16	−0.11	0.01	0.03	−0.43	−0.39	0.21	−0.12	−0.17	−0.14	0.76	0.12			
14. Saint-Estèphe	0.05	0.23	−0.07	−0.01	0.06	−0.01	−0.05	−0.10	−0.08	0.07	0.02	0.00	−0.16	−0.02	0.13		
15. Pauillac	0.06	0.25	0.08	0.13	0.06	0.03	0.00	0.01	−0.06	0.00	0.10	0.00	0.03	0.04	0.00	−0.06	
16. Saint-Julien	0.05	0.21	0.08	0.11	−0.04	0.00	0.07	0.13	−0.20	0.15	0.09	0.00	0.05	−0.12	−0.16	−0.05	−0.06
17. Margaux	0.09	0.28	−0.04	0.03	0.02	−0.05	0.04	0.08	−0.08	0.07	0.02	0.00	−0.06	0.03	−0.09	−0.07	−0.08
18. Other Médoc	0.14	0.35	−0.17	−0.26	0.00	0.07	−0.04	−0.02	0.27	−0.19	−0.13	0.00	0.05	0.04	0.10	−0.10	−0.11
19. Graves	0.10	0.30	0.00	−0.02	0.03	0.01	−0.01	−0.07	−0.03	0.03	0.00	0.00	−0.02	0.07	0.02	−0.08	−0.09
20. Pomerol	0.13	0.34	0.10	0.12	0.01	−0.02	−0.11	−0.08	−0.19	0.19	0.01	0.00	0.04	−0.01	0.24	−0.09	−0.10
21. Saint-Emilion	0.22	0.42	0.13	0.06	−0.06	−0.05	0.14	0.14	−0.14	0.09	0.09	0.00	−0.03	−0.01	−0.31	−0.13	−0.14
22. Satellite	0.15	0.36	−0.19	−0.18	−0.03	0.05	−0.05	−0.10	0.38	−0.30	−0.14	0.00	0.05	−0.04	0.10	−0.10	−0.11
23. First Growth	0.02	0.13	0.25	0.24	0.24	0.11	0.02	0.06	−0.12	−0.11	0.40	0.00	−0.03	0.03	−0.04	−0.03	0.28
24. Second Growth	0.05	0.21	0.17	0.16	−0.01	0.03	0.09	0.14	−0.20	0.03	0.30	0.00	−0.03	0.08	−0.22	0.08	0.07
25. Third Growth	0.05	0.21	0.01	0.03	−0.02	−0.06	0.08	0.12	−0.11	0.12	−0.02	0.00	−0.01	0.02	−0.17	0.02	−0.06
26. Fourth Growth	0.03	0.18	0.00	0.00	−0.04	−0.05	−0.04	0.02	−0.10	0.13	−0.06	0.00	0.03	−0.06	0.10	0.04	0.03
27. Fifth Growth	0.06	0.23	−0.08	−0.03	−0.02	−0.03	0.01	−0.01	0.05	0.00	−0.08	0.00	0.03	−0.02	−0.03	0.00	0.61
28. Classified Growth	0.03	0.17	0.11	0.06	−0.01	−0.02	0.02	−0.07	−0.13	0.08	0.07	−0.01	−0.09	−0.01	−0.05	−0.04	−0.05
29. First Great Growth	0.05	0.21	0.20	0.17	0.03	0.00	0.08	0.04	−0.21	−0.03	0.40	0.01	0.01	0.07	−0.17	−0.05	−0.06
30. Great Growth	0.11	0.32	−0.02	−0.05	−0.06	−0.05	0.08	0.13	−0.04	0.09	−0.08	0.00	−0.01	−0.04	−0.18	−0.09	−0.09

Table 1.   Continued

Variable	Mean	S.d.	16	17	18	19	20	21	22	23	24	25	26	27	28	29
1. Robert Parker score	90.43	3.48														
2. *Wine Spectator* score	89.84	3.54														
3. Extreme Robert Parker score	0.05	0.22														
4. Extreme *Wine Spectator* score	0.05	0.21														
5. Use of winemaking consultants	0.70	0.46														
6. Winery size	3.01	0.93														
7. One-star terroir	0.46	0.50														
8. Two-star terroir	0.44	0.50														
9. Three-star terroir	0.09	0.29														
10. Industry use of winemaking consultants	0.70	0.03														
11. Local family ownership	0.69	0.46														
12. Owner-managed winery	0.48	0.50														
13. Inverse Mills ratio	0.49	0.32														
14. Saint-Estèphe	0.05	0.23														
15. Pauillac	0.06	0.25														
16. Saint-Julien	0.05	0.21														
17. Margaux	0.09	0.28	−0.07													
18. Other Médoc	0.14	0.35	−0.09	−0.13												
19. Graves	0.10	0.30	−0.07	−0.10	−0.14											
20. Pomerol	0.13	0.34	−0.09	−0.12	−0.16	−0.13										
21. Saint-Emilion	0.22	0.42	−0.12	−0.16	−0.22	−0.18	−0.21									
22. Satellite	0.15	0.36	−0.09	−0.13	−0.17	−0.14	−0.16	−0.23								
23. First Growth	0.02	0.13	−0.03	0.05	−0.05	0.04	−0.05	−0.07	−0.05							
24. Second Growth	0.05	0.21	0.32	0.21	−0.09	−0.07	−0.08	−0.12	−0.09	−0.03						
25. Third Growth	0.05	0.21	0.10	0.47	−0.04	−0.06	−0.08	−0.12	−0.09	−0.03	−0.05					
26. Fourth Growth	0.03	0.18	0.31	0.14	−0.02	−0.06	−0.07	−0.10	−0.08	−0.02	−0.04	−0.04				
27. Fifth Growth	0.06	0.23	−0.05	0.02	0.02	−0.08	−0.10	−0.13	−0.10	−0.03	−0.05	−0.05	−0.05			
28. Classified Growth	0.03	0.17	−0.04	−0.05	−0.07	0.53	−0.07	−0.09	−0.07	−0.02	−0.04	−0.04	−0.03	−0.04		
29. First Great Growth	0.05	0.21	−0.05	−0.07	−0.09	−0.07	−0.09	0.41	−0.09	−0.03	−0.05	−0.05	−0.04	−0.05	−0.04	
30. Great Growth	0.11	0.32	−0.08	−0.11	−0.14	−0.12	−0.14	0.66	−0.15	−0.05	−0.08	−0.08	−0.06	−0.09	−0.06	−0.08

N = 3,099 except for Robert Parker scores (N = 1,861) and *Wine Spectator* scores (N = 2,008).

Table 2.   Results of hypothesis testing

Variables	Model 1 Use of winemaking consultants			Model 2 Robert Parker scores			Model 3 Wine Spectator scores			Model 4 Extreme Robert Parker scores			Model 5 Extreme Wine Spectator scores		
Constant	−0.313	0.665	0.638	86.888	0.652	0.000	86.312	0.641	0.000	−2.797	1.072	0.009	0.366	0.881	0.678
Saint-Estèphe	−1.040	0.143	0.000	−1.162	0.569	0.041	0.750	0.557	0.178	2.247	0.775	0.004	−0.702	0.831	0.398
Pauillac	−0.402	0.183	0.028	−0.242	0.692	0.726	1.600	0.652	0.014	0.761	1.006	0.450	−0.417	0.828	0.614
Saint-Julien	0.128	0.183	0.482	−0.585	0.686	0.394	1.702	0.717	0.018	0.450	1.138	0.693	−1.219	0.987	0.217
Margaux	−0.460	0.148	0.002	−1.895	0.597	0.002	0.632	0.556	0.256	1.231	0.872	0.158	−2.217	0.947	0.019
Other Médoc	−0.059	0.098	0.545	−0.745	0.473	0.115	−0.970	0.435	0.026	0.806	0.769	0.295	1.091	0.555	0.049
Graves	−0.063	0.116	0.588	−0.348	0.500	0.487	0.666	0.476	0.162	0.898	0.775	0.246	0.128	0.635	0.840
Pomerol	−0.318	0.108	0.003	1.423	0.447	0.001	2.333	0.437	0.000	1.001	0.728	0.169	−1.016	0.644	0.114
Saint-Emilion	0.405	0.136	0.003	1.569	0.502	0.002	1.055	0.487	0.030	−0.721	1.232	0.559	−1.226	0.771	0.112
First Growth	0.099	0.275	0.720	6.018	0.983	0.000	3.923	0.938	0.000	3.024	1.140	0.008	1.528	1.033	0.139
Second Growth	0.870	0.208	0.000	3.761	0.673	0.000	1.680	0.647	0.009	−0.260	0.941	0.783	1.090	0.853	0.201
Third Growth	1.013	0.184	0.000	2.638	0.640	0.000	1.588	0.600	0.008	−0.659	0.948	0.487			
Fourth Growth	−0.147	0.174	0.398	2.504	0.677	0.000	0.814	0.650	0.210	−1.413	1.309	0.280			
Fifth Growth	0.486	0.173	0.005	1.628	0.613	0.008	0.903	0.571	0.114	−0.400	0.843	0.635	−0.402	0.773	0.603
Classified Growth	−0.174	0.194	0.370	2.810	0.702	0.000	1.555	0.653	0.017	−0.069	1.036	0.947	−1.652	1.109	0.136
First Great Growth	0.125	0.201	0.536	0.746	0.605	0.217	1.521	0.585	0.009	1.773	1.341	0.186	0.014	0.998	0.989
Great Growth	−0.029	0.143	0.838	−0.593	0.425	0.163	0.328	0.419	0.434	0.287	1.261	0.820	−0.613	0.911	0.501
Winery size	0.063	0.039	0.112	−0.295	0.162	0.068	−0.091	0.152	0.552	−0.043	0.273	0.876	−0.223	0.225	0.322
Two-star terroir	0.203	0.067	0.002	1.532	0.268	0.000	1.196	0.251	0.000	−0.741	0.430	0.085	−0.404	0.395	0.308
Three-star terroir	0.383	0.146	0.009	3.042	0.496	0.000	3.272	0.476	0.000	−0.331	0.747	0.658	1.215	0.659	0.065
Industry use of winemaking consultants	**2.610**	**0.929**	**0.005**												
Local family ownership	**−1.468**	**0.080**	**0.000**												
Owner-managed winery	**−0.218**	**0.055**	**0.000**												
Inverse Mills ratio				0.380	0.397	0.339	0.345	0.378	0.360	−0.821	0.626	0.190	−0.787	0.564	0.163
Use of winemaking consultants				**1.019**	**0.243**	**0.000**	**0.446**	**0.230**	**0.053**	**−0.928**	**0.372**	**0.013**	**−0.705**	**0.342**	**0.040**
Vintage controls	Not included			Included			Included			Included			Included		
Number of observations	3,099			1,861			2,008			1,861			2,008		
Number of firms	311			291			297			291			297		
Wald Chi-square				1163.21			1789.63								
Log likelihood	−1538.83									−288.34			−244.00		

Table 2.   Continued

Variables	Model 6 Robert Parker scores			Model 7 Robert Parker scores			Model 8 Robert Parker scores			Model 9 Wine Spectator scores			Model 10 Wine Spectator scores			Model 11 Wine Spectator scores		
	One-star terroir			Two-star terroir			Three-star terroir			One-star terroir			Two-star terroir			Three-star terroir		
Constant	87.119	0.893	0.000	87.470	1.227	0.000	92.990	2.201	0.000	85.286	0.749	0.000	86.600	1.268	0.000	94.748	2.927	0.000
Saint-Estèphe	−1.387	0.828	0.094	−0.625	1.184	0.598	0.234	1.961	0.905	1.092	0.662	0.099	0.672	1.223	0.582	−1.642	2.963	0.580
Pauillac	−0.045	0.986	0.964	0.720	1.398	0.607	−1.271	2.694	0.637	1.176	0.712	0.099	2.524	1.415	0.074	−2.817	4.054	0.487
Saint-Julien	2.341	2.202	0.288	−0.326	1.237	0.792	−1.469	2.595	0.571				2.103	1.326	0.113	−1.446	3.912	0.712
Margaux	−0.328	0.911	0.719	−1.761	1.223	0.150	−2.314	2.564	0.367	1.695	0.633	0.007	0.434	1.239	0.726	−3.433	3.867	0.375
Other Médoc	−0.805	0.509	0.114	0.432	1.265	0.733				−1.249	0.381	0.001	−0.447	1.265	0.724			
Graves	−0.746	0.596	0.211	0.522	1.140	0.647	−1.365	2.995	0.648	−0.012	0.448	0.979	1.309	1.190	0.271	−3.345	4.445	0.452
Pomerol	0.510	0.647	0.431	2.401	1.012	0.018				1.234	0.493	0.012	2.892	1.061	0.006			
Saint-Emilion	2.287	0.603	0.000	1.388	1.101	0.207	0.101	1.594	0.950	1.626	0.512	0.001	1.627	1.120	0.146	−1.939	2.371	0.413
First Growth							5.329	2.216	0.016							4.678	3.389	0.167
Second Growth	−1.290	1.285	0.315	4.717	0.847	0.000	2.042	1.921	0.288	0.310	0.933	0.740	2.832	0.873	0.001	1.307	2.937	0.656
Third Growth	1.186	1.208	0.326	3.841	0.805	0.000				1.130	0.931	0.225	2.287	0.813	0.005			
Fourth Growth	0.810	0.862	0.347	3.038	0.818	0.000				0.060	0.617	0.922	0.773	0.848	0.362			
Fifth Growth	0.513	2.493	0.837	1.697	0.945	0.073				1.610	1.252	0.198	1.265	0.950	0.183			
Classified Growth				2.645	0.873	0.002	3.047	2.844	0.284				1.415	0.897	0.115	2.215	4.300	0.606
First Great Growth				2.252	0.805	0.005	−0.250	1.480	0.866				1.932	0.786	0.014	0.667	2.228	0.765
Great Growth	−1.196	0.561	0.033	0.495	0.651	0.447	−0.599	0.670	0.371	−0.111	0.530	0.835	0.145	0.603	0.810	−0.138	0.959	0.886
Winery size	−0.356	0.242	0.141	−0.189	0.225	0.399				−0.002	0.193	0.992	−0.036	0.225	0.873			
Industry use of winemaking consultants																		
Local family ownership																		
Owner-managed winery																		
Inverse Mills ratio	0.498	0.532	0.349	0.332	0.640	0.603	−0.299	1.403	0.831	0.414	0.423	0.327	1.049	0.645	0.104	0.737	1.637	0.652
Use of winemaking consultants	**1.716**	**0.345**	**0.000**	**0.498**	**0.387**	**0.198**	**0.676**	**0.718**	**0.346**	**0.917**	**0.285**	**0.001**	**0.401**	**0.377**	**0.288**	**−0.108**	**0.823**	**0.895**
Vintage controls	Included			Included			Included			Included			Included			Included		
Number of observations	647			946			268			720			1,020			268		
Number of firms	129			133			29			133			135			29		
Wald Chi-square	226.00			527.71			282.52											
Log likelihood										537.61			914.85			315.23		

Coefficients in the first column, standard errors in the second column, and *p* values in the third column of each model. All models are significant at the 0.000 level.

Parker scores, and b = -0.108, p = 0.895 for *Wine Spectator* scores). Overall, these results provide support for Hypothesis 3.

While empirical results are consistent across the two measures of product quality, it can be noted that they are stronger for Robert Parker scores than for *Wine Spectator* scores. This phenomenon reflects the influence of Robert Parker in the Bordeaux wine industry (Barthélemy, 2010). As Steinberger (2008: 130) explained: "Around spring each year, scores of wine writers descend on Bordeaux for the en primeur tastings, and every spring, many end up asking themselves the same rueful question: Do I really need to be here? When it comes to rendering a verdict on each new Bordeaux vintage, the only opinion that matters in the eyes of producers, merchants, retailers, and consumers is Robert Parker's. His barrel score hugely influence the prices and are treated as the vinous equivalent of papal bulls by wine lovers around the world." Hence, winery owners (and their winemaking consultants) may be tempted to create their wines with Parker's perceived preferences in mind. This phenomenon is sometimes referred to as "parkerization" (Chauvin, 2010). In supplemental analyses, I explored the effect of adding technical consultants on relative product quality. I also examined the effect of technical consultant expertise on relative product quality. There was some evidence that adding technical consultants has a positive impact on relative product quality. Empirical results also confirmed that the expertise of technical consultants matters (see Appendix S1 for more detail).

DISCUSSION

In the strategic management literature, there is a long tradition of using the RBV to explain differences in firm performance. So far, the bulk of the RBV literature has examined the relationship between resource characteristics and performance (Newbert, 2007). The relationship between resource management and performance has attracted far less attention. As Sirmon, Gove, and Hitt (2008: 928) put it: "Little empirical research has opened the black box to help researchers understand the importance of resource management."

While a few empirical studies have shown that the ability to manage resources influences performance, they have typically assumed that firms manage their resources on their own (Holcomb *et al.*, 2009; Huesch, 2013; Sirmon *et al.*, 2008). The primary contribution of this study to the RBV literature comes from exploring the role of technical consultants in the management of their clients' resources. I focused on three related research questions: What is the impact of technical consultants on relative product quality? What is the impact of technical consultants on the extremeness of relative product quality? To what extent is the impact of technical consultants on relative product quality contingent on relative resource quality?

Consulting is pervasive in many industries. Yet, the use of consultants remains controversial (Sturdy, 2011). Why would firms give away key activities to consultants? Why would consultants perform these activities better than in-house employees? In this study, I found evidence that technical consultants enhance the relative quality of their clients' products. This finding is not straightforward. Indeed, prior research suggests that "best practices" are difficult to identify and transfer (Szulanski, 1996; Tucker *et al.*, 2007). Wellstein and Kieser (2011: 709) have even argued that "consultancies' claim that they are capable of identifying "best practices" is a myth. Rather, best practice is a buzzword launched by consultants out of marketing purposes." In the wine industry, "best practices" do not seem to be particularly difficult to identify and transfer. Regarding transfer, a potential explanation is that winemaking "best practices" (such as the use of oak barrels, smaller yields, and later harvests) can be implemented even if clients lack absorptive capacity (Cohen and Levinthal, 1990; Szulanski, 1996). Moreover, "best practices" are often reproached for being less unique than internally generated knowledge (Bierly and Chakrabarti, 1996; Devaughn and Leary, 2007). While internally generated knowledge may be more unique than "best practices," it is not always more valuable. On average, the less unique but more valuable "best practices" of technical consultants outperform internally generated knowledge (Drnevich and Kriauciunas, 2011).

If technical consultants enhance their clients' performance, one may wonder why they are not used by all firms. There are several explanations for this phenomenon. First, prior research has shown that firms make mistakes (Leibenstein, 1966, 1976). Hence, a gap may eventually exist between the "best practices" known to improve product quality and the more idiosyncratic practices used by some firms. Second, some firms may deliberately engage in the

riskier practice of relying on internally generated knowledge. Third, hiring technical consultants is costly. Not all firms can afford to do so. For instance, the annual fees of Michel Rolland range from $30,000 to $250,000 (Asimov, 2006; Teague, 2013). Fourth, some winery owners are in this business "for the love of wine" (Scott Morton and Podolny, 2002). Thus, they do not want technical consultants to tell them how to make their wines.

While prior research has shown that resource management influences performance, it has overlooked the effect of resource management on performance extremeness. My study addressed this gap by arguing and showing that technical consultants have a negative effect on the extremeness of relative product quality. Hiring technical consultants is a double-edged sword for their clients. On the one hand, their "best practices" have more certain performance implications than internally generated knowledge. Thus, they decrease the likelihood of extremely low relative product quality. On the other hand, uniqueness is a necessary condition for outstanding performance (Litov *et al.*, 2012). Because "best practices" are less unique than internally generated knowledge, they also decrease the likelihood of extremely high relative product quality.

In addition, this study extends the RBV literature by showing that the impact of technical consultants on the relative quality of their clients' products is contingent on relative resource quality. Specifically, technical consultants seem to matter more to relative product quality at lower levels of relative resource quality than at higher levels of relative resource quality. When resource quality is low, technical consultants have a lot of room to add value by leveraging their "best practices." Unlike low-quality resources, high-quality resources always tend to perform at "peak" levels. Thus, the "best practices" of technical consultants do not have such a strong impact on their productivity. In the Bordeaux wine industry, these findings suggest that wineries with high-quality terroirs benefit less from the help of winemaking consultants than wineries with low-quality terroirs. Importantly, they do not imply that wineries with high-quality terroirs do not benefit at all from the help of winemaking consultants. For instance, Château Latour has one of the best terroirs of the Bordeaux region. According to Frédéric Engerer, its director: "I can honestly say that in my view, after working 10 years with (Jacques and Eric Boissenot), their value in optimising the selection of our lots in order to make the best possible assemblage (i.e., blend) is very clear" (Robinson, 2009).

Finally, most empirical studies drawing on the RBV have used overall performance as the dependent variable. Examining the relationship between resources and overall performance is likely to be misleading for two reasons (Ray, Barney, and Muhanna, 2004). First, a competitive advantage in one activity may be offset by a competitive disadvantage in another activity. Second, some stakeholders may appropriate the profits generated by a competitive advantage before they materialize in overall performance (Coff, 1999). In this study, I examined the impact of technical consultants on the quality of their clients' products. This approach is consistent with calls to use less aggregated dependent variables in RBV studies (Ray *et al.*, 2004).

While the use of consultants is widespread, few large-scale studies have examined how they impact their clients' performance. In particular, there is a dearth of research on technical consultants. As Kirby and Jones-Evans (1997: 169) put it: "technical consultancies (is) a type of professional service which remains under-researched and largely unrecognized." Hence, it is unclear whether and when firms should hire technical consultants. This study provides two important managerial implications for firms that contemplate hiring technical consultants.

The first implication is that the decision to hire technical consultants should depend on a firm's strategy. If the objective of a firm is to improve its performance, it should hire technical consultants. On average, their "best practices" are more valuable than internally generated knowledge. If the objective of a firm is to achieve outstanding performance, "playing it safe" by hiring technical consultants is unlikely to be the right decision. Because their "best practices" are less unique than internally generated knowledge, they may actually be an obstacle to achieving success. As Steve Jobs once explained (Morris, 2008): "We don't hire consultants. The only consultants I've ever hired … is one firm to analyze Gateway's retail strategy so I would not make some of the same mistakes they made [when launching Apple's retail stores]. But we never hire consultants, per se. We just want to make great products." Interestingly, some of Apple's products were huge successes (e.g., Apple II, Mac, iPod, iPhone, iPad …), whereas others were complete failures (e.g., Lisa, Newton, eWorld online service …).

The second implication is that the decision to hire technical consultants should depend on the

quality of a firm's resources. Compared to firms with high-quality resources, firms with low-quality resources tend to benefit more from the help of technical consultants. This is consistent with the "doctor-patient" model of the literature on management consulting (Canback, 1998). According to this model, firms benefit more from the help of consultants when their performance is low, which can often be attributed to low-quality resources. The problem is that firms with low-quality resources also tend to be less profitable than firms with high-quality resources. Thus, they can spend less on consulting fees. Paradoxically, firms that need help are less likely to hire technical consultants than firms that not really need help. This phenomenon can clearly be observed in the Bordeaux wine industry. Wineries with the best terroirs are more likely to hire technical consultants. However, they benefit less from their advice than wineries with the worst terroirs.

Conclusion

The objective of this study was to contribute to the RBV literature by examining the impact of technical consultants on resource productivity. Findings indicate that technical consultants have a positive impact on relative product quality and a negative impact on the extremeness of relative product quality. They also show that the impact of technical consultants on relative product quality is stronger at lower levels of relative resource quality.

This study has a number of limitations. First, I focused on winemaking consultants. While I cannot claim that my results apply to other types of consulting, there are many similarities between winemaking consultants and other consultants. Like other consultants, winemaking consultants are "knowledge workers" who create and disseminate knowledge (Werr and Stjernberg, 2003). Second, I used tasting scores to proxy relative product quality. While Robert Parker's *Wine Advocate* and the *Wine Spectator* are the most influential publications in the Bordeaux wine industry, tasting scores are subject to the preferences of critics. Third, my measure of the terroir does not distinguish between its different components (soil and slope exposure). Future studies could benefit from a finer-grained measure of the terroir. Fourth, the study remains agnostic about the impact of wine quality on the revenue of wineries. While high-quality wines can be sold at high prices,

improving quality often requires lowering the volume of production. Hence, wineries must make a trade-off between quality and volume of production.

Despite these limitations, this study provides new insights into the impact of technical consultants on resource productivity. The focus of this article was on product quality. It would be interesting to explore the effect of technical consultants on other dimensions of resource productivity (such as production costs). Future research could explore related issues such as the influence of technical consultants on the diffusion of "best practices." It would also be interesting to test whether findings from this study apply to management consultants.

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REFERENCES

Amit R, Schoemaker P. 1993. Strategic assets and organizational rent. *Strategic Management Journal* **14**: 33–46.

Asimov E. 2006. Satan or savior: setting the grape standard. *New York Times* October 11.

Barney J. 1991. Firm resources and sustained competitive advantage. *Journal of Management* **17**: 99–120.

Barney J. 1995. Looking inside for competitive advantage. *Academy of Management Executive* **9**: 49–61.

Barthélemy J. 2010. L'influence du critique américain Robert Parker dans l'univers du vignoble bordelais. *Gérer and Comprendre* **101**: 60–71.

Belsey D, Kuh E, Welsch R. 1980. *Regression Diagnostics: Identifying Influential Data and Sources of Collinearity*. Wiley: New York, NY.

Benjamin B, Podolny J. 1999. Status, quality, and social order in the California wine industry. *Administrative Science Quarterly* **44**: 563–589.

Bergh D, Gibbons P. 2011. Stockholder reaction to the hiring of management consultants: a signalling theory approach. *Journal of Management Studies* **48**: 544–567.

Bettane M, Desseauve T. 2004. *Classement des meilleurs vins de France*. Editions de la Revue du vin de France: Paris, France.

Bierly P, Chakrabarti A. 1996. Generic knowledge strategies in the US pharmaceutical industry. *Strategic Management Journal* **17**: 123–135.

Boidron B. 2004. *Bordeaux et ses vins* (17th edition). Féret: Bordeaux, France.

Boidron B. 2007. *Bordeaux et ses vins* (18th edition). Féret: Bordeaux, France.

Bordeaux News. 1999. *Les femmes et le vin*. June issue.

Canback S. 1998. The logic of management consulting (part one). *Journal of Management Consulting* **10**(2): 3–11.

Carlin J. 1994. Meet the Spielberg of the wine world. *The Observer*, November 7.

Castanias R, Helfat C. 2001. The managerial rents model: theory and empirical analysis. *Journal of Management* **27**: 661–678.

Chatterjee A, Hambrick D. 2007. It's all about me: narcissistic chief executive officers and their effects on company strategy and performance. *Administrative Science Quarterly* **52**: 351–386.

Chauvin PM. 2010. La signature œnologique: frontières et transferts de réputation chez les consultants vitivinicoles. *Sociologie du travail* **52**: 461–479.

Coff R. 1999. When competitive advantage doesn't lead to performance: the resource-based view and stakeholder bargaining power. *Organization Science* **10**: 119–133.

Cohen W, Levinthal D. 1990. Absorptive capacity: a new perspective on learning and innovation. *Administrative Science Quarterly* **35**: 128–152.

David R, Strang D. 2006. When fashion is fleeting: transitory collective beliefs and the dynamics of TQM consulting. *Academy of Management Journal* **49**: 215–233.

Denrell J. 2003. Vicarious learning, undersampling of failure, and the myths of management. *Organization Science* **14**: 227–243.

Denrell J. 2005. Should we be impressed with high performance? *Journal of Management Inquiry* **14**: 292–298.

DeVaughn M, Leary M. 2007. Consultants to the rescue? Antecedents and consequences of hiring consultants during the startup process. In *Academy of Management Proceedings*. Philadelphia, PA; 1–6.

Drnevich P, Kriauciunas A. 2011. Clarifying the conditions and limits of the contributions of ordinary and dynamic capabilities to relative firm performance. *Strategic Management Journal* **32**: 254–279.

Dupont J. 2011. *Le guide des vins de Bordeaux*. Grasset: Paris, France.

Dyer J, Nobeoka K. 2000. Creating and managing a high-performance knowledge-sharing network: the Toyota case. *Strategic Management Journal* **21**: 345–367.

Editors of the *Revue du Vin de France*. 2014. Style, goût, prix: le jugement de Bordeaux. *Revue du Vin de France*, June issue: 43–50.

Ernst B, Kieser A. 2003. search of explanations for the consulting explosion. In *The Expansion of Management Knowledge: Carriers, Flows, and Sources*, Sahlin-Andersson K, Engwall L (eds). Stanford University Press: Stanford, CA; 28–43.

Greene W. 2003. *Econometric Analysis* (5th edn). Prentice Hall: Upper Saddle River, NJ.

Greve H. 2009. Bigger and safer: the diffusion of competitive advantage. *Strategic Management Journal* **30**: 1–23.

Guillard M. 1995. *Emile Peynaud, oenologue dans le siècle*. La Table Ronde: Paris, France.

Hadj Ali H, Lecocq S, Visser M. 2008. The impact of gurus: Parker grades and en primeur wine prices. *Economic Journal* **118**: 158–173.

Hamilton B, Nickerson J. 2003. Correcting for endogeneity in strategic management research. *Strategic Organization* **1**: 51–78.

Hansen M, Nohria N, Tierney T. 1999. What's your strategy for managing knowledge? *Harvard Business Review* **77**(2): 106–116.

Hansen M, Perry L, Reese C. 2004. A Bayesian operationalization of the resource-based view. *Strategic Management Journal* **25**: 1279–1295.

Hargadon A, Sutton R. 1997. Technology brokering and innovation in a product development firm. *Administrative Science Quarterly* **42**: 716–749.

Hay C. 2007. Globalisation and the institutional re-embedding of markets: the political economy of price formation in the Bordeaux en primeur market. *New Political Economy* **12**: 185–209.

Hay C. 2010. The political economy of price and status formation in the Bordeaux en primeur market: the role of wine critics as rating agencies. *Socio-Economic Review* **8**: 685–707.

Hitt M, Bierman L, Shimizu K, Kochhar R. 2001. Direct and moderating effects of human capital on strategy and performance in professional service firms: a resource-based perspective. *Academy of Management Journal* **44**: 13–28.

Holcomb T, Holmes M, Connelly B. 2009. Making the most of what you have: managerial ability as a source of resource value creation. *Strategic Management Journal* **30**: 457–485.

Huesch M. 2013. Are there always synergies between productive resources and resource deployment capabilities? *Strategic Management Journal* **34**: 1288–1313.

Kirby D, Jones-Evans D. 1997. Small technology-based professional consultancy services in the United Kingdom. *Service Industries Journal* **17**: 155–172.

Ko D, Kirsch L, King W. 2005. Antecedents of knowledge transfer from consultants to clients in enterprise system implementations. *MIS Quarterly* **29**: 59–85.

Leibenstein H. 1966. Allocative efficiency vs. X-efficiency. *American Economic Review* **56**: 392–415.

Leibenstein H. 1976. *Beyond Economic Man*. Harvard University Press: Cambridge, MA.

Lewin B. 2009. *What Price Bordeaux?* Dover, DE: Vendange Press.

Litov L„ Moreton P, Zenger T. 2012. Corporate strategy, analyst coverage, and the uniqueness paradox. *Management Science* **58**: 1797–1815.

Malter D. 2014. On the causality and cause of returns to organizational status: evidence from the Grands Crus Classés of the Médoc. *Administrative Science Quarterly* **58**: 271–300.

Masset P, Weisskopf JP, Cossutta M. 2015. Wine tasters, ratings, and en primeur prices. *Journal of Wine Economics* **10**: 75–107.

Morris B. 2008. Steve Jobs speaks out. *Fortune*, March 7.

Newbert S. 2007. Empirical research on the resource-based view of the firm: an assessment and suggestions for future research. *Strategic Management Journal* **28**: 121–146.

Nossiter J. 2004. *Mondovino*, Twentieth Century Fox.

Ofek E, Sarvary M. 2001. Leveraging the customer base: creating competitive advantage through knowledge management. *Management Science* **47**: 1441–1456.

Parker R. 2003. *Bordeaux: A Consumer's Guide to the World's Finest Wines*. Simon & Schuster: New York, NY.

Peteraf M. 1993. The cornerstones of competitive advantage: a resource-based view. *Strategic Management Journal* **14**: 179–191.

Porter M. 1980. *Competitive Strategy: Techniques for Analyzing Industries and Competitors*. Free Press: New York, NY.

Powers D,, Xie Y. 2000. *Statistical Models for Categorical Data Analysis*. Academic Press: San Diego, CA.

Priem R, Butler J. 2001. Is the resource-based "view" a useful perspective for strategic management research? *Academy of Management Review* **26**: 22–40.

Quarin J-M. 2011. *Guide Quarin des vins de Bordeaux*. Solar: Paris, France.

Ray G, Barney J, Muhanna W. 2004. Capabilities, business processes, and competitive advantage: choosing the dependent variable in empirical tests of the resource-based view. *Strategic Management Journal* **25**: 23–37.

Roberts P, Reagans R. 2007. Critical exposure and price-quality relationships for New World wines in the U.S. market. *Journal of Wine Economics* **2**: 56–69.

Robinson J. 2009. Boissenots – Bordeaux's secret ingredient. *Financial Times*, October 31.

Sanders WG, Hambrick D. 2007. Swinging for the fences: the effects of CEO stock options on company risk taking and performance. *Academy of Management Journal* **50**: 1055–1078.

Scott Morton F, Podolny J. 2002. Love or money? The effects of owner motivation in the California wine industry. *Journal of Industrial Economics* **50**: 431–456.

Semadeni M, Withers M, Trevis Certo S. 2014. The perils of endogeneity and instrumental variables in strategy research: understanding through simulations. *Strategic Management Journal* **35**: 1070–1079.

Singh J, Fleming L. 2010. Lone inventors as sources of breakthroughs: myth or reality? *Management Science* **56**: 41–56.

Sirmon D, Gove S, Hitt M. 2008. Resource management in dyadic competitive rivalry: the effects of resource bundling and deployment. *Academy of Management Journal* **51**: 919–935.

Sirmon D, Hitt M, Arrègle J-L, Campbell JT. 2010. The dynamic interplay of capability strengths and weaknesses: investigating the bases of temporary competitive advantage. *Strategic Management Journal* **30**: 1386–1409.

Sirmon D, Hitt M, Ireland R. 2007. Managing firm resources in dynamic environments to create value: looking inside the black box. *Academy of Management Review* **32**: 273–292.

Sirmon D,, Hitt M, Ireland D, Gilbert B. 2011. Resource orchestration to create competitive advantage: breadth, depth, and life cycle effects. *Journal of Management* **37**: 1390–1412.

Steinberger M. 2008. Every one a critic: the future of wine writing. *World of Fine Wine* **18**: 130–135.

Stimpfig J. 2003. Michel Rolland the Decanter interview. *Decanter,* December issue.

Sturdy A. 2011. Consultancy's consequences? A critical assessment of management consultancy's impact on management. *British Journal of Management* **22**: 517–530.

Szulanski G. 1996. Exploring internal stickiness: impediments to the transfer of best practice within the firm. *Strategic Management Journal* Winter Special Issue **17**: 27–43.

Tang J, Crossan M, Rowe G. 2011. Dominant CEO, deviant strategy, and extreme performance: the moderating role of a powerful board. *Journal of Management Studies* **48**: 1479–1503.

Teague L. 2013. What winemaking consultants really do. *Wall Street Journal*, May 3.

Tucker A, Nembhard I, Edmondson A. 2007. Implementing new practices: an empirical study of organizational learning in hospital intensive care units. *Management Science* **56**: 894–907.

Wellstein B, Kieser A. 2011. Trading best practices—a good practice? *Industrial and Corporate Change* **20**: 683–719.

Wernerfelt B. 1984. A resource-based view of the firm. *Strategic Management Journal* **5**: 171–180.

Werr A, Stjernberg T. 2003. Exploring management consulting firms as knowledge systems. *Organization Studies* **24**: 881–908.

Womack J, Jones D, Ross D. 1990. *The Machine that Changed the World*. Rawson Associates: New York, NY.

Yin X, Zajac E. 2004. The strategy/governance structure fit relationship: theory and evidence in franchising arrangements. *Strategic Management Journal* **25**: 365–383.

SUPPORTING INFORMATION

Additional supporting information may be found in the online version of this article:

Appendix S1. Supplemental analyses.