Corks and Risk Perception by Consumers: Experimental investigation
Benoît LECAT, J. François OUTREVILLE, Eric LE FUR

School of Wine and Spirits Business, ESC Dijon & INSEEC Bordeaux Business School - FR
Benoit.Lecat@escdijon.eu, Jf.outreville@laposte.net, elefur@inseec.com

1. Introduction

You ceremoniously pull the cork on your bottle of wine and…. it is another "corked" wine! It is generally agreed that 3 to 5 percent of all bottles with natural corks show some degree of spoilage. This happens when the wine reacts with a substance called Trichloroanisole; commonly known as TCA (some say up to 5 to 10 percent of corks will have TCA in them). This complex chemical comes from reactions within corks, which involve natural molds and the chlorine bleach used in cork manufacture.

Over a period of 11 years, the CIVB (Interprofessional Council of Bordeaux wines) organized a survey on the quality of Bordeaux wines to present an analysis of corked wines. Samples were collected in supermarkets, in wine shops and wholesalers in France. Over the period, 2.38% on average of the wines tasted were considered altered by cork taint or musty, by tasters. Depending on the year, this rate can vary from 1.5% (the minimum was reached in 2010) to 3.22% (the maximum reached in 2002), although with a declining trend over the years (CIVB, 2013).

Buying a bottle of wine is often marked by expectations and uncertainty as to its quality. Consumers are confronted with an enormous amount of changing information on brands and vintages, which impacts on perceived risk (Speed, 1998). In an experimental design, Desrochers and Outreville (2013) examine the decision to purchase a bottle of wine when information is provided on the risk of purchasing a corked bottle. Participants (students) were asked if they had prior experience with a corked bottle of wine (on average 39% of participants answered positively) and to reveal their perceived probability of a bottle of wine to be corked (the average probability was 6.1%). However, in the study, the risk was assumed to be constant and not related to the price of the bottle.

The influence of price has been studied as one of the most important cues used consistently by consumers to predict quality, across a wide range of products (Verdú Jover et al., 2004; Kardes et al., 2004; Veale and Quester, 2008; Mastrobuoni et al., 2014). This price/quality relationship reflects consumers' strongly held belief that 'you get what you pay for' (Lee and Lou, 1996). Beyond the attributes of the wine and the situation, different consumers choose wine differently. Therefore, given the incomplete information on quality, price is probably used in this context by some students to overcome any perceived risk.

The purpose of this paper is to examine the purchase decision of people when faced with a perceived risk relative to a corked wine for different levels of price. It provides an example of a study of human behavior in the context of risk aversion. Research in the loss domain has developed considerably (L'Haridon, 2009), but no study (to our knowledge) has ever investigated the behavior of people when asked to reveal their perceived risk and purchase decision. Studies investigating known-risk gambles have systematically used the urn context (Camerer and Weber, 1992; Pulford and Colman, 2008). Rather than using the usual urn context, the experiments were conducted with business students using a questionnaire similar to the one originally tested by Desrochers and Outreville (2013).

In the proposed experimental design, it is possible that subjects do indeed believe that they have some knowledge in the domain and that the situation they are dealing with is known to some extent. Therefore, participants in the study are asked if they have prior experience with a corked bottle of wine and to reveal their perceived probability of a bottle of wine to be corked. To assess the extent of risk taking related to the price of a bottle, subjects are required to indicate whether they accept to buy L Euros a bottle of wine against the functional risk of buying a corked bottle and losing eventually L Euros. Each question required a choice between buying and not buying one bottle. The answer is a statement of preference for which there is no right or wrong answer per se.

Experiments have been undertaken in the fall tern of 2014 at INSEEC Bordeaux Business School and a replication of the experiment was undertaken with students in wine marketing at ESC Dijon. The paper is organized as follows. In the next two sections, we present a review of related literature and a detailed explanation of the context that is used for the experiments and the experimental designs. We continue in section 4 with a discussion of our findings. Finally, in section 5, we draw conclusions and discuss the practical impact of our findings.

2. Literature review

Because wine is an experience good, the quality of a bottle of wine is not directly observable in advance of purchase. Generally, price an important cue for quality when there is some chance of making a wrong choice. In their model, Bagwell and Riordan (1991) conclude that if consumers lack information about quality, then a high quality product may signal its true type by its price.[1]

A growing body of literature tends to explain the formation of wine prices with microeconomic matters such as age effects, climatic conditions, grape quality, and external quality ratings (Combris et al., 1997; Gergaud, 1998; Jones and Storchmann, 2001; Schamel and Anderson, 2003; Cardebat and Figuet, 2004; Lecocq and Visser, 2006). More recently, Cevik and Sedik (2014) argue that global macroeconomic variables also account for the bulk of the variation in fine wine prices. At the same time, there has been growing interest in wine as an investment asset (Fogarty, 2010; Masset and Henderson, 2010; Storchmann, 2012). However, the large selection of wines and the range of prices for the same variety can be explained only by a quality differential as perceived by consumers. Indeed, there can be considerable diversity and disparity in price between two bottles of the same wine variety whose physical properties (e.g. acidity, chateau, colour, vintage) are almost identical (Golan and Shalit, 1993). The perceived quality of a wine region raises the quality expectation of the sub-regions or appellations within that region. The wine region is the most important information to predict quality on wine labels (Johnson and Bruwer, 2007). Finally, a model that combines reputation and collective reputation variables provides a reasonable description of the information used by consumers. The effect of price of short term changes in quality is relatively small (Landon and Smith, 1997).

Accumulated theoretical and empirical evidence also suggests that wine prices and demand depend on quality, reputation and sensory characteristics. Consumers are also confronted with their own appreciations on the quality of wines, brands and vintages, which impacts on perceived risk. This price/quality relationship reflects consumers' strongly held belief that 'you get what you pay for' (Lee and Lou, 1996). Beyond the attributes of the wine and the situation, different consumers choose wine differently. Therefore, given the incomplete information on quality, price is probably used in this context to overcome any perceived risk.

3. The context

Contrary to the rational choice theory of consumer behavior (Green, 2002), the agent in our analysis does not have a full set of alternative choices but only a limited choice, i.e. yes or no. Nevertheless, he/she is assumed to have his/her own utility function in a sense that he/she is assumed to make feasible choices that result in the highest possible value of his/her utility function. Monotonicity and transitivity in the answers are also assumed.[2] The framework of the analysis is static since it does not allow the agent to revise his/her decision in a second evaluation. Similar to the rational choice theory, the analysis allows for uncertainty about the choice.[3]

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[1]   See Roberts and Reagans (2007).
[2]   On transitivity, see Birnbaum and Schmidt (2008).
[3]   Readers are referred to Loomes et al, (2009) for more information on uncertainty in consumer choice

The context is the decision to purchase a bottle of wine (the price of which varies from €5 to €80). The purchase is considered in a specialized wine shop. In a basic rational choice model the agent knows perfectly all the qualities of the goods under consideration. Buying a bottle of wine is often marked by expectations and uncertainty as to its quality. Risks include functional, such as the taste of the wine or the physical aspects of the product, social, such as being embarrassed is the quality is not adequate, financial because of the cost of the product. Gluckman (1990) contends that the act of purchasing wines is clouded with insecurity and many wine purchases therefore involve risk-aversion (Mitchell and Greatorex, 1988, 1989). Spawton (1991) suggests that with the exception of a few connoisseurs, most wine purchasers are highly risk-sensitive and their subsequent purchases are governed by risk-reduction strategies.[4]

To assess the extent of risk taking related to the price of a bottle, subjects are required to indicate whether they accept to buy L Euros a bottle of wine against the functional risk of buying a corked bottle and losing eventually L Euros. A series of six questions is used with wines valued €5, €10, €20, €35, €55, €80. Each question required a choice between buying and not buying one bottle. The answer is a statement of preference for which there is no right or wrong answer per se. The information given concerning the probability of having some risk of buying a corked bottle is not given but the respondent is asked to give his/her own estimation of the risk (the estimated risk later in the text). To illustrate this situation, consider an example of each question with prices varying from $5 to €80.

Question: you have the opportunity to buy a bottle at a price-level of €xx given that there is a risk that one of them is cork-taint.

Do you buy this bottle at this price level?   YES   NO

Out of 100, how many of them, do you think, are cork-taint: _____/100
Do you prefer that those bottles have a screw-cup?   YES   NO

Additional questions are used to determine subjects' risk attitudes and consistency. Attached to each questionnaire are questions dealing with price habits (how much do you pay for a bottle of wine?), knowledge of the risk (a corked wine), and experienced risk for a corked bottle. The experienced risk is based on respondents' prior experience with corked bottles.

Participants were also asked to grade on a 5-point Likert scale how they perceived themselves compared to the group for three types of trait of character/personality:

   1) Are you a risk-averse/risk-seeking person?

   2) Are you careful with money/spending easily money?

   3) Are you an optimist/pessimist person?

4. The experiments: preliminary results

The total number of participants in Bordeaux amount to 261 and 24 (9.1%) of the questionnaires were discarded for not respecting the monotonicity hypotheses. 55 (23.2%) of the respondents did not want to buy wine at all.

The average age is 22.5 years old and 40% are men. The average value for the willingness to buy a bottle when invited for a dinner at friends is €9.8 and varies from €2 to €30. It is interesting to note that the value given by the respondent could be considered as an arbitrary anchor. However, it is assumed that participants' relative valuations of the different amounts are orderly, coherent and that demand curves can be derived from the questions (Ariely et al., 2003).[5]

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[4] Risk-reduction strategies in the purchase of wines include, selecting a known brand, recommendations, advice from retail assistants, undertaking wine appreciation education, pricing, packaging and labelling, getting reassurance through trials such as tastings and samples (Mitchell and Greatorex, 1989).

[5] Ariely et al. (2003) report experiments with wine and note that subjects were able to know the difference between wine categories and they did know the relative ordering of the values of wine.

In this experimental design, it is possible that all subjects do indeed believe that they have some knowledge in the domain and that the situation they are dealing with is known to some extent so that ambiguity is less than expected (Heath and Tversky, 1991). Participants were asked if they had prior experience with a corked bottle of wine (on average 79.4% of participants answered positively) and to reveal their perceived probability of a bottle of wine to be corked (the average probability called the experienced risk was about 10% with a range of 1.0% - 50%. About 78% of the respondents also indicated that the risk is higher for red wines than for white wines.

The 3 questions on the general behavior of participants reveal no significant difference between male and female for the level of risk aversion, the price-oriented level or the level of optimism/pessimism. The impacts of these variables on the willingness to buy a bottle and on the willingness to pay for a bottle of wine are also analyzed in the following tables.

The willingness to buy (ACHAT)

Risk seeking is the only significant variable in the regression and is positive as expected. Other variables are not statistically significant or exhibit a wrong sign.

Dependent Variable: ACHAT
Method: ML - Binary Logit (Quadratic hill climbing)
Included observations: 237
Convergence achieved after 4 iterations

Variable	Coefficient	Std. Error	z-Statistic	Prob.
C	0.088576	0.833701	0.106244	0.9154
PRICEHABIT	0.012197	0.034463	0.353902	0.7234
RISKPERCEIVED	0.029477	0.020452	1.441262	0.1495
FEMALE	-0.132000	0.327264	-0.403342	0.6867
RISKSEEKING	0.382814	0.156791	2.441561	0.0146
BIGSPENDER	-0.076323	0.164844	-0.463003	0.6434
PESSIMIST	-0.025095	0.153209	-0.163793	0.8699

McFadden R-squared	0.034951	Mean dependent var	0.767932
S.D. dependent var	0.423045	S.E. of regression	0.418227
Akaike info criterion	1.104726	Sum squared resid	40.23023
Schwarz criterion	1.207158	Log likelihood	-123.9101
Hannan-Quinn criter.	1.146013	Deviance	247.8201

Obs with Dep=0	55	Total obs	237
Obs with Dep=1	182		

The willingness to pay for a bottle of wine (WTP)

Price habit is a significant variable explaining the willingness to buy a bottle of wine. The estimated risk at the willingness to pay (RISKPRICEPAID) is also significantly affecting the demand. The willingness to pay for a bottle is also positively related to the risk seeking (non significant) and big spender (significant) variables.

As expected women (FEMALE) are more risk averse than men and the willingness to pay is therefore lower. Almost all studies confirm that women are more risk averse than men. Empirical investigations in laboratory experiments or field studies find the same result (see surveys by Eckel and Grossman, 2008; Croson and Gneezy, 2009). This finding remains true even when controlling for the effects of other individual characteristics such as age, education, family status, and wealth (see Outreville, 2014 for a survey).

Dependent Variable: WTPAY
Method: ML - Censored Normal (TOBIT) (Quadratic hill climbing)
Included observations: 182
Left censoring (value) series: 1
Right censoring (value) series: 6
Convergence achieved after 4 iterations

Variable	Coefficient	Std. Error	z-Statistic	Prob.
C	0.847595	0.911053	0.930347	0.3522
PRICEHABIT	0.158113	0.038277	4.130711	0.0000
RISKPRICEPAID	-0.095121	0.018697	-5.087600	0.0000
FEMALE	-0.499985	0.339100	-1.474444	0.1404
RISKSEEKING	0.122428	0.170573	0.717745	0.4729
BIGSPENDER	0.595143	0.185569	3.207124	0.0013
PESSIMIST	0.040179	0.166758	0.240940	0.8096

Error Distribution				
SCALE:C(8)	2.124567	0.152638	13.91902	0.0000

Mean dependent var	3.274725	S.D. dependent var	1.724480
S.E. of regression	1.503085	Akaike info criterion	3.584040
Sum squared resid	395.3713	Schwarz criterion	3.724876
Log likelihood	-318.1477	Hannan-Quinn criter.	3.641133

Left censored obs	28	Right censored obs	36
Uncensored obs	118	Total obs	182

Results for the demand curve

As expected, the demand curve has a negative slope and it is verified that women in the sample are more risk averse than the men and have a lower demand curve for wines. However it is interesting to notice that the two curves are crossing each other at price €35.
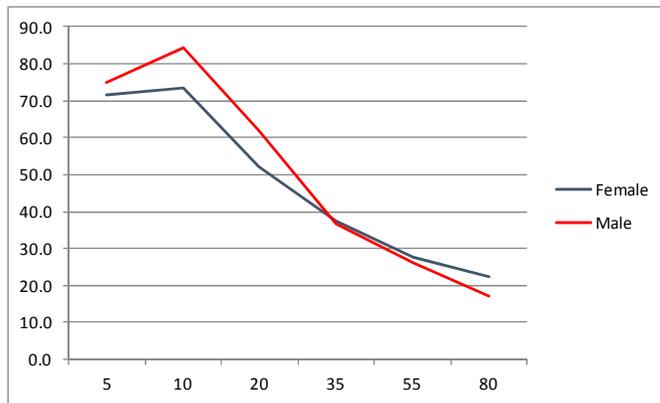
This demand curve provides an explanation for the low significance of the gender variable in the previous regressions.

Risk perception for males and women
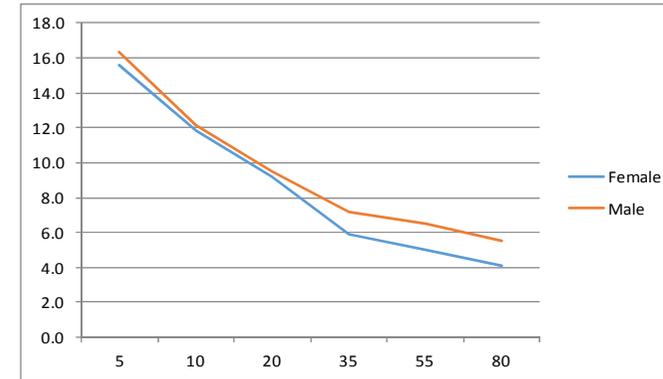
The global demand for screw caps compared to the risk estimated for each price
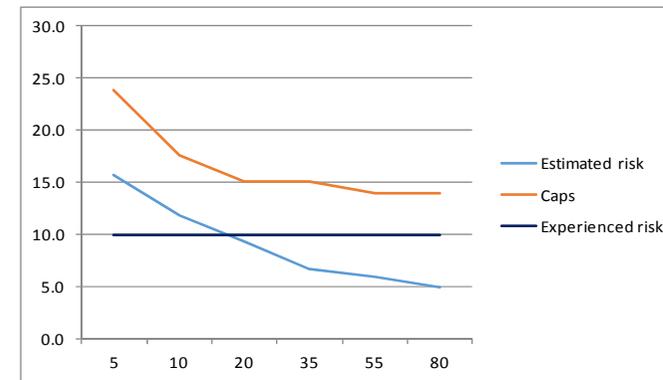
Compared to the experienced risk by respondents at the beginning of the questionnaire (question 3), the estimated risk for each price level is declining with price. The result is consistent with the expectations linking the quality of wine to the price. However, respondents to the questionnaire largely overestimated the risk. According to the Interprofessional Council of Bordeaux wines, on average of the wines tasted, the rate of wines altered by cork can vary from 1.5% to 3.2% depending of the years. This result is consistent with similar consumer surveys on risk perception for durable goods (Huysentruyt and Read, 2010). Results also show a surprising high level of demand for caps at all prices.

5. References

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