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**RISK TAKING WHEN BUYING WINE:  
AN EXPERIMENTAL INVESTIGATION**

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# **Risk taking when buying wine: an experimental investigation**

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## **Abstract:**

The act of purchasing wines is clouded with insecurity and many wine purchases therefore involve risk-aversion. Risks include functional, such as the taste of the wine or the physical aspects of the product, social, such as being embarrassed if the quality is not adequate, financial because of the cost of the product. Different people will respond to similar risky situations in very different ways. Numerous experiments have been undertaken by psychologists and economists in attempts to understand the behavior of risk-averse persons.

The experiments reported in this paper try to shed some light on this issue by analyzing choices within the framework of a purchase decision of a wine bottle when the context assumes a possible functional risk. The experiments are conducted with graduate and undergraduate students in different countries using a questionnaire and assuming either no information or full information on the probability that the wine may have a functional risk. The demand function is negatively related to the price of a bottle as expected. When potential buyers are facing a known functional risk, the demand curve is shifting downward.

**Keywords:** Wine purchase, risk behavior, experimental economics

**JEL classification:** C9, D8, L66

**Note:** The author is solely responsible for this paper but he acknowledges the collaboration of Jan Bentzen (Aarhus University, Denmark), Jean-Marie Cardebat (Université Montesquieu-Bordeaux, France) and Marek Hudik (University of Economics, Prague, Czech Republic) for the collection of data in their respective institutions.

# **Risk taking when buying wine: an experimental investigation**

## **Introduction**

Buying a bottle of wine is often marked by expectations and uncertainty as to its quality. 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.<sup>1</sup> Risks include functional, such as the taste of the wine or the physical aspects of the product, social, such as being embarrassed if the quality is not adequate, financial because of the cost of the product. Mitchell and Grottel (1988) suggest the major concern in purchasing wines revolve around functional risks, however, there is some degree of risk of making a wrong choice and experiencing a social risk. Gluckman (1990) contends that the act of purchasing wines is clouded with insecurity and many wine purchases therefore involve risk-aversion. Not surprisingly, uncertainty as a background in the decision process has attracted a lot of attention from economists and psychologists since real decisions are often taken in an environment where full information is not available.

Different people will respond to similar risky situations in very different ways. Numerous experiments have been undertaken by psychologists and others in attempts to define profiles of risk-taker and risk-averse persons. Differences in the behavior of individuals facing similar risky situations could be partially explained by the individual's family background, education, position, prior experience, and geographical location (Kogan and Wallach, 1974). The conventional anthropological theory is that individuals are guided in their choice between risk-avoiding and risk-taking strategies by their culture. A renewed interest in this area of study is linked to the work of Hofstede.<sup>2</sup>

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<sup>1</sup> 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 Grottel, 1989).

<sup>2</sup> See Hofstede (1980) and papers by Newman and Nollen (1996), Yeh and Lawrence (1995).

MacCrimmon and Wherung (1986) provide an extensive survey of theoretical and empirical studies directed towards the understanding of risk behavior. Some of this research focuses on the riskiness of situations, while other studies focus on the willingness of people to take risks in such situations. In many situations, people make decisions in conditions where some critical information is lacking. This means that even if the decision maker has some knowledge about an outcome he/she is unable to attach a probability to the event. An environment is called 'risky' if the set of outcomes and the probability distribution over it is known, while it is called "uncertain" if either of these environmental characteristics is unknown or only partially known.<sup>3</sup>

How people deal with conditions of ignorance or risky situations is a relevant issue to understand the purchasing behavior of people. This article focuses attention on the decision generated by lack of information or prior knowledge of the true probability of a risk (which is always a loss in this case). In fact, we seek to separate out the pure risk attitude from the pure buying behavior when dealing with an uncertain environment. The experiments reported in this paper try to shed some light on this issue by analyzing choices within the framework of a purchase decision for a wine bottle. It provides an example of a study of human behavior when aversion towards loss is considered.

The study of human choice behavior provides a focus for considering this issue in different contexts. The experiments are conducted with graduate and undergraduate students in different countries using a questionnaire. The context is the decision to purchase a bottle of wine (the price of which varies) assuming either no information or full information on the probability that the wine may have a functional risk (it is corked or corky). The experiments reported in this paper provide some evidence on risk-aversion when purchasing wine in a risky context by comparison with an unknown situation. To our knowledge, similar experiments with students have often been investigated in a laboratory environment within an urn context but seldom observed within a look-like real context.

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<sup>3</sup> Knight (1921) was probably the first economist to distinguish between measurable uncertainty (risk) and unmeasurable uncertainty (uncertainty). Ellsberg (1961) makes the difference between a "risky" environment and an "ambiguous" choice if the environment is either unknown or only partially known. Results of experimental studies suggest ambiguity aversion in the domain of gains and ambiguity seeking in the domain of losses (see Camerer and Weber, 1992 for a survey).

The next section will provide a detailed analysis of the experiment background and context. The following section will present the results of the experiment in different countries. The paper is concluded with a discussion and proposals for further analysis.

## **Experiment background and context**

### *Background*

A large body of empirical literature considers situations where unknowable uncertainty concerning a potential financial loss is the situation where the subjects have no prior information. The known uncertainty is simply the case where probability of the loss is precisely specified. In an experimental design, it is not possible to be completely confident that all subjects do indeed believe that the situation they are dealing with represents an unknowable uncertainty. In fact, consumers are confronted with an enormous amount of changing information on brands and vintages which impacts on perceived risk (Speed, 1998). Our experimental designs are therefore approximations of the condition of unknowable uncertainty (Chow and Sarin, 2002).<sup>4</sup>

It is however possible to take an “optimistic” view focusing on better possible values rather than worse ones. Einhorn and Hogarth (1985) predict that uncertainty seeking will predominate for small probabilities of gain and large probabilities of loss, but little systematic research has investigated differences in expressed attitude as a function of the manner in which vague probability information is communicated to a decision maker. It is less known if changes in message presentation, without any change in the underlying problem structure, influence how decision makers interpret uncertainty information.<sup>5</sup>

Contrary to the rational choice theory of consumer behavior (Green, 2002), the agent in our analysis do 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

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<sup>4</sup> *Vagueness* has been suggested as a more accurate label for imprecision of probabilities (see Budescu, Weinberg and Wallsten, 1988).

<sup>5</sup> This neglect of message format is somewhat surprising given its practical importance (Kuhn, 1997).

of his/her utility function. Monotonicity and transitivity are also assumed.<sup>6</sup> 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. A related problem is the context of incomplete information. In a basic rational choice model the agent knows perfectly all the qualities of the goods under consideration. Therefore, this broad 'rational choice paradigm' is replaced by the narrower definition of maximizing expected utility defined by Von Neumann and Morgenstern (1944) which does depend on strong assumptions of a psychological nature.

Whether expected utility theory is consistent with individual behavior is a question that has received considerable attention in the literature. Many laboratory experiments of choice under risk have raised doubts on the validity of the principles of expected utility. Behavioral decision theorists try to take into account biases in people's information process. In the prospect theory formulated by Kahneman and Tversky (1979) the behavior of people may at the same time exhibit overweighting of low probabilities and under weighting of high ones.<sup>7</sup> A strong intuition about preferences is that people treat gains and losses differently (Hershey and Schoemaker, 1980, 1985). A property called loss aversion refers to the fact that people tend to be more sensitive to decreases in their wealth than to increases (Thaler *et al.*, 1997). Previous studies presenting experimental evidence on decisions under risk when losses are involved seem to imply that choices are not inconsistent with expected utility theory (Schoemaker, 1990).

It should also be reminded that the same risky prospects experienced in different contexts are valued differently. The way, in which a problem is formulated, including its script, presentation, and response mode, affects preferences. This has been known as a context effect (Hershey and Schoemaker, 1980; Thaler *et al.*, 1997). Furthermore, it is not necessarily verified that risk attitude is the same in all cultural environments. It is

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<sup>6</sup> On transitivity see Birnbaum and Schmidt (2008).

<sup>7</sup> Many other approaches have been developed (Machina, 1982, 1987; Camerer, 1989) and the conclusions of much of these analyses seem to be that no one theory can explain all of the data (Camerer, 1994; Harless and Camerer, 1994; Hey and Orme, 1994).

therefore interesting to validate a questionnaire with several different groups and countries.

### *The context*

The context is the decision to purchase a bottle of wine (the price of which varies from \$5 to \$500) assuming that there is a possibility that the wine may have a functional risk (it is corked or corky). The purchase is considered in a tax-free zone of an airport rather than in a wine shop where the consumer usually can bring back the bottle. A picture of a tax-free zone in an airport displaying bottles of wine was presented to the students in the first experimentation but this was not repeated in further experimentations.

The experiment is defined in two phases and distributed to two different groups to avoid any memory or anchoring effect: 1) there no information given concerning a potential loss and 2) there is a given probability that one bottle may be corked and that this will result in a loss. The design of the questionnaire is similar to questionnaires tested before by Hershey and Schoemaker (1980) or Loubergé and Outreville (2001).

It is important to determine how individuals actually behave when they are confronted by the prospect of a potential loss. To assess the extent of risk taking related to the price of a bottle, subjects are required to indicate whether they accept to buy  $L$  Dollars a bottle of wine against the functional risk of buying a corked bottle and losing eventually  $L$  Dollars.

### *Experiments*

In the first experiment no information is revealed and therefore we are testing the effect of price on demand. The risky prospect is suggested by a case of 12 bottles that may or may not contain one corked bottle. The probability of having some risk of buying a corked bottle in this case is unknown. A series of seven questions is used with wines valued \$5, \$10, \$20, \$50, \$100, \$200, \$500. Each question required a choice between buying and not buying one bottle in this case. The answer is a statement of preference for which there is no right or wrong answer *per se*. To illustrate this consider this set of the first three questions:

1. You want to buy a bottle of wine valued \$5 in a case in which you don't know if there is a possibility you may buy one corked bottle.

Do you buy a bottle: YES NO

2. You want to buy a bottle of wine valued \$10 in a case in which you don't know if there is a possibility you may buy one corked bottle.

Do you buy a bottle: YES NO

3. You want to buy a bottle of wine valued \$20 in a case in which you don't know if there is a possibility you may buy one corked bottle.

Do you buy a bottle: YES NO

Because wine is an experience good (Nelson, 1970; 1974), the quality of a bottle of wine is not directly observable in advance of purchase.<sup>8</sup> Generally, price is an important cue for quality when there is some degree of risk of making a wrong choice (Cox and Rich, 1967; Szybillo and Jacoby, 1974; Horowitz and Lockshin, 2002). 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.<sup>9</sup> Similarly, 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).<sup>10</sup> 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.

In the second experiment, the risky prospect is suggested by a case of 12 bottles containing for sure one corked bottle. It is equivalent to an urn containing red and blue balls in known amounts. A series of seven questions is used with the same values. Each question required a choice between buying and not buying one bottle in this case. The answer is a statement of preference for which there is no right or wrong answer *per se*. The design of the questions is as follows:

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<sup>8</sup> See Gerbaud, Storchmann and Verardi (2012) for a recent survey.

<sup>9</sup> See Roberts and Reagans (2007).

<sup>10</sup> See Veale and Quester (2008).

1. You want to buy a bottle of wine valued \$5 in a case in which there is for sure always one corked bottle (the salesperson in the shop is providing you with this information). Do you buy a bottle: YES NO

It is assumed that all of the students are familiar with the concepts of expected values and probabilities. Since it is important to invoke context effects, a few additional questions were added to the questionnaire to evaluate the propensity to buy a bottle of wine and at what price and to determine subjects' risk attitudes and consistency.

### **Results of the experiments**

The first experiments, used to test the questionnaires, have been undertaken during the fall term of 2010 with students enrolled in Finance bachelor classes at HEC Montréal (Canada). Each experiment was performed in a different class and the size varied from 22 to 28 students. The small size of the experiment is recognized here. Further experiments were realized in 2011 and 2012 at Aarhus University, Denmark, at Montesquieu University in Bordeaux, France and at the University of Economics in Prague, Czech Republic. It was decided to keep the size of samples similar (as far as possible) in all the experiments.

Interestingly, to the question “If you buy a bottle of wine when you are invited by friends to a dinner, how much would you usually spend?” the answer is very close in Bordeaux (€14.5), in Denmark (\$15.3) and even in the Czech Republic (\$11.8).<sup>11</sup>

As shown in figure 1 for the original experiments in Montreal, the demand function is negatively related to the price of a bottle as expected. When potential buyers are facing a known functional risk, the demand curve is shifting downward.

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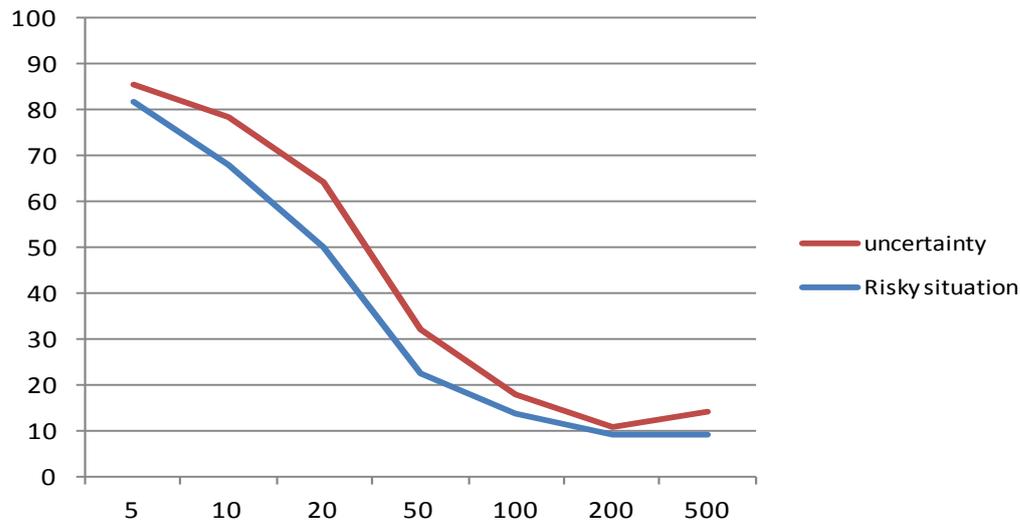
Insert figure 1 here

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<sup>11</sup> In each country, dollars amounts were converted in the questionnaires into the local currency.

**Figure 1: The demand as a function of price with and without a risky prospect**  
HEC Montreal, sample size = 28 and 22



This result is challenging Elberg (1961) who provides evidence that people prefer to draw a ball from an urn that is characterized by having an explicit probability of the outcome rather than drawing a ball from an urn with unknown probabilities.<sup>12</sup> Chow and Sarin (2002) find that people prefer when probabilities are precise (known information) and they feel insecure when they are ambiguous (unknown information), because they think someone else possesses the information. However, they prefer unknowable information over unknown information if uncertainty is more acceptable when the information is not available at all.

In our experiment, if people believe they have sufficient knowledge to evaluate that the situation of uncertainty is less risky (the probability of buying a corked bottle is probably much lower than 1/12), then they prefer no information to prior information on the risk. Heath and Tversky (1991) provide such evidence suggesting that ambiguity aversion disappears when people believe they have sufficient knowledge in the relevant domain.

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<sup>12</sup> Several studies confirmed this result (Becker and Brownson, 1964; Slovic and Tversky, 1974; Hogarth and Kunreuther, 1989; Sarin and Weber, 1993) but other studies have challenged these results (Fox and Tversky, 1995; Viscussi and Chesson, 1999; Fox and Weber, 2001; Chow and Sarin, 2001).

As suggested by the comparative ignorance hypothesis (Fox and Tversky, 1995), people usually avoid ambiguous choices when there is a chance to directly compare them with a clear alternative. However, the same does not happen if they are confronted with separate evaluations. The affective reaction is more important when people do not have enough information to evaluate the outcome.

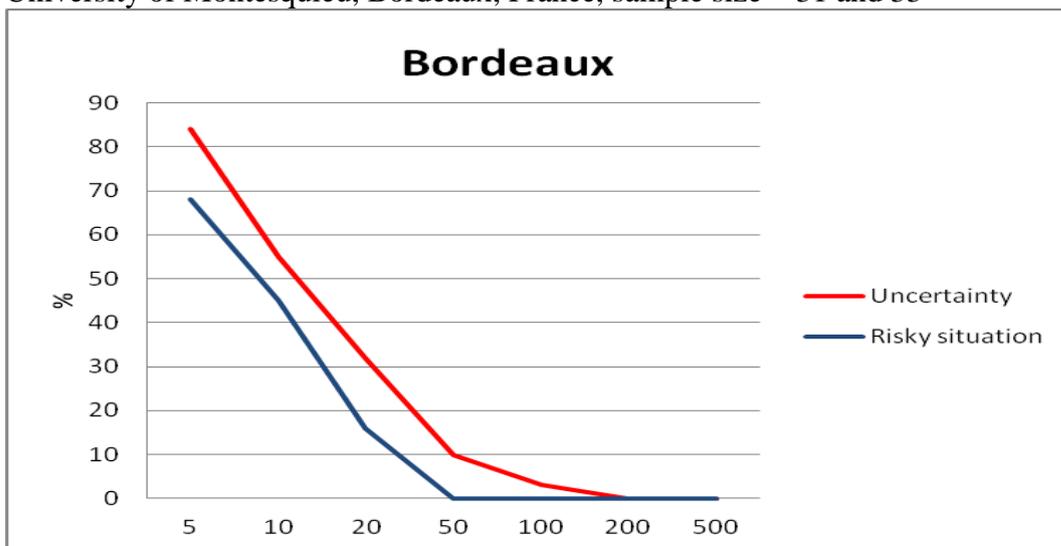
The results are confirmed in Bordeaux (figure 2), Aarhus University (figure 3) and Prague (figure 4).

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Insert figures 2, 3 and 4 here

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**Figure 2: The demand as a function of price with and without a risky prospect**  
University of Montesquieu, Bordeaux, France, sample size = 31 and 33

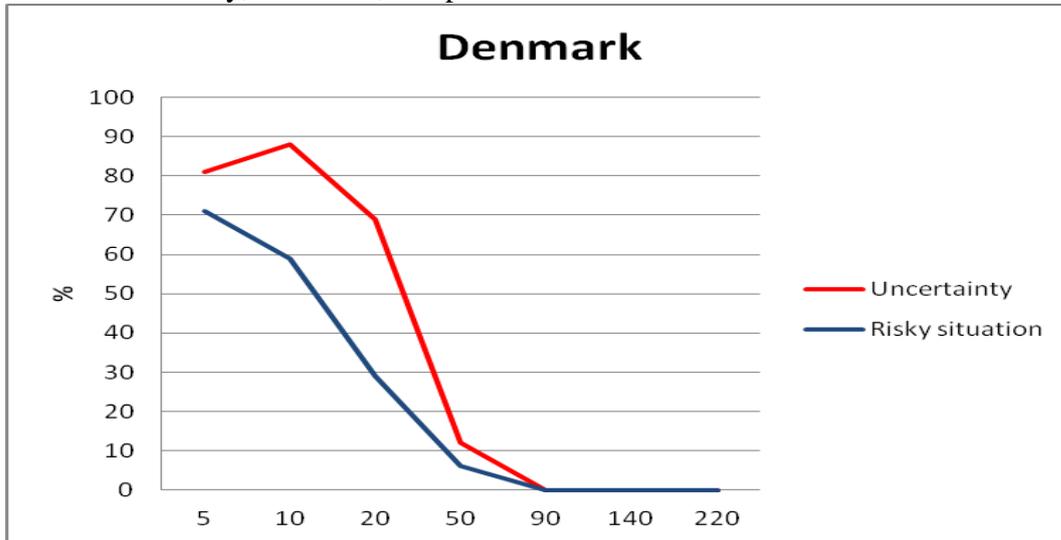


It was decided to revise the scale of prices assuming that the larger prices were not reasonable prices for students. Interestingly, the shapes of the curves in the risky situation are very similar in all universities and the scale of prices does not seem to affect the results.

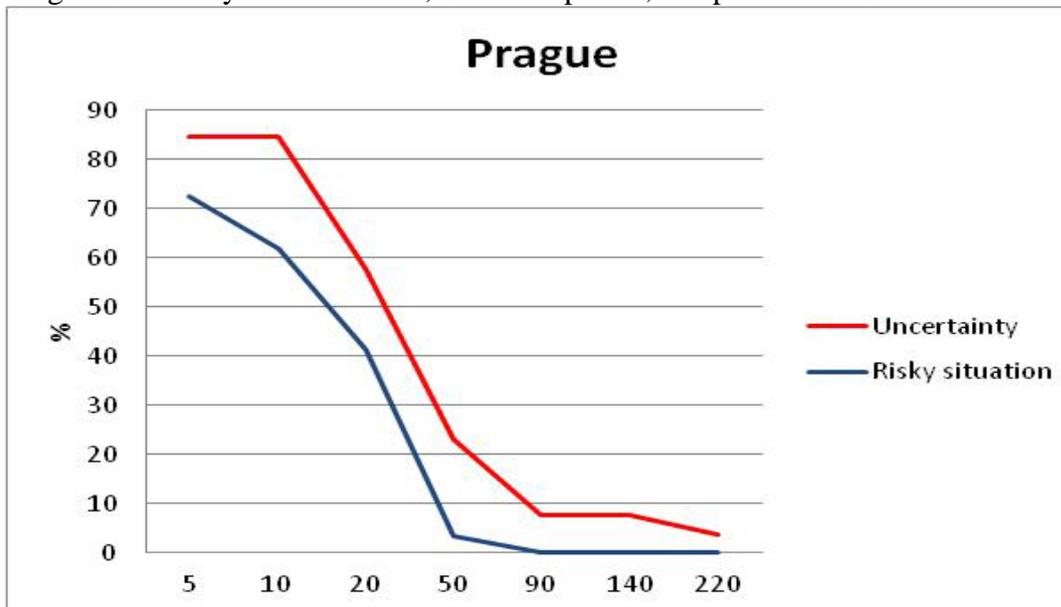
According to consumers' behavior, one would anticipate that the demand for wine is non linear with price (does have a relationship with quality) and is therefore lower for cheap wines perceived as low quality wines. This hypothesis means that there is a non

linear relationship between demand and price.<sup>13</sup> Our analysis does not confirm this hypothesis with the exception of the sample of students at Aarhus University, Denmark (figure 3).

**Figure 3: The demand as a function of price with and without a risky prospect**  
Aarhus University, Denmark, sample size = 16 and 17



**Figure 4: The demand as a function of price with and without a risky prospect**  
Prague University of Economics, Czech Republic, sample size = 26 and 29



<sup>13</sup> Horowitz and Lockshin (2002), show that the relationship between price and quality is not necessarily linear either.

## **Conclusion and implications**

The experiments reported in this paper provide some evidence on human behavior when aversion towards loss is considered. By analyzing choices within the framework of a purchase decision for a wine bottle, the experiments show significant risk-aversion when purchasing wine in a risky context. The experiments are conducted with graduate and undergraduate students in different countries using a questionnaire and assuming either no information or full information on the probability that the wine may have a functional risk. The demand function is negatively related to the price of a bottle as expected. When potential buyers are facing a known functional risk, the demand curve is shifting downward.

The results must, however, be viewed in the context of the study's limitations. Studies on the comparative ignorance hypothesis have shown that people's preferences are heavily influenced by the affective reactions they experience toward the alternative choice they have to make.<sup>14</sup> Recently, Rubaltelli et al. (2010) find that people's affective reactions help explain the evaluation of decisions when they have more or less information about the outcome. Here, imprecision is related to the unknowable information and conflict to the unknown information.

One area of further research would be to examine differences between these two ambiguity sources can come from the unknown and unknowable informations. It is not clear how people would respond to different kinds of ambiguity. A decision maker would prefer to obtain more information or choose the option about which he/she is best informed, all other things being equal (Baron & Frisch, 1994). A direct application could be the choice between a bottle with a natural cork, a synthetic cork or a screw cap.

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<sup>14</sup> For a review see Peters (2006).

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