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RISK AVERSION, RISK BEHAVIOUR AND DEMAND FOR INSURANCE: A SURVEY

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Risk Aversion, Risk Behavior and Demand for Insurance: a survey

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Abstract:

Determinants of risk attitudes of individuals are of great interest in the growing area of behavioral economics that focuses on the individual attributes, psychological or otherwise, that shape common financial and investment practices. The purpose of this paper is to review the empirical literature on risk aversion (and risk behavior) with a particular focus on insurance demand or consumption. Empirical research on risk aversion may be categorized into two main areas, i.e. 1) the measurement and magnitude of risk aversion, 2) the empirical analysis of socio-demographic variables associated with risk aversion. The paper reviews this literature as well as empirical studies on the demand for insurance considering the use of variables associated with relative risk aversion.

Keywords: Risk aversion, Insurance demand, Education, Human development.

JEL classification: G22, D10, D81

Risk Aversion, Risk Behavior and Demand for Insurance: a survey

"If one can accept the assumption that basic attitudes toward risk ought to have bearing on insurance consumption, then variables such as age, sex, personality, childhood experiences, intelligence, utility for money, and preferred risk levels, all of which are apparently related to risk attitudes, should likewise be of value in explaining insurance buying behavior."(Mark Greene, JRI 1963)

1. Introduction

Since Pratt (1964) and Arrow (1965) independently derived the measure of absolute and relative risk aversion, the concept of Relative Risk Aversion (RRA) has been used in many theoretical economic and financial models.[1] If, as wealth is increased across households, a greater (smaller) proportion of wealth is held in the form of risky assets, household are said to exhibit decreasing (increasing) RRA, i.e., they are relatively less (more) risk averse. Within an expected-utility framework, decision-makers are usually assumed to be non-satiated and risk-averse.

Nearly all theoretical and empirical work on the demand for life insurance takes Yaari (1964, 1965) and Hakansson (1969) as a starting point. The demand for insurance is properly considered within the context of the consumer's lifetime allocation process (Fisher, 1973; Campbell, 1980; Lewis, 1989; Bernheim, 1991). Within this framework, the consumer maximizes lifetime utility and a variety of variables is used to represent the possible outcome of the decision being represented. Demand is a function of wealth (or total assets), expected income, expected rate of returns on alternative choices and subjective discounting functions to evaluate these choices.[2] It is implicitly assumed that the level of risk aversion has an impact on these discounting factors and hypothesized that risk aversion is positively correlated with insurance consumption in a nation (Schlesinger, 1981; Szpiro, 1985).

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[1] Risk attitudes other than risk aversion, i.e. prudence and temperance, are becoming important both in theoretical and empirical work (See Eeckhoudt, 2012, and Gollier et al., 2013, for a review).

[2] This focus is clearly on life insurance but it could be generalized to the consumption of all insurance products as part of a basket of securities available to the consumer. By considering this approach, the analysis ignores the corporate demand for insurance. The insurance literature has paid insufficient attention to the fundamental differences between individual and corporate purchasers. Although risk aversion is at the heart of the demand for insurance by individuals, it provides an unsatisfactory framework from the corporate finance point of view. The empirical literature on the corporate demand for insurance relies heavily on Mayers and Smith (1982, 1987) and Main (1982, 1983) to investigate the determinants of the corporate demand.

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.[3] 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, 1964). Determinants of risk attitudes of individuals are of great interest in the growing area of behavioral finance that focuses on the individual attributes, psychological or otherwise, that shape common financial and investment practices.[4]

Historically, in the insurance literature, the studies by Greene (1963, 1964) and Hammond et al. (1967) were the first to study the behavioral aspects of the demand for insurance (respectively non-life and life) using experimental economics with a panel of students. Burnett and Palmer (1984) examined psychographic and demographic factors and found that ethic, religion and education, among other characteristics, are significant factors of life insurance ownership.

More recent research in the field of behavioral insurance focuses on the riskiness of situations, while other studies focus on the willingness of people to take risks in such situations. The conventional anthropological theory is that individuals are guided in their choice between risk-avoiding and risk-taking strategies by their culture.[5] A renewed interest in this area of study is linked to the work of Hofstede.[6] It is surprising that this subject has remained unexplored for a long time considering the article published by Hofstede (1995) in the Geneva Papers on Risk and Insurance and which opened the door to such research.

The purpose of this paper is to review the empirical literature on risk aversion (and risk behavior) with a particular focus on insurance demand or consumption. Empirical research on risk aversion may be categorized into two main areas, i.e. 1) the measurement and magnitude

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[3] MacCrimmon and Wherung (1986) provide an extensive survey of theoretical and empirical studies directed towards the understanding of risk behavior.

[4] Behavioral finance is the paradigm where financial markets are studied using models that are less narrow than those based on Von Neumann–Morgenstern expected utility theory and arbitrage assumptions. Specifically, behavioral finance has two building blocks: cognitive psychology and the limits to arbitrage (see Ritter, 2003). Cognitive psychologists have documented many patterns regarding how people behave. Some of these patterns are known as heuristics or rules of thumb, overconfidence, mental accounting, framing, conservatism, disposition effect, i.e. the differences between losses and gains. More extensive analysis can be found in Benartzi and Thaler (2001), Barber and Odean (2001), Barberis and Thaler (2003), Hirshleifer (2001).

[5] Ward and Zurbruegg (2000) point to the importance of the cultural environment. The economic benefits derived from insurance are likely to be conditional on the cultural context of a given economy. Douglas and Wildavsky (1982) (mentioned in Hussels et al., 2005) show that the demand for insurance in a country may be affected by the unique culture of the country.

[6] See Hofstede (1980, 1983) and papers by Newman and Nollen (1996), Yeh and Lawrence (1995).

of risk aversion, 2) the empirical analysis of socio-demographic variables associated with risk aversion.

The paper is structured as follows. Section 2 provides a survey of the numerous studies examining the relationship between risk aversion and wealth and measuring the level of RRA. The following section presents an assessment on the relationship between RRA and socio-demographic variables from a survey of the empirical literature. The next section reviews the use of these socio-demographic variables associated with RRA in empirical studies of the demand for insurance. The last section examines the embryonic literature on behavioral insurance.

2. The measurement and magnitude of risk aversion

Numerous difficulties are encountered in attempting to measure preferences toward risk in a real world setting. Attention has also focused on the conditions under which it is possible in principle to recover individual investor's risk preferences from their demand for assets or by observing the behavior of individuals towards the demand for insurance.

Earliest studies have used questionnaires to recover individual investor's risk preferences (Lease et al., 1974; Lewellen et al., 1977). At the same time, attention has also focused on the conditions under which it is possible in principle to recover these individual preferences by observing their behavior (Cohn et al., 1975). One of the earliest and most quoted studies of risk aversion and wealth is by Friend and Blume (1975). Their measure of risk aversion depends on the individual investor's portfolio allocation between risky and risk-free assets but implication is that the coefficient of relative risk aversion for a typical household is in excess of 1.0. They find evidence of decreasing relative risk aversion (DRRA), i.e. individuals invest a larger proportion of their wealth in risky assets as wealth increases. When wealth is defined to include the value of houses, cars and human capital, they find that the assumption of constant relative risk aversion (CRRA) is a fairly accurate proposition. They conclude that the coefficient of relative risk aversion (RRA) for a typical household is in excess of 1.0 and more likely close to 2.0.

Although Stiglitz (1969) derived a prediction that RRA will increase with wealth, there is no consensus among economists and this issue is the source of many empirical papers. Siegel and Hoban (1982 and 1991) present also some empirical evidence of either decreasing,

constant or increasing relative risk aversion (IRRA) depending on wealth measure and sample size. They also find decreasing RRA for the wealthy households and increasing RRA for the poorer households. As shown by Meyer and Meyer (2005), variations in the way the outcome variable of a risky choice is defined or measured, significantly alter the relative risk aversion measure determined by the decision maker. In addition, various studies also frequently define or measure wealth or income in different ways. Measures of wealth, for instance, often exclude the value of human capital. Although the measure of relative risk aversion is invariant to the unit in which the outcome variable is measured, this elasticity measure is sensitive to what is included or excluded when defining or measuring a variable.

The definition of wealth, age, high- or low-wealth status, and demographic characteristics emerge from many studies as indicators of risk attitudes. Landskroner (1977) extends the analysis of Friend and Blume to include the impact of occupation and employment and found only small variations in the relationship between RRA and occupation or the type of industry. The assumption of CRRA cannot be rejected in his study. Morin and Suarez (1983) analyze data from Canadian households. They find IRRA for less wealthy households and DRRA for others. Barsky et al. (1997) report the same results. Bellante and Saba (1986) examine human capital and life-cycle effects on RRA and find that all age groups exhibit DRRA.

Several other studies find similar discrepancies.[7] Support for DRRA is found in Levy (1994), Schooley and Worden (1996), Jianakoplos and Bernasek (1998) and Ogaki and Zhang (2001). Szpiro (1986), Brown (1990), Guiso and Paiella (2006) provide support for CRRA. Several experiments have also been conducted in rural areas in developing countries but the stories give mixed results. Binswanger (1981), Mosley and Verschoor (2005) find no significant association between risk aversion and wealth. Wik et al. (2004), Yesuf and Bluffstone (2009) find negative correlations.

The methodologies and contexts have been varied and the results also. Much of the existing evidence about risk preferences is based on laboratory experiments following the methodology designed by Holt and Laury (2002).[8] Some results are based on television game show participants (Gertner, 1993; Metrick, 1995, Beetsma and Schotman, 2001). Attention has mainly focused on the conditions under which it is possible in principle to recover

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[7]   See Bajtelsmit and Bernasek (2001) and Carson et al. (2011) for previous surveys.
[8]   These studies are not surveyed in this paper.

individual investor's risk preferences from their demand for assets following Friend and Blume (1975).

Some attempts have been made to recover risk preferences from decisions of regular market participants. Chetty (2006) and Palacios-Huerta (2006) recover RRA measures from the labor market and wage data. Halek and Eisenhauer (2001) consider the demand for life insurance, Cohen and Einav (2007) the demand for automobile insurance and Sydnor (2010) the demand for property insurance. At a macro-economic level, it has been shown by Szpiro (1986), that it is possible to obtain an aggregate measure of risk aversion by observing the behavior of individuals towards the demand for insurance.

It comes out the literature on the demand for insurance that the relative risk aversion of individuals and the wealth elasticity of insurable risky wealth are the main determinants of the changes in the willingness to insure (Raviv, 1979; Doherty and Schlesinger, 1983; Chesney and Loubergé, 1986). Karni and Zilcha (1985, 1986) addressed the problem of measurement of risk aversion and studied the implications of differences in risk aversion for the optimal choice of life insurance coverage. Cleeton and Zellner (1993) detailed the relationship between insurance demand and income when there is a change in the degree of risk aversion.

The concept of risk tolerance is used in some studies.[9] Risk tolerance is supposedly the reverse of risk aversion – i.e. when risk aversion increases, risk tolerance decreases. The measure of risk tolerance is based on a combination of investment and subjective questions assessing the behavior of respondents. It was developed in the Federal Reserve Board's Survey of Consumer Finances (SCF) with the purpose of classifying respondents by levels of tolerance. It does not provide an exact measure of risk tolerance. Barsky et al. (1997) use a similar approach to measure risk aversion. Papers by Sung and Hanna (1996), Hanna and Chen (1997), Grable and Lytton (1999), Hanna et al. (2001) are examples of papers having developed this approach.

Following these approaches, several studies have presented evidence concerning the measures of RRA. Estimates of the value of RRA range from less than 1.0 (Hansen and Singleton, 1982; Keane and Wolpin, 2001; Belzil and Hansen, 2004; Brodaty et al. 2007), to well over

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[9] Not to be confused with risk attitudes other than risk aversion (e.g. prudence and temperance) which are becoming important both in theoretical and empirical work (Eeckhoudt, 2012).

30 (Hansen and Singleton, 1983; Blake, 1996; Palacios-Huerta, 2006; Sydnor, 2010) (See table 1).[10]

In contrast to the abundant literature on relative risk aversion, there has been relatively little work done in estimating prudence and temperance (Dynan, 1993; Merrigan and Normandin, 1996, Eisenhauer and Halek, 1999; Eisenhauer, 2000; Eisenhauer and Ventura, 2003; Deck and Schlesinger, 2010; Maier and Ruger, 2010; Noussair et al., 2011; Ebert and Weisen, 2011).

Insert table 1 here

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3. Socio-demographic variables associated with risk aversion

In earlier studies, estimations of the relationship between an individual's investment in risky assets and wealth, or direct RRA measures, are examined in the context of the levels of income and wealth. Many studies however exclude the effects of individual and household characteristics. Studies that are more recent include a wide range of control variables that are hypothesized to influence risk decision making. Characteristics such as gender, age, race and religion clearly affect one's level of risk aversion. The relationship between risk aversion and other characteristics such as the level of education, the marital status and size of the family, the health status or the type of employment is not as clear. While it can be argued that these traits may affect one's risk aversion, it may also be that one's risk aversion affects these lifestyle choices. It may for example be argued that investors with a high level of education are less risk averse, but it may also be argued that less risk averse individuals choose to pursue a higher level of education. Table 2 reviews the empirical studies exploring differences in risk preferences across demographic groups.[11]

a. Risk aversion and gender

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

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[10] A number of observers have been disconcerted by this lack of consistency across studies. Gollier (2001, pp. 424-425) has remarked, "It is quite surprising and disappointing for me that almost 40 years after the establishment of the concept of risk aversion by Pratt and Arrow, our profession has not been able to attain a consensus about the measurement of risk aversion."

[11] See Bajtelsmit and Bernasek (2001) and Carson et al. (2011) for previous surveys.

Eckel and Grosssman, 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. For example, Jianakoplos and Bernasek (1998) look for evidence of gender differences in financial risk taking. They use data from the Federal Reserve's Survey of Consumer Finances and estimate relative risk aversion by gender. They find that single women were relatively more risk averse than single men and married couples. The proportion held in risky assets increase with wealth (DRRA) but for single women the effect is significantly smaller than for single men and married couples.

Some studies explore gender differences in different context or cultural environment and find similar results. Palsson (1996) study Swedish households also finds evidence that women are more risk averse than men. A similar result is found in the Netherlands (Donkers et al, 2001; Hartog et al., 2002), in Israel (Cohen and Einav, 2007), Germany (Dohmen et al., 2011) and Taiwan (Lin, 2009). It is interesting to note that two studies in Switzerland (Schubert et al., 1999) and Denmark (Harrison et al., 2007) are the only ones finding no significant gender differences.

Other studies have explored gender differences in risk aversion in the context of consumer decisions. Hersch (1996) finds that, on average, women made safer choices than men in a number of risky consumer decisions such as smoking, seat belt use, preventative dental care and having regular blood pressure checks.

b. Risk aversion and age

Age is a demographic characteristic that is often hypothesized to affect an individual's degree of risk aversion. Several early studies consider the effects of age on risk aversion within the context of the lifecycle risk aversion hypothesis[12] and find risk aversion to be positively correlated with age (Morin and Suarez, 1983; Brown, 1990; Bakshi and Chen, 1994; Palsson, 1996). On the other hand, Bellante and Saba (1986) differentiate the effects of human capital and age on risk aversion and find evidence of IRRA with human capital but DRRA with age.

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[12] The lifecycle risk aversion hypothesis predicts that risk aversion will increase over the lifecycle. After retirement, labor income is replaced by assets income and a person is not willing to accept more investment risks. On the contrary, the further a person is from retirement the more risk they are willing to accept in their investments.

Riley and Chow (1992) find that risk aversion decreases with age up to 65 years and then increases significantly. Halek and Eisenhauer (2001) confirm that risk aversion increases significantly after age 65. Several other studies confirm this non-linear relationship between age and RRA (Jianakoplos and Bernasek, 1998; Lin, 2009).

The effects of age on risk aversion are complicated by the possibility of cohort effects. Young people in periods of economic growth may be less risk averse than young people today. Brown (1990) examines the effect of the distribution of wealth across age cohorts and find that middle age investors are less risk averse than young investors. Jianakoplos and Bernasek (1998) propose a similar explanation. Harrison et al (2007) find a decrease in risk aversion as the age of a person increases before 65 years. Cohen and Einav (2007) find also a U-shaped relationship.

c. *Risk Aversion and family status*

In one of the earliest study on the determinants of risk aversion, Cohn et al. (1975) find DRRA from a survey among customers of a large nation-wide retail brokerage firm and variables such as age, gender, marital status, family size, occupation significantly influence the degree of RRA. The marital status and family size are negatively correlated with the degree of risk aversion. Several studies confirm this result (Riley and Chen, 1992; Siegel and Hoban, 1991; Hersch, 1996; Schooley and Worden, 1996; Lin, 2009).

In many other studies, the relationship between risk aversion and the marital status or the family size is not as clear. Sunden and Surette (1998) demonstrate that the behavior is determined by a combination of gender and marital status and may exhibit different signs. Although married women and men do not differ, married women are more likely than single women to choose non-risky assets (see also Jianakoplos and Bernasek, 1998). While it can be argued that these traits may affect one's risk aversion, it may also be that one's risk aversion affects these lifestyle choices. For example, marriage increases one's risk aversion, but at the same time, more risk-averse individuals choose to marry (Halek and Eisenhauer, 2001).

Similarly, the existence of children would lengthen the planning horizon to the extent and the expected coefficient related to the family size is positive (Jianokoplos and Benasek, 1998). However, this expected result is not verified in many studies (Bellante and Green, 2004).

d. Risk aversion and education

A number of studies have examined the effects of formal education on risk aversion. A common concern in interpreting the results of these studies is that education, income and wealth tend to be highly correlated (Halek and Eisenhauer, 2001). Similarly to previous traits, it may for example be argued that investors with a high level of education are less risk averse, but it may also be argued that less risk averse individuals choose to pursue a higher level of education. The causality links have not been explored in the literature.

Most recent rational choice theories of educational decision-making, including theory of Relative Risk Aversion (RRA) (Goldthorpe, 1996; Breen and Goldthorpe, 1997; Morgan, 1998; Breen, 1999) predict that individuals are utility-maximizing agents and are assumed to make educational decisions in light of the expected benefits and costs of these decisions. The review of the literature on the relationship between RRA and the level of education tends to support the view that more risk-averse individuals have a lower tendency to pursue a university education (Outreville, 2013b).

Riley and Chow (1992) find that financial risk aversion decreases with education. Papers by Shooley and Worden (1996), Bajtelsmit and Bernasek (2001), Hartog et al. (2002), Bellante and Green (2004), Harrison et al. (2007), Lin (2009), also support this result. Dohmen et al. (2011) also find that higher parental education has a significant positive impact on the willingness to take risks. Jianakoplos and Bernasek (1998) find that single women and single men with less than a sixth grade education hold portfolios with much greater percentages of risky assets compared with those having more education. On the contrary, Hersch (1996) finds that risk aversion increases with education when considering risky consumer choices.

In the context of financial risk taking, Bayer et al. (1996) examines the effects of financial education in the workplace on participation in and contributions to voluntary savings plans. They find that measures of savings activity are significantly higher when employers offer retirement seminars and the effects are greater for lower paid employees than for higher paid employees (Bajtelsmit and Bernasek, 2001).

e. Risk aversion and race/ethnicity, religion

A few papers examine the effects of race/ethnicity on risk aversion. Siegel and Hoban (1991) find that non-white people exhibit higher financial leverage, i.e. a lower degree of risk aversion. A similar result find by Schooley and Worden (1996), Jianakoplos and Bernasek

(1998). Halek and Eisenhauer (2001) find that both blacks and Hispanics are consistently significantly less risk averse than whites and other races. Hersch (1996) finds that whites make safer choices than blacks do, but that the racial gap closes considerably when education and wealth are controlled for.

Barsky et al. (1997) find noticeable differences in risk tolerance by the race and religion of the respondent. Whites are the least risk tolerant, blacks and Native Americans somewhat more risk tolerant, and Asians and Hispanics the most risk tolerant. Risk tolerance also varies significantly by religion. Protestants are the least risk tolerant, Jews the most, Catholics are about halfway between Protestants and Jews. Halek and Eisenhauer (2001) do not confirm this result. They find that only Catholics are marginally more risk averse and find no significant effect for other religions.

f. Is risk aversion related to occupation and behavioral habits?

After Cohn et al. (1975) and Landskroner (1977), only a few papers have examined the relationship between risk aversion and the type of occupation, self-employment of unemployment (Halek and Eisenhauer, 2001; Hartog et al., 2002; Lin, 2009). Landskroner (1977) find that the self-employed class has the lowest measure of RRA compared to clerical workers and salaried professionals. The industries in which he finds the highest risk aversion are Finance, Insurance and Real Estate. The industries with low RRA are Services and Trade.

Risk aversion is also examined with regards behavioral habits like smoking and drinking (Barsky et al., 1997; Dohmen et al., 2011) and the health status (Hartog et al., 2002; Bellante and Green, 2004). Interestingly, Dohmen et al. (2011) find also that taller individuals are more willing to take risks. All these results are often strongly significant statistically and are associated with quantitatively significant coefficient estimates.

The importance of culture is another field of research that is not part of this survey. Hsee and Weber (1999) demonstrate how Chinese respondents to lottery valuation are relatively more risk-seeking than westerners.[13] 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.[14] Recently, Rubaltelli et al. (2010) find that

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[13] See also Kachelmeier and Shehata (1992).
[14] For a review see Peters (2006).

people's affective reactions help explain the evaluation of decisions when they have more or less information about the outcome.

Insert table 2 here

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4. Risk aversion in empirical studies of insurance demand

The previous findings pose a serious problem for applied economics.[15] Unfortunately, measuring attitudes to risk is a difficult task, if not impossible at a macro-level, and in the past most empirical studies have used socio-demographic variables to proxy risk aversion.

The earlier papers investigating life insurance purchases were mainly concerned with the microeconomic factors motivating the demand for life insurance such as the demographics of households.[16] Greene (1963, 1964) is the first author to investigate the association between life insurance purchasing behavior and specific non-demographic and socioeconomic variables. Greene (1963) finds no significant relationship between risk attitudes and previous insurance purchasing behavior. Greene (1964) performs a second study to examine the consistency of these findings. Again, he finds no evidence that insurance purchasing behavior could be predicted from risk taking behavior.

Almost all past research dealing with panel or survey data in the United States has focused on life insurance purchasing behavior as a function of various demographic and socioeconomic variables. In fact, the empirical research on the determinants of insurance demand has essentially focused on the life sector in the United States (table 3).[17]

The probability of holding life insurance falls with age. One would expect, other things being equal, that fewer purchases would be made as the age of the insured increases because life insurance premiums increase with age and because older age implies a lower need for insurance protection. This is consistent with the effect predicted by the bequest motive hypothesis. This is not verified in half of the empirical papers showing a positive and significant sign related to the age variable. In general, a higher level of education may lead to

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[15] See for example Bruhin et al. (2010).
[16] Mantis and Farmer (1968) is the first paper to look at macroeconomic factors, followed by several papers investigating the role of inflation on the demand for life insurance.
[17] See the surveys by Zietz (2003), Carson et al. (2011) and Outreville (2013a).

a greater awareness of the necessity of insurance and several papers find a positive relationship between the level of education and insurance purchases. However, Outreville (2013b) in a survey of the relationship between risk aversion and education shows that this relationship should be negative. Higher education leads to lower risk aversion that in turn leads to more risk-taking by skilled and well-educated people. Again, this result is only verified in about half of the empirical papers.

Papers examining the effect of the marital status or the family size find mixed results. Other variables such as race, religion or occupation are only considered in a very few papers.

In macroeconomic studies and cross-country studies, these variables have also been considered to account for the risk behavior of people (See Outreville, 2013a for a survey). The aging of a population is of major concern for the whole economy and especially for the pension and life insurance sectors, which are both directly affected by longevity; but the population aging process effect on the demand for insurance is ambiguous (Browne et al, 2000). For example, Truett and Truett (1990) and Chen et al. (2001) conclude that age distribution of the population positively affects the demand for life insurance.

The age dependency ratio (defined as the ratio of people under 15 and above 65 years of age over the working age population) is traditionally assumed to have a positive effect on life insurance demand, on the grounds that wage earners buy life insurance primarily to protect their dependents. All cross-country studies find that a young dependency ratio is positively correlated with life insurance demand (Beenstock et al., 1986; Truett and Truett, 1990; Browne and Kim, 1993; Feyen et al., 2013). However, Beck and Webb (2003) argue that the effect is rather ambiguous, because dependency ratios can have different effects across different business lines.

The demand for insurance may differ according to country-specific variables including human capital endowment. The level of education can be proxied by the percentage of the labor force with higher education (usually tertiary education) relative to the population. Education is generally hypothesized to be positively related to insurance consumption although there is evidence that the relationship between RRA and education is negative. Most of the empirical papers have verified a strong positive and significant relationship for both life and property-liability insurance demand (Outreville, 2013a, table 3).

The demand for insurance (and particularly life insurance) in a country may be affected by the unique culture of the country. An individual's religion can provide insight into the individual's behavior; understanding religion is an important component of understanding a nation's unique culture. Countries with Islamic background have a reduced demand for life insurance consumption as verified in empirical papers dealing with this variable (Outreville, 2013a, table 3).

Ward and Zurbruegg (2000) point to the importance of the cultural environment. An alternative risk aversion proxy is the uncertainty avoidance index proposed by Hofstede (1995) as a determinant of the demand for insurance. Based on survey data, this index is constructed using employee attitudes toward the extent to which company rules are strictly followed, the expected duration of employment with current employers and the level of workplace stress. [18]

Park (1993) attempts to understand the impacts of national culture on the insurance business but these ideas were formally tested by Park et al. (2002) who found no statistical relationship between insurance penetration and cultural variables with the exception of the masculine/feminine dimension. Esho et al. (2004) highlight that the demand for property-liability insurance is not significantly affected by cultural factors.[19] More recent papers examine these variables and find significant relationships by looking at a panel of data for a larger set of countries (Chui and Kwok, 2008 and 2009; Park and Lemaire, 2011).

Insert table 3 here

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5. Risk aversion and behavioral insurance

Explaining a behavior that does not necessarily conform to standard economic models of choice and decision-making is a fundamental issue in insurance.[20] Asymmetric information, adverse selection and moral hazard are the keywords in several empirical papers. When risk

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[18] Hofstede's cultural dimensions are related to "power distance" which refers to the degree of inequality among people; ''individualism/collectivism'' which measures the degree to which people in a country prefer to act as individuals rather than members of a same group; "masculinity" to evaluate the impact of gender differences in a country; and ''uncertainty avoidance/tolerance for ambiguity'' which assess the degree of preference for known situations. One of the most important studies that would provide a profound impact on the recent cross-cultural research is Hofstede's work (Hofstede, 1980 and 1983).

[19] Other papers by Hwang and Greenford (2005) and Kwok and Tadesse (2006) could be mentioned.

[20] Cutler and Zeckhauser (2004) discuss selected kinds of anomalies related to insurance.

and uncertainty or incomplete information about an alternative is introduced, people or organizations may behave somewhat different from rationality.[21] The analysis and the understanding of the behavior of policyholders is an important issue in insurance and a particular promising field for empirical works in behavioral economics. Most consequences of the behavior of the individual facing uncertainty are applicable not only to insurance, but also to other sectors of the financial services market. It has been argued that insurance offers a particular promising field for empirical work on contracts.[22]

In economics and contract theory applied to insurance, most papers assume some form of asymmetric information. The insured is assumed either to have information that is relevant to the contract but that is unknown to the insurer (adverse selection) or to be able to perform some relevant action that is hidden to the insurer (moral hazard). Chiappori and Salanié (2000) stress that the positive correlation between risk and insurance demand is fairly robust (in theory). It does not depend on the market structure (perfect competition or monopoly). However, the existence of such a correlation is only a necessary condition for adverse selection to be present, and the absence of such a correlation is therefore sufficient for rejecting adverse selection. Assuming that individuals have different levels of risk aversion and that more risk-averse individuals are more likely both to try to reduce the hazard and to purchase insurance,[23] this would suggest a negative correlation between insurance coverage and accident frequency.

Another important topic to be considered is insurance fraud and the strategy of the insurer in dealing with this problem. Insurance fraud is a typical case of asymmetric information where the insurer cannot distinguish between the actions that a policyholder might pursue only at costly auditing of contracts and claims. Insurance fraud is also considered by many authors as a particular case of moral hazard. Although several papers on insurance fraud have used the usual setting of rationality and optimization,[24] the behavior of policyholders towards fraud, underlying this theoretical problem, could also be based on a principle of satisfaction rather than a principle of optimization.[25] Lammers and Schiller (2010) investigate the impact of

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[21] The term "bounded rationality" is used to designate rational choice that takes into account the cognitive limitations of the decision-maker, limitations of both knowledge and computational capacity.

[22] See Chiappori and Salanié (2003) for a recent survey of papers that have recently been devoted to empirical application of the theory.

[23] In Chiappori and Salanié (2000) terms, more risk-averse drivers tend to both buy more insurance and drive more cautiously.

[24] See for instance the survey by Picard (2000).

[25] Simon (1955) pointed this out long time ago.

insurance contract design on the behavior of people towards filing fraudulent claims but do not report any significant differences with gender of education.

The behavior of people and the sensitivity of consumer demand with regards the default risk of a company is another area of interest for insurance. Experimental research by Wakker et al. (1997), Albrecht and Maurer (2000) and Zimmer et al., (2009) show that the awareness of default risk has an influence on consumers' insurance purchase behavior.

Considering the importance of asymmetric information, adverse selection and moral hazard for insurance business and markets, the above-mentioned papers raise some interesting potential empirical research questions to better understand how the misperception of the risks or poor information may lead to a behavior that differs from the expected outcome. All these perspectives on decision making under uncertainty or decision making under ignorance remain an important issue.[26]

6. Conclusion

Although there is considerable information available on the determinants of the demand for insurance there are several issues that still require further attention. Determinants of risk attitudes of individuals are of great interest in the growing area of behavioral economics that focuses on the individual attributes, psychological or otherwise, that shape common financial and investment practices.

This paper reviews the empirical literature on risk aversion (and risk behavior) with a particular focus on insurance demand or consumption. Empirical research on risk aversion may be categorized into two main areas, i.e. 1) the measurement and magnitude of risk aversion, 2) the empirical analysis of socio-demographic variables associated with risk aversion. The paper reviews this literature as well as empirical studies on the demand for insurance considering the use of variables associated with relative risk aversion.

However, the evidence presented in this paper is based on a survey of studies that have examined empirically the relationship between the level of risk aversion and socio-demographic variables because the evidence points only to association between variables, and not to the nature of the causal links among these variables.

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[26] See Thomas (2007) and Outreville (2010).

Table 1: Measurement and Magnitude of Relative Risk Aversion (RRA)

Authors	Context	Results
Friend and Blume (1975)	Household demand for risky assets, FED data, 1962/63	Between 1.25 and 2.0
Landskroner (1977)	Survey of Consumer Finances, 1962	Between 2.459 and 8.154
Hansen and Singleton (1982)	Time series consumption and asset returns, 1959/78	All estimates are <1.0
Hansen and Singleton (1983)	Investment returns, NYSE, 1959/78	From 0.264 up to 58.25 depending on estimation procedures
Szpiro (1986)	Time series demand for property insurance	Between 1.2 and 1.8
Szpiro (1988)	Cross-country series on the demand for property insurance	Between 0.92 and 6.38
Szpiro and Outreville (1988)	Cross-country series on the demand for property insurance	Between 0.81 and 4.99
Brown (1990)	US current population reports	Between 0.5 and 3.0
Gertner (1993)	TV game show participants	Mean value = 4.79
Metrick (1995)	TV game show participants	Mean value = 1.02
Blake (1996)	UK assets portfolios, Survey 1991/92	Between 7.88 (richer investors) and 47.60 (poorer investors)
Barsky et al. (1997)	Questionnaire in HRS, 1992	Between 0.7 and 15.8
Bajtelsmit and Bernasek (2001)	HRS study, 1994	Between 3.86 and 10.31
Beetsma and Schotman (2001)	Dutch TV game participants	Between 0.42 and 13.08
Halek and Eisenhauer (2001)	Cross-sectional demand for life insurance, HRS, 1992	Mean value = 3.74, with sd = 24.1
Hanna et al. (2001)	Web surveys of households, 1998	Mean value = 6.6
Keane and Volpin (2001)	NLSY schooling and employment data,	Mean estimate = 0.5
Gourinchas and Parker (2002)	Consumer Survey Expenditures, 1980/93	Between 0.15 and 5.3
Eisenhauer and Ventura (2003)	Survey data from the Bank of Italy, 1993/95	Between 7.18 and 8.59
Bezil and Hansen (2004)	National Longitudinal Survey of Youth (NLSY),1979	Estimated value = 0.928
Guiso-Paiella (2005)	Survey of Household Income and Wealth, Bank of Italy, 1995	Mean value = 6.03 range beween 1.9 and 13.3
Chetty (2006)	Labor market, supply behavior	Between 1.0 and 2.0
Palacios-Huerta (2006)	Wage data, US surveys, 1964/2003	Between 38.6 and 66.4
Cohen and Einav (2007)	Cross-sectional demand for auto insurance, Israel, 1994/99	Mean value = 97.22
Brodaty et al. (2007)	Education survey in France, 1992	Between 0.2 and 0.9
Lin (2009)	Survey of Family Income and Expenditure, Taiwan, 2003	Between 0.8 and 2.3, distribution is right-skewed with some extreme outliers
Sydnor (2010)	Cross-sectional demand for property insurance, United States, 2001	The lower bound of RRA is around 1,000 times the level estimated by other studies.

Note: FED = Federal Reserve Board, HRS = Health and Retirement Study, NLSY = National Longitudinal Surveys of Youth

Table 2: Demographics associated with RRA

Authors	Context/country	Variables
Cohn et al. (1975)	US survey of households	Age (+), Gender (+), Marital status (-), Family size (-), Education, Occupation
Landskroner (1977)	US survey of households	Occupation
Morin and Suarez (1983)	Canadian population	Age (+)
Belante and Saba (1986)	US households	Age (-/+)
Levin et al. (1988)	University students	Gender (+)
Brown (1990)	US population	Age (+)
Siegel and Hoban (1991)	US population	Race, Marital status, Family size (-), Occupation
Riley and Chow (1992)	US households	Age (-/+), Education (-),Gender (+), Race, Marital status (-)
Bakshi and Chen (1994)	US population	Age (+)
Bajtelsmit and Bernasek (1996)	US population	Gender (+)
Hersch (1996)	US households	Age (NS), Gender (+), Education (+), Race, Family size (-), Marital status (NS)
Palsson (1996)	Swedish households	Age (+), Gender (+)
Schooley and Worden (1996)	US population	Gender (+), Education (-), Marital status (-), Race
Barsky et al. (1997)	US survey	Age (+), Gender (+), Race, Religion, Smoking and drinking habits
Powell and Ansic (1997)	University students	Gender (+)
Jianakoplos and Bernasek (1998)	US population	Age (-/+), Gender (+), Education (-), race, Marital status, Family size
Sunden and Surette (1998)	Survey of US households	Age (NS), Gender (+), Education (NS), Marital Status (-/+)
Schubert et al. (1999)	Swiss laboratory experiment	Gender (NS)
Bajtelsmit and Bernasek (2001)	US survey (HRS)	Age (+), Gender (+), Education (-), Race
Donkers et al. (2001)	Dutch household survey	Age (+), Gender (+), Education (-)
Halek and Eisenhauer (2001)	US households	Age (-/+), Gender (+), Education (+), Race, Religion, Marital status, Occupation
Hartog et al. (2002)	Dutch laboratory experiment	Gender (+), Marital status (NS), Education (-), Health status, Occupation
Bellante and Green (2004)	US households	Age (-), Gender (+), Education (-), Family size (NS), Race, Health status
Cohen and Einav (2007)	Insurance data, Israel	Gender (+), Age (U-shape)
Harrison et al. (2007)	Population survey, Denmark	Age (-), Gender (NS), Education (+)
Eckel and Grossmann (2008)	US laboratory experiment	Gender (+)
Croson and Gneezy (2009)	US laboratory experiment	Gender (+)
Lin (2009)	Household survey, Taiwan	Age (-/+), Gender (+), Education (-), Marital status (-), Family size (-), Occupation
Dohmen et al. (2011)	Population survey, Germany	Age (+), Gender (+), Parental educ (-), Behavioral habits
Charness and Gneezy (2012)	US laboratory experiment	Gender (+)

Note: Gender means dummy =1 for female; (-/+) means a non-linear result; NS= non-significant.

Table 3: Demographics associated with the micro-economic demand for life insurance

Authors	*Context/country*	*Variables*
Greene (1963)	College student survey, 1962	Behavioral habits (NS)
Greene (1964)	College student survey, 1962-63	Gender (NS), Education (+), Marital status (NS), Family size (NS), Behavioral habits (NS)
Hammond et al. (1967)	U/S household survey, 1952 and 1961	Age (NS), Education (+), Marital status (-), Family size (-), Race (NS), Self-employed (+)
Duker (1969)	Survey of Consumer Finance, 1959	Age (NS), Education (-), Family size (NS), Occupation
Berekson (1971)	College student survey	Age (+), Marital status (NS), Family size (+)
Anderson and Nevin (1975)	Young Married Couple survey	Age (NS), Education (-), Family size (NS), Occupation
Ferber and Lee (1980)	Married Couple interviews	Age (-), Education (+), Family size (+), Occupation
Burnett and Palmer (1984)	Consumer surveys, early 1980s	Age (NS), Education (+), Family size (+), Religion (-)
Fitzgerald (1987)	Assets and Income survey, 1946-64	Age (NS), Occupation
Truett and Truett (1990)	Economic surveys, US and Mexico	Age (+), Education (+),
Auerbach and Kotlikoff (1991)	Survey of Financial Decisions, 1980	Age (-), Education (-), Family size (-), Occupation
Bernheim (1991)	Retirement History survey, 1975	Age (-), Marital status (NS), Family size (+),
Showers and Shotick (1994)	Consumer Expenditure Survey, 1987	Age (+), Family size (+)
Gandolfi and Miners (1996)	LIMRA survey, 1984	Age (NS), Gender (+), Education (+), Family size (NS)
Hau (2000)	Survey of Consumer Finance, 1989	Age (NS), Gender (NS), Education (NS), Family size (NS)
Lin and Grace (2007)	Survey of Consumer Finance-1992 to 2001	Age (-), Education (+), Financial vulnerability (+)
Gutter and Hatcher (2008)	Survey of Consumer Finance, 2004	Age (+), Education (-), Family size (NS), Race (NS)
Lee et al. (2010)	Consumer survey data, Rep. of Korea, 2005	Age (+), Education (+),
Millo and Carmeci (2012)	Panel regional data, Italy, 1996-2001	Age (-), Education (-), Family size (+)

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