Gender Differences in Risk Attitudes: Is Culture Relevant?

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**Abstract**

There is a general consensus that females are more risk averse than males. However, when explaining this gender difference, most current literature has focused on biological reasons, including evolutionary traits, physical strength and emotions. This study analyzed the effects of culture on the gender gap in risk attitudes by applying Hofstede’s 6-dimension cultural framework. The results show that (1) consistent with previous research, culture is significantly correlated with risk attitudes in general; (2) a higher level of masculinity, which indicates that gender roles are more differentiated in a society, increases the gender gap in risk. The paper provides evidence that the gender difference in risk is a result of cultural influence, rather than biological traits. Important implications and future research directions are discussed.

**KEYWORDS:** Risk Preference, Gender Difference, Culture, Masculinity

**JEL Classification:** D8, J16, D03

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**Section 1: Introduction**

When identifying oneself, gender is an important component. Gender shapes who we are and influences our behaviors in a variety of aspects. For instance, research in psychology shows that on the scale of the Big Five personality traits, women consistently report higher neuroticism, agreeableness, warmth, and openness to feelings, while men often report higher openness to ideas and assertiveness (Costa, Terracciano, and McCrae, 2001). Also, women tend to have a democratic and relationship-oriented leadership style, whereas men are more task-oriented and are more effective in achieving goals in leadership (Gray, 1992).

In economics, one of the most important gender differences studied is in risk preference, which is indicated through decision makers’ choices among options with different risks (Schaefer, 1978). Risk preference is involved in our daily lives, from choosing to put our seat belts on while driving, to making decisions on our investment portfolios or pension plans. While a few studies revealed little or no gender differences in risk attitudes, the majority of empirical studies provide evidence that females are indeed more risk averse than males, especially when faced with financial risks (Powell & Ansic 1997; Byrnes, Miller, & Schafer 1999; Eckel and Grossman 2002; Waldron et al., 2005; Dohmen et al 2005; Charness & Gneezy 2012).

Without a doubt, this gender difference in risk attitudes has crucial real life implications. For instance, the perception that females are less willing to take risks can harm their chances of getting promoted in the corporate world, where risk-taking is viewed as a necessary component of progress (Johnson & Powell 1994; Bajtelsmit & Bernasek 1996; Schubert et al., 1999). More importantly, as Rai (2014) has pointed out in her article, gender difference in risk can affect welfare implications for women. Since risk aversion is often associated with less wealth, a combination of being more risk averse and having more longevity implies that women often need to support their longer retirement periods with lower retirement wealth.

Consequently, it is important, especially for policy makers, to understand the causes of this gender disparity in risk attitudes in order to make effective policy interventions. Although there is a great deal of empirical literature on identifying the gender difference, a relatively small amount of research has analyzed the reasons behind these differences, and most of it is focused on biological reasons. Researchers have tried to explain this gap in risk attitudes with gender differences in evolutionary processes, emotions, overconfidence, and even physical prowess (Buss, 2003; Harris et al. 2006; Croson & Gneezy 2009; Ball, Eckel, & Heracieous 2010).

In my view, however, another important factor we need to consider is culture. First, research has indicated that there are significant cross-cultural differences in risk preferences, which indicates that culture matters for our risk-taking behaviors (Rieger, Wang, and Hens, 2014). In addition, many sociologists have argued that gender should be understood as a social rather than physiological construct (Ridgeway and Correll, 2004; Fleming, Lee, and Dworkin, 2014; Edwards, 2015). In other words, gender differences are formed through our cultural norms, rather than through biologically inherited traits. Besides, there is also empirical research against the biological hypothesis (Booth and Nolen, 2012; Carr and Steele, 2010).

Therefore, in this paper, I aim to analyze the effects of culture on gender differences in risk attitudes. If gender differences in risk are indeed due to biological reasons, there should be no cross-cultural variations. Also, this paper innovates in at least three ways. First, with Filippin and Crosetto’s micro-dataset (2016), this paper uses a large sample with nearly 4200 subjects from 12 countries. As Matsumoto and Vijver (2011) noted in their book, it is problematic to conduct intercultural studies with only two cultures, because the size of the differences between these two cultures is unknown, which makes result interpretations difficult. By including a variety of countries with different cultural characteristics, my study will be able to address this problem. Second, the risk preference measure is controlled and only studies that replicated the Holt-Laury task are examined. I will go into further details on this task in the methodology section. This is important because research shows that elicitation methods matter for the risk preference measurement. Third, by applying Hofstede’s 6-dimension cultural framework (Hofstede, 1980; Hofstede and Hofstede, 2005; Hofstede, Hofstede, and Minkov, 2011), which includes power distance (PDI), individualism (IDV), masculinity (MAS), uncertainty avoidance (UAI), long-term orientation (LTO), and indulgence (IND), I am able to quantify culture and compare cross-cultural differences in a systematic way.

The results not only confirm the association between culture and risk attitudes in general, but more importantly, also provide evidence that culture matters for the gender difference in risk. Masculinity score, the cultural dimension related to the gender dynamic in a society, is positively correlated with the gender gap in risk. Although the results should not be taken as conclusive given that my sample is entirely students, they serve as important evidence against the popular biological hypothesis. It will be interesting to replicate this study with more representative samples from more countries in the future to confirm my results.

The remainder of this paper is divided into four sections. Section two is a review of related literature. Section three explains the methodology implemented, including risk preference and culture measurements, data descriptions, and econometric models. Section four presents the results and explanations. Finally, section five discusses the limitations and implications of the study, as well as possible directions for future research.

**Section 2: Literature Review**

Since the 1990s, a larger amount of research in both psychology and economics has started to look at gender differences in risk attitudes. Although a small amount of empirical research found little or no gender gap in risk attitudes, the general consensus is that women are more risk averse than men. For instance, Byrnes, Miller, and Schafer (1999) conducted a meta-analysis of 150 studies and concluded that males are clearly more risk seeking than females are. Also, more recently, Charness and Gneezy (2012) did a meta-analysis as well with data from 15 different experiments and found strong and consistent evidence that females are more risk averse.

This gender difference in risk plays an important role in many aspects of life, including investments, job promotions, salary, and even retirement plans. For instance, Wang (1994) found in his research that investment brokers often offer women lower-risk investment options with lower expected returns due to the perception that they are more risk averse than men. This leads to potentially suboptimal investment decisions by women compared to a situation when they receive unbiased information. Additionally, in the corporate world, this gender difference in risk attitudes is often related to job promotions. In their study, Johnson and Powell (1994) showed that women are excluded from managerial positions because of the belief that they will not be willing to take risks for the company’s development. However, this belief is based on observations of the general population, and empirical evidence shows that female and male managers actually display similar risk preferences. Furthermore, according to Eckel and Grossman (2002), employers offer women lower initial wages in employment negotiations and bargain more aggressively since they expect women to be more risk averse and therefore, more likely to accept a given offer than men would be. Finally, another critical implication of gender difference in risk is in retirement plans. According to Infanger (2006), risk aversion is usually associated with lower wealth based on people’s asset allocation and portfolio choices. However, on average, women live 5 to 10 years longer than men, and 85% of the people over 100 years old are women (Blue, 2008). Therefore, a combination of risk aversion and longevity implies that women have less wealth to support their longer retirement periods. Indeed, based on a study conducted by the National Institute on Retirement Security (NIRS), women are 80% more likely than men to fall below the poverty line at age 65 and older, while women between the ages of 75 to 79 are three times more likely than men to face poverty (Brown et al., 2016). Although factors such as lower income and more time-off to provide childcare can influence this result, researchers at NIRS suggest that lower risk tolerance of women partially accounts for the problem as well. This should be an important concern for policy makers, and hence, understanding the story behind the gender difference in risk attitudes is crucial for effective policy interventions.

Nevertheless, a relatively small amount of research has focused on the causes of this gender difference, and most of it is trying to explain the discrepancy with biological reasons. For instance, Harris, Jenkins, and Glaser (2006) proposed the “offspring risk hypothesis” in their article. Given that the investment required to produce an offspring was much greater for females than for males, females became more risk averse in order to keep their offspring safe, and this trait has been passed along through natural selection. Similarly, Ball, Eckel, and Heracleous (2010) argued that men are more risk tolerant than women because they are physically stronger and therefore, they are more capable of dealing with consequences. From a psychology perspective, another proposed explanation is that women are born to experience emotions such as nervousness and fear more strongly, and are less overconfident compared to men, which leads to the gender disparity in risk (Croson and Gneezy, 2009).

However, in my view, another important factor we should not neglect is culture. Theoretically, many scholars argue that gender should be interpreted as a social rather than physiological identity. For instance, Peterson and Runyan (1993) claimed that gender differences are a complex set of characteristics and behaviors established by a society and they are learned through the socialization process. Also, in their research, Fleming, Lee, and Dworkin (2014) went further and asserted that both female and male behaviors are largely influenced by socially constructed gender norms, rather than biologically inherent traits. Empirically, there is also support against the biological hypothesis. First, using survey data from 53 countries and conducting cross-cultural comparisons, Rieger, Wang, and Hens (2010) showed that cultural background is definitely involved in risk decisions. Moreover, an experiment done with high school students from single-sex and co-ed schools suggested that gender differences in risk might reflect social learning (Booth and Nolen, 2012). The results indicated that the girls from single-sex schools display similar risk tolerance as the boys from single-sex or co-ed schools, and are less risk averse than girls from co-ed schools. Also, a psychology experiment by Carr and Steele’s research (2010) provided additional support. When female students were asked to indicate their gender and complete a “mathematics task,” they showed a higher level of risk aversion than their male counterparts. However, when the experimenters changed the task name to “puzzle-solving task” without asking for gender information, female students displayed similar risk preferences as the male students. The results demonstrated that the presence of stereotype threat can affect female’s behaviors, and therefore, implied that culture might influence gender differences in risk attitudes.

To my best knowledge, only three empirical studies have tried to analyze the effects of culture from different perspectives. All of them compared samples from the same country or 2 different societies with different risk elicitation methods. The first study was conducted by Gong and Yang (2012) in the matrilineal Mosuo and the patriarchal Yi in China. Subjects were given 10 RMB, which was equivalent to less than $2, and they had to decide how they would allocate the cash between two given lotteries. Their results indicated that women are more risk averse than men in both societies, but the gender gap is smaller in the matrilineal Mosuo. In contrast, using two samples from the matrilineal Teop in Papua New Guinea and the patrilineal Palawan in the Philippines, Pondorfer (2016) asked subjects to choose among five different lotteries, and found little gender differences in risk preferences in either society. Lastly, Rai (2014) used data from Survey of Consumer Finances and applied Fairlie’s decomposition technique (2006). Using the average risk preferences of two gender groups as the proxy for social norm, the decomposition model showed that social norm was the most important factor in explaining gender differences in risk, and it accounted for 61.3% of the observed gender gap.

**Section 3: Methodology**

**3.1 Risk Measurement**

Empirically, experimenters have tried many ways to measure risk preference. The three most popular methods being used in the field are: (1) Gneezy and Potters’ investment game (1997), (2) Eckel and Grossman (EG) task (2002), and (3) Holt and Laury (HL) task (2002).

First, in the investment game by Gneezy and Potters (1997), subjects are given a certain amount of money at the beginning of the experiment. They need to decide how they will allocate the money between a safe account with no interest payment, or a risky option that yields a 250% return with 50% probability, and 0 otherwise. The expected return rate of the risky option is

**Figure 1. Eckel and Grossman Task (2002).**

|  |  |  |  |
| --- | --- | --- | --- |
|  | Choice | Probability | Outcome |
| 1 | A | 50% | $16 |
| B | 50% | $16 |
| 2 | A | 50% | $24 |
| B | 50% | $12 |
| 3 | A | 50% | $32 |
| B | 50% | $8 |
| 4 | A | 50% | $40 |
| B | 50% | $4 |
| 5 | A | 50% | $48 |
| B | 50% | $0 |

higher than 1, and therefore, risk-neutral people will put all the money there. The second method is the EG (Eckel and Grossman) task. As shown in Figure 1, subjects are given five lottery options that each includes a good and a bad outcome. The probability is always 50% for both outcomes across five lotteries. However, the difference between the good and bad outcome is growing from lottery 1 to 5. As we move down the list, the expected return is increasing as well. Hence, risk neutral people will always choose lottery 5, whereas risk averse people will choose among lottery 1 to 4.

Finally, another method to elicit risk preference is the HL (Holt and Laury) task (Figure 2). There are two options: for option A, payoffs are either $2 or $1.6; for option B, payoffs are either $3.85 or $0.1. The difference between the good and bad outcomes in option B is much larger than that of option A. Therefore, option A is regarded as the safe choice whereas option B is the risky choice. The probability of the good outcome is increasing while the chance of the bad outcome is decreasing in both options. Hence, the expected payoff is growing in both options,

**Figure 2. Holt and Laury Task (2002).**

|  |  |  |
| --- | --- | --- |
|  **Option A**                                    **Option B** **(safe) (risky)**  |  | **Expected Payoff Differences** |
|  | p | Stake | p | Stake |  | p | Stake | p | Stake |
| 1 | 1/10 | $2 | 9/10 | $1.6 |  | 1/10 | $3.85 | 9/10 | $0.1 | $1.17 |
| 2 | 2/10 | $2 | 8/10 | $1.6 |  | 2/10 | $3.85 | 8/10 | $0.1 | $0.83 |
| 3 | 3/10 | $2 | 7/10 | $1.6 |  | 3/10 | $3.85 | 7/10 | $0.1 | $0.50 |
| 4 | 4/10 | $2 | 6/10 | $1.6 |  | 4/10 | $3.85 | 6/10 | $0.1 | $0.16 |
| 5 | 5/10 | $2 | 5/10 | $1.6 |  | 5/10 | $3.85 | 5/10 | $0.1 | -$0.18 |
| 6 | 6/10 | $2 | 4/10 | $1.6 |  | 6/10 | $3.85 | 4/10 | $0.1 | -$0.51 |
| 7 | 7/10 | $2 | 3/10 | $1.6 |  | 7/10 | $3.85 | 3/10 | $0.1 | -$0.85 |
| 8 | 8/10 | $2 | 2/10 | $1.6 |  | 8/10 | $3.85 | 2/10 | $0.1 | -$1.18 |
| 9 | 9/10 | $2 | 1/10 | $1.6 |  | 9/10 | $3.85 | 1/10 | $0.1 | -$1.52 |
| 10 | 10/10 | $2 | 0/10 | $1.6 |  | 10/10 | $3.85 | 0/10 | $0.1 | -$1.85 |

but it is growing at a faster pace for the risky option. The column on the right shows the expected payoff difference between the safe and risky option, calculated as the expected return of option A minus the expected return of option B. Subjects are asked to make ten binary choices by going through the entire list. The expected return difference changes from positive to negative in row 5, and that is where risk neutral people will switch from option A to B, whereas risk averse individuals will switch later than that.

Studies replicating the HL task usually use two ways to show the degree of risk aversion. First, they can use the number of safety choices, or the percentage of safety choices made to represent an individual’s risk attitude. For example, 2 safe choices will demonstrate risk seekingness while 7 safe choices will indicate risk aversion. Alternatively, some researchers, including Holt and Laury themselves, calculate the actual risk aversion parameter. Under the assumption of constant relative risk aversion (CRRA), the utility function takes the form of, where r is the risk aversion parameter and it is positive for risk averse subjects. For a risk neutral individual who switches at row 5, we can infer that, where. The estimated risk aversion parameter will be. The four stake values are chosen in a way so that r will be symmetric around 0, and the midpoint of the range is often used as the risk attitude estimate for an individual.

Among these three elicitation methods, Holt and Laury’s task is the most popular and replicated measure. Also, this task is shown to yield the highest accuracy in experiments (Dave et al., 2010). More importantly, as Filippin and Crosetto mentioned in their article (2016), unlike the investment game and EG task, the HL task allows for risk-loving behaviors. Since research shows that different elicitation methods can lead to different risk estimates, for my research, I will rely on the HL task as the measure of risk attitudes. To measure risk, I will use the percentage of safe choice (Option A) made as the risk attitude proxy. A higher percentage indicates a higher level of risk aversion.

**3.2. Culture Measurement**

According to Taras (2009), culture is a complicated multi-level construct and is a relatively stable characteristic belonging to a group or society. Given its subjective nature, quantifying culture is not an easy task. Since early 1900s, scholars in different fields have attempted to measure the various aspects of culture (Kuhn and McPartland, 1954; England, 1967). Among these attempts, the most popular and dominant cultural framework was developed by sociologist Hofstede, which was first documented in his book *Culture’s Consequences* (Hofstede, 1980). Using more than 100,000 employee value surveys collected by IBM from 93 countries, Hofstede defined national culture in 6 dimensions: power distance (PDI), individualism (IDV), masculinity (MAS), uncertainty avoidance (UAI), long-term orientation (LTO), and indulgence (IND), which I will go over in details below.

**Power distance (PDI).** Power distance is defined as the extent to which the less powerful members of a community within a country expect and accept that power is distributed unequally (Hofstede and Hofstede, 2005). Hence, this index reflects the view on inequality and the dynamic of authority and obedience. Examples of the questions used are “how often do you feel fearful to express disagreement with your managers” and “what is your preference for your manager’s decision-making style (i.e. autocratic or consultative)”. A high PDI index characterizes a society where inequality is expected or even desired, whereas a low PDI index indicates that subordinates and superiors consider each other as existentially equal in that society. The results show that most countries in Asia (e.g., Malaysia and the Philippines), Eastern Europe (e.g., Slovakia and Russia), Africa, and Arabic-speaking countries tend to have a high PDI, while German-speaking countries (e.g., Switzerland and Germany), the Nordic countries (e.g., Denmark and Finland), the United States, and Canada tend to have a low PDI.

**Individualism (IDV).** By definition, an individualistic society is one in which individuals have loose ties with others and everyone is expected to look after himself or herself and his or her immediate family. On the other hand, a collectivistic society is when people are integrated into cohesive in-groups with unquestioning loyalty (Hofstede and Hofstede, 2005). Items used on the questionnaire include “how important is personal time to you” and “how important is freedom to you.” A high IDV score indicates that people in this society learn to think in terms of “I” and they view speaking one’s mind as a trait of an honest person. A low IDV score indicates that people in this society learn to think in terms of “we” and that harmony should always be maintained. Countries that display a high IDV include the United States, Australia, Great Britain, and Canada. Countries that have a low IDV include Guatemala, Ecuador, West Africa, and China.

**Masculinity (MAS).** A society is labeled as masculine if it emphasizes achievements, and more importantly, if gender roles are clearly distinguished: men are expected to be assertive, tough, and competitive, whereas women are expected to be modest, tender, and value the importance of relationships. On the contrary, a society is labeled as feminine when gender roles overlap: both men and women are modest, tender, and concerned with relationships as well as quality of life (Hofstede and Hofstede, 2005). An example of questions regarding to masculinity is “how important is recognition and advancement to you.” Unlike PDI and IDV, Hofstede found this index to be completely unrelated to national wealth. Countries that display a high MAS include Slovakia, Japan, Hungary, and Venezuela. Countries that have a low MAS include Sweden, Norway, Netherlands, Denmark, and Costa Rica.

**Uncertainty avoidance (UAI).** This index is a measure of the extent to which the members of a society feel threatened by ambiguous situations (Hofstede and Hofstede, 2005). To measure UAI, questions that Hofstede used include “how many years do you think you will continue working for IBM (2 years at the most, 2-5 years, more than 5 years, or until you retire).” Also, Hofstede made a special note that UAI should not be confused with risk preference. While risk often describes the likelihood of certain results, uncertainty describes a situation when anything could happen and no probability is attached to it. UAI tends to be high in Latin American and Mediterranean countries, and it tends to be low in many African, and the Anglo and Nordic countries.

**Long-term orientation (LTO).** The fifth dimension of Hofstede’s cultural framework is related to a long-term versus short-term orientation. Characteristics of people in a long-term oriented society include being perseverant, thrifty, and willing to subordinate oneself for a purpose, whereas people in a short-term oriented society hold the belief that efforts should produce quick results and are socially pressured toward spending. Items on the questionnaire include “to what extent do you agree that persistent efforts are the surest way to results.” Countries in East Asia have the highest ranks in LTO, especially China, Japan, and Vietnam, and the United States, Great Britain, Zimbabwe, and Canada score on the short-term side.

**Indulgence (IND).** This last cultural dimension was not added into the framework until 2010, when Hofstede updated his theory with his book, *Cultures and Organizations* (Hofstede, Hofstede, and Minkov, 2010). According to Hofstede, indulgence represents the case when a society freely allows people to pursue natural human desires and enjoy life. On the other hand, a restraint society suppresses this free gratification and regulate it with strict norms. The questions used by Hofstede include “in your private life, how important is keeping time free for fun to you.” Countries in South and North America, and Western Europe show high IND, whereas countries in Eastern Europe, Asia, and Muslim countries display low IND (Hofstede, 2011).

Since its publication in 1980, Hofstede’s model has been the most well-known framework without a doubt, and it has been applied to many different fields, especially in cross-cultural studies and international business management. Although the initial study was done with an enormous sample of IBM employees across nations, subsequent studies over the decades have confirmed and extended these results to occupationally different populations, including students, teachers, pilots and so on (Mihet, 2012). With Hofstede’s cultural model, I am able to make systematic cross-cultural comparisons, and more importantly, interpret the results in a meaningful way. The data were directly downloaded from Hofstede website, and they were last updated in 2010, which matches the period when the risk experiments in my sample were conducted.

**3.3. Data Description**

**Risk Measurement.** As I briefly mentioned in the methodology section, data on risk attitudes came from Filippin and Crosetto’s (2016) meta-analysis of HL task, where they were testing for gender differences in risk attitudes, without looking at cultural variations. The original Filippin and Crosetto dataset covered 63 different papers and 8713 subjects, which made it the largest meta-analysis on gender differences in risk attitudes compared to all previous literature.

In order to use this micro-data set, I contacted authors of each individual paper to get permission to use their studies. Furthermore, since many scholars have argued and provided evidence that cross-cultural studies need to be conducted in a homogenous sample to control for background factors (Hofstede, 2001; Matsumoto and Vijver, 2011), I only included student samples for my study. Out of the 63 papers compiled by Filippin and Crosetto, I was left with 39 studies after excluding (1) studies from which I did not hear back and thus, I did not have permission to use; (2) studies that used a multinational sample, but I did not have information on where individual subjects came from; (3) studies that included both students and non-students samples, but I did not have information to distinguish them in the data set. The list of the papers included is shown in Figure 3. There are 4179 subjects in total, with a roughly balanced sample of females and males (2183 males and 1996 females). The countries analyzed include Austria, Canada, Colombia, France, Germany, Greece, India, Israel, Morocco, Netherlands, Spain, and the United States.

As mentioned in Section 3.1, I am using the percentage of safe choices made as the proxy for risk attitudes, and it is between 0 and 1. A higher percentage indicates a higher level of risk aversion, and vice versa. The average safe choice percentage is around 0.58 for the entire sample, which shows that people are risk averse in general. The average safe choice percentage for females is around 0.60, which is greater than that of males (P = 0.57). This is consistent with the literature that women tend to be more risk averse than men are.

**Figure 3. Paper List.**

|  |  |
| --- | --- |
| **Article** | **Country** |
| Abdellaoui et al. (2011) | Morocco |
| Bauernschuster et al. (2010) | Germany |
| Chakravarty et al. (2011) | India |
| Chen et al. (2013) | USA |
| Crosetto and Filippin (2013) | Germany |
| Dave et al. (2010) | Canada |
| Deck et al. (2012a) | USA |
| Delnoij (2013) | Netherlands |
| Dickinson (2009) | USA |
| Drichoutis and Nayga (2015) | Greece |
| Eckel and Wilson (2006) | USA |
| Fiedler and Glockner (2012) | Germany |
| Fiore et al. (2009) | USA |
| Gloeckner and Hilbig (2012) | Germany |
| Gloeckner and Pachur (2012) | Germany |
| Harrison et al. (2013) | Colombia |
| Harrison et al. (2007) | USA |
| Holt and Laury (2002)  | USA |
| Jacquemet et al. (2008) | France |
| Jamison et al. (2008) | USA |
| Kocher et al. (2011) | Netherlands |
| Lange et al. (2007a) | USA |
| Lange et al. (2007b) | USA |
| Levy-Garboua et al. (2012) | France |
| Lusk and Coble (2015) | USA |
| Mueller and Schwieren (2012) | Germany |
| Nieken and Schmitz (2012) | Germany |
| Pogrebna et al. (2011) | Germany |
| Ponti and Carbone (2009) | Spain |
| Rosaz (2012) | France |
| Rosaz and Villeval (2012) | France |
| Ryvkin (2011) | USA |
| Schipper (2012) | USA |
| Schram and Sonnemans (2011) | Netherlands |
| Shafran (2010) | USA |
| Slonim and Guillen (2010) | USA |
| Sloof and van Praag (2010) | Netherlands |
| Wakolbinger and Haigner (2009) | Austria |
| Yechiam and Hochman (2013) | Israel |

**Figure 4. Cultural Parameters Summary Statistics.**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Variables | Mean | Standard Deviation | Min | Max |
| Power Distance | .4282464  | .1214493  | .11  | .77 |
| Individualism | .7498409  | .161752  | .13  | .91 |
| Masculinity | .551977  | .1502866  | .14 | .79 |
| Uncertainty Avoidance | .5825863  | .1546255  | .4  | 1 |
| Long-term Orientation | .47413  | .2237466  | .13  | .83 |
| Indulgence | .5930794  | .1245114  | .25  | .83 |

**Culture Measurement.** Each cultural index takes a value between 0 and 1. As demonstrated in the summary statistics in Figure 4, the 12 countries included in my study show a high degree of variation in these culture characteristics, which makes the cross-cultural comparison interesting. However, as shown in the correlation matrix (Figure 5), one issue with the cultural data is that some of them are highly correlated. According to Mislick and Nussbaum (2015), as well as other statisticians, two variables are highly correlated when the correlation is higher than 0.7. For my sample, IDV (individualism)/UAI (uncertainty aversion), and LTO (long-term orientation)/IND (indulgence) are highly correlated (r = -0.7591 and r = -0.7669). This correlation between certain cultural dimensions is also noted by Hofstede (2005) in his book. Neglecting this issue can result in multicollinearity and invalid coefficient estimates for individual variables. Hence, I threw out one variable from each pair in my regression. The regression below shows the results from excluding uncertainty aversion and long-term orientation. However, I also replicated the regression by changing which variables to exclude, and the results remained the same.

**3.4. Econometric Modeling**

Ordinary linear regression (OLS) with interaction terms was adopted for my study. The regression I ran is as follows:



**Figure 5. Correlation Matrix.**

Correlation Matrix

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | Power Distance  | Individualism | Masculinity | Uncertainty Avoidance | Long-term Orientation | Indulgence |
| Power Distance | 1.0000 |  |  |  |  |  |
| Individualism | -0.3110 | 1.0000 |  |  |  |  |
| Masculinity | -0.3520 | -0.0812 | 1.0000 |  |  |  |
| Uncertainty Avoidance | 0.5448 | -0.7591 | -0.1078 | 1.0000 |  |  |
| Long-term Orientation | -0.1549 | -0.3398 | -0.1487 | 0.4527 | 1.0000 |  |
| Indulgence | -0.1481 | 0.4067 | -0.1517 | -0.5273 | -0.7669 | 1.0000 |

Once again, the dependent variable safe choice is the percentage of safe choice (Option A) each individual made during the HL task, and a higher percentage of safe choices made indicates a higher level of risk aversion. Female is a dummy and it takes value 1 when an individual is a female, and 0 when an individual is a male. The coefficient β1 indicates the effect of being female on risk aversion. The α coefficients represent the cultural influence that applies equally to both females and males. The λ coefficients, which are the ones I am most interested in for my study, demonstrate how the cultural parameters affect female and male risk preferences differently. My control variables are GDP per capita (in thousand dollars) and population growth rates from year 2010, which matches the year when Hofstede’s cultural values were last updated.

**Section 4: Results**

**4.1 Regression Results**

The regression results are shown in Table 1. I ran five different models. Column 1 only includes female as the explanatory variable, while Column 2 includes female and 2 control variables (GDP per capita and population growth rates). The coefficient on female is around 0.023 (p < 0.001), which is similar to what Filippin and Crosetto (2016) found in their sample, as well as what previous literature has found.

Next, in column 3, I added the four cultural measures: power distance (PDI), individualism (IDV), masculinity (MAS), and indulgence (IND). The effect of PDI was not statistically significant, while the other three dimensions all showed significant effects on risk aversion levels. First, a higher level of individualism is associated with a higher level of risk aversion (α2 = 0.170, p < 0.001). This is consistent with Hsee and Weber’s Cushion Hypothesis (1999). Using subjects from China and the US, they found that Chinese students are in fact more risk seeking than American students are, which is contradicted to the cultural stereotype many people hold. Their explanation is the Cushion Hypothesis and it has been confirmed by many studies later on (Tan, 2011; Schneider et al., 2014). The collective culture and larger network Easterners share give them a feeling of security and back-up, and therefore make them more comfortable with taking on risks than Westerners are. Therefore, when individualism increases, which means that people tend to have looser ties with others, risk aversion levels increase as well.

**Table 1. Regression Results**

Dependent Variable: Safechoice (Mean = 0.579, Std Dev = 0.179)

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| VARIABLES | (1) | (2) | (3) | (4) | (5) |
|  |  |  |  |  |  |
| Female | 0.0231\*\*\* | 0.0220\*\*\* | 0.0236\*\*\* | 0.000676 | 0.00332 |
|  | (0.00445) | (0.00453) | (0.00376) | (0.0181) | (0.00382) |
| PDI |  |  | -0.0522 | -0.0419 | -0.0494 |
|  |  |  | (0.0503) | (0.0504) | (0.0503) |
| IDV |  |  | 0.170\*\*\* | 0.171\*\*\* | 0.169\*\*\* |
|  |  |  | (0.0231) | (0.0333) | (0.0226) |
| MAS |  |  | -0.0416\*\* | -0.0547\*\* | -0.0555\*\* |
|  |  |  | (0.0177) | (0.0182) | (0.0180) |
| IND |  |  | 0.176\* | 0.171\* | 0.176\* |
|  |  |  | (0.0819) | (0.0786) | (0.0817) |
| Female\*PDI |  |  |  | -0.0123 |  |
|  |  |  |  | (0.0216) |  |
| Female\*IDV |  |  |  | -0.00246 |  |
|  |  |  |  | (0.0429) |  |
| Female\*MAS |  |  |  | 0.0344\*\* | 0.0360\*\*\* |
|  |  |  |  | (0.0138) | (0.00919) |
| Female\*IND |  |  |  | 0.0189 |  |
|  |  |  |  | (0.0416) |  |
| GDP |  | -0.000235 | -0.00424\*\*\* | -0.00421\*\*\* | -0.00420\*\*\* |
|  |  | (0.000505) | (0.000724) | (0.000798) | (0.000717) |
| Population  |  | -0.0141\*\* | -0.0788\*\* | -0.0798\*\* | -0.0784\*\* |
| Growth Rate |  | (0.00551) | (0.0276) | (0.0276) | (0.0275) |
| Constant | 0.568\*\*\* | 0.585\*\*\* | 0.606\*\*\* | 0.611\*\*\* | 0.612\*\*\* |
|  | (0.00582) | (0.0214) | (0.0834) | (0.0819) | (0.0832) |
|  |  |  |  |  |  |
| Observations | 4,179 | 4,179 | 4,152 | 4,152 | 4,152 |
| R-squared | 0.004 | 0.005 | 0.009 | 0.010 | 0.010 |

Robust standard errors in parentheses

\*\*\* p<0.01, \*\* p<0.05, \* p<0.1

Moreover, masculinity is associated with a lower level of risk aversion (α3 = -0.0416, p = 0.044). This result is not surprising. A masculine society places emphasis on competitiveness and achievements. This mentality is likely to encourage people to be ambitious and confident, which can lead to a higher level of risk-taking behaviors in the society. So far, no studies have examined how masculinity as a cultural element influences individual risk taking behavior. However, a study by D’Acunto (2014) showed that people were less risk averse when they were given cues to focus on their masculine identity. Subjects read a text about masculinity, and then were asked to recall an event when they behaved in a masculine way. Results showed that individuals in the experiment condition displayed a higher level of risk tolerance after they got the “masculinity priming.” Hence, people in a more masculine society are expected to display a lower level of risk aversion.

Additionally, indulgence also has a statistically significant and positive effect on risk aversion (α4 = 0.176, p = 0.060). There has not been any study done on the relationship between indulgence culture and risk-taking behavior, especially given that this dimension was not added into Hofstede’s framework until 2010. One possible explanation, however, is that individuals in a society with high indulgence tend to enjoy the moment and are satisfied with their basic needs (Christiansen, Yildiz and Yildiz, 2014). Also, they are not easily motivated by material possessions or status, which could explain why they are less likely to get involved in risk-taking.

In Column 4, I included the four interaction terms between the female and cultural variables, and the only significant coefficient is the interaction between female and masculinity (λ3 = 0.0344, p = 0.034). This is expected since masculinity is the only cultural index related to the gender dynamic in a society, and therefore, it has a different impact on females and males. To illustrate how to interpret the coefficients, I will use the Netherlands and Austria as two examples. The Netherlands is the country with the lowest masculinity score in my sample (MAS = 0.14). Multiplying the MAS score by the coefficient gives us 0.0048, which implies that the gender gap in risk in the Netherlands is quite small. On the other hand, Austria is the country with the highest level of masculinity in my data set (MAS = 0.79). Multiplying the MAS score by the coefficient gives us 0.0272, which is even bigger than the coefficient of female in columns 1 and 2. More importantly, it is worth noting that the coefficient on female is not significant anymore, which suggests that masculinity has taken on the explanatory power for the observed gender differences in risk attitudes. In Column 5, I excluded the other three interaction terms, and the results did not change. In fact, the coefficient on the interaction between female and masculinity is even more significant (λ3 = 0.0360, p = 0.004).

**4.2 Robustness Check**

To control for other unobserved factors in a country, such as political stability, that might influence the gender disparity in risk attitudes, I also ran a country fixed-effect model. The regression is of the following form:



Column 1 in Table 2 shows the results from the fixed-effect regression. The coefficient between female and masculinity is even more significant and larger (λ= 0.042, p < 0.001), which means that the effect size of masculinity on the gender gap in risk is bigger.

In addition, since the US and Germany samples are much larger compared to samples from other countries, I also ran the country fixed-effect without these two samples to make sure the cultural impacts are not driven by these two countries alone. The results are displayed in the second and third columns in Table 2 respectively, and they are basically the same as the model including the entire sample. Hence, the observed effect of masculinity on the gender disparity in risk is not due to sample selection. These two robustness checks give us confidence that masculinity level in a country help explain the gender gap in risk attitudes.

**Table 2. Country Fixed Effects**

Dependent Variable: Safechoice

|  |  |  |  |
| --- | --- | --- | --- |
| VARIABLES | (1) | (2) | (3) |
|  |  |  |  |
| Female\*MAS | 0.0422\*\*\* | 0.0387\*\*\* | 0.0473\*\*\* |
|  | (0.00547) | (0.00772) | (0.00532) |
| Fixed Effects | Yes | Yes | Yes |
|  |  |  |  |
|  |  |  |  |
| Constant | 0.548\*\*\* | 0.550\*\*\* | 0.546\*\*\* |
|  | (0.00208) | (0.00293) | (0.00202) |
|  |  |  |  |
| Observations | 4,179 | 2,605 | 3,096 |
| R-squared | 0.014 | 0.016 | 0.016 |

Robust standard errors in parentheses

\*\*\* p<0.01, \*\* p<0.05, \* p<0.1

**Section 5: Discussion**

Taken together, there are two important findings from my study. First, consistent with previous literature, my results indicate that culture is a significant predictor of risk attitudes. More importantly, masculinity affects the gender disparity in risk. This is evidence against the popular biological hypothesis since if the gender gap is entirely due to biological reasons, we should find no cross-cultural variations. Instead, in countries with a higher level of masculinity, the gender differences in risk preferences are larger. When masculinity is high, the gender roles are clearly differentiated in a society. In other words, men are supposed to behave in a masculine way – assertive, competitive, and ambitious – whereas women are supposed to behave in a feminine way – tender, modest, and relationship-oriented. On the contrary, if masculinity is low, the gender roles are overlapping, and both females and males value modesty, tenderness, and quality of life.

My results go along with Rai’s social norm hypothesis (2014). In this context, differentiated gender roles are the social norm established in a masculine country. Since many people believe that risk-taking is a “masculine” feature (Paul, 2017), females might feel they are obligated to behave in a “feminine” way and therefore, become more risk averse than their male counterparts. In other words, the differentiated gender roles put restrictions on people’s behaviors. There is also research showing that men in a masculine society are more likely to suffer from anxiety and mental health issues, which can also be due to that fact that they are trying to meet the “masculine” standard and behave in a competitive way (Wong et al., 2016). Hence, it seems that these narrow and restricted standards built for gender roles have significant negative impacts on both females and males.

What can we do then? As Hofstede (2005) and many other cross-cultural scholars have argued, culture is a relatively stable feature of a group, and it is passed along from generation to generation. Therefore, in my view, the best way for policy makers to intervene is through education. This does not mean that we should encourage everyone, females and males, to behave in the same way and eliminate all the gender differences. However, I think it is critical that we educate people, especially children, that they do not have to be restricted by the social norms or live up to certain expectations. Everyone should have the ability to freely decide what his or her own way is, without being judged by others or by the society.

Finally, the last aspects I want to discuss briefly are the limitations of the study and future research directions. First, as I mentioned in the beginning, this result should not be taken as conclusive given that I only analyzed student samples in my study. Also, there could be international students included in my sample, but I do not have data to identify from where each individual comes. It would be interesting to compare the international student sample to the home country sample and check if they behave differently. Second, it would be helpful if I had more data on other control variables, such as majors, parents’ education, household wealth and so on. For instance, based on data from Human Developments, while the female expected years of schooling in 2010 was 10.5 years in India and 10.7 years in Morocco, it was 16.5 years in the United States and 17.2 years in Netherlands. Hence, the college students from the developing countries in my sample might come from wealthier families compared to their national average, which could affect their risk attitudes. Having more data on control variables can further ensure that the background factors are homogeneous across nations. Furthermore, many of the countries in my sample are developed Western countries, where most of the risk experiments were conducted. For future research, it will be important to include a more geographically and economically diversified sample of countries. Finally, another critical topic for future research is religion. Research shows that religion is related to gender identities as well as status of women (Klingorova and Havlicek, 2015), and it is worth looking at how that affects the gender differences in risk preferences.

To summarize, my study contributes to the nature vs. nurture argument in explaining the gender gap in risk attitudes, and it helps us understand the story behind this gap better. The paper provides strong evidence that culture could affect the gender difference in risk. The results also have important implications in real life. For the well-being of both women and men, we should work together to break down gender norms and restrictions that we as a society have created. Are men really from Mars and women from Venus as John Gray (1992) claimed? I do not think so. We are all from the same planet, and let us not use gender norms to build up a gap and separate ourselves.

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