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# Gender Differences in Risk Preferences and Stereotypes: Experimental Evidence from a Matrilineal and a Patrilineal Society

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# Gender Differences in Risk Preferences and Stereotypes: Experimental Evidence from a Matrilineal and a Patrilineal Society*

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Abstract:

We use a controlled experiment to analyze gender differences in risk preferences and stereotypes about risk preferences of men and women across two distinct island societies in the Pacific: the patrilineal Palawan in the Philippines and the matrilineal Teop in Papua New Guinea. We find no gender differences in actual risk preferences, but evidence for culture-specific stereotypes. Like men in Western societies, Palawan men overestimate women's actual risk aversion. By contrast, Teop men underestimate women's actual risk aversion. We argue that observed differences in stereotypes between the two societies are determined by the different social status of women.

Keywords: Gender roles, culture, stereotype, experiment, risk aversion

JEL: C93, D81, J15, J16

**Andreas Pondorfer** (corresponding author)
Kiel Institute for the World Economy
24105 Kiel, Germany
E-mail: andreas.pondorfer@ifw-kiel.de

**Toman Omar Mahmoud**
Kiel Institute for the World Economy
24105 Kiel, Germany
E-mail: toman.mahmoud@ifw-kiel.de

**Katrin Rehdanz**
Kiel Institute for the World Economy
24105 Kiel, Germany
E-mail: katrin.rehdanz@ifw-kiel.de

**Ulrich Schmidt**
Kiel Institute for the World Economy
24105 Kiel, Germany
E-mail: ulrich.schmidt@ifw-kiel.de

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# 1 Introduction

Evidence from Western and industrialized societies suggests that women are generally more risk averse than men.[1] Such differences have important implications for economic outcomes such as occupational choice, investment and consumption choices, or insurance coverage. Findings from rural and traditional societies, however, cannot confirm the verdict of systematically different risk preferences of women and men (e.g., Binswanger 1980, Henrich and McElreath 2002). Even experimental work conducted in societies where the roles of women and men are mirror images in specific aspects of social norms provide only mixed results. Gneezy et al. (2009) observe gender differences in competition but not in risk preferences among the patriarchal Maasai in Tanzania and the matrilineal Khasi in India. Gong and Yang (2012) find that women are more risk averse than men in patriarchal and matrilineal societies in China but the gender gap is smaller in the latter one. These findings suggest that gender differences in risk preferences cannot unequivocally be attributed to nature. Rather such differences may also be culture-specific and evolve during socialization.[2]

In this study we analyze gender differences in risk preferences and gender stereotypes in two traditional island societies in the Pacific, which mainly differ in the social status of women: the patrilineal Palawan in the Philippines and the matrilineal Teop in Papua New Guinea. We use a simple gamble choice task based on the design of Eckel and Grossman (2002, 2008a) to measure a subject's risk preference. To examine gender stereotypes, each subject is asked to predict the gamble choice of another female and male subject from the same society. We are hence able to examine whether a person's sex is considered as a signal of risk preference in each society.

Stereotypes change with the social structure and norms of a society, in particular with the status of groups (Crocker et al. 1998, Fiske 2000). We therefore expect gender stereotypes to be culture-specific. Specifically, we expect men from the patrilineal Palawan to exhibit different stereotypes about female risk preferences than men from the matrilineal Teop.

Stereotypes play an ambiguous role in decision making. On the one hand, by highlighting differences between groups, they allow easy processing of information and categorization of

[1] See Eckel and Grossman (2008b), Croson and Gneezy (2009) and Bertrand (2011) for reviews of the experimental literature as well as Charness and Gneezy (2012). Women have also been shown to be more socially oriented, more selfless, less willing to compete and less willing to negotiate than men.

[2] See Gneezy et al. (2009, pp. 1644) for an intriguing discussion of the nature-nurture debate. Booth and Nolen (2012) also provide evidence for the role of nurture within a Western society. They show that English girls in an all-girls group or attending a single-sex school are less risk-averse than girls in coeducational schools.

people (Brewer 1999).[3] On the other hand, stereotypes are necessarily selective and highlight only the most distinctive features of a group (Hilton and von Hippel 1996). They may hence be associated with biased assessment of an individual's actual risk preferences and ultimately lead to statistical discrimination. Whether one sex is, rightly or wrongly, stereotyped as more risk averse, has important and potentially adverse consequences for the opportunities, choices, and outcomes of an individual with that sex. In an economic transaction with another party, it is often the risk preference perceived by the other party – not the typically unobservable true risk preference – that matters.

For instance, Wang (1994) finds that investment brokers offer women lower risk investment options (with lower expected returns) than men, which is consistent with the stereotype that women are more risk averse than men. Women may then make different and potentially suboptimal investment decisions compared to a situation in which they would receive unbiased advice. Stereotypes may also cause the underrepresentation of women in higher management positions. Johnson and Powell (1994) find no differences in decision quality and risk propensity between female and male managers and argue that the exclusion of women from such positions may be based on false stereotypes derived from observations of the non-managerial population. Heilman (2001) comes to a similar conclusion arguing that gender stereotypes bias the evaluation of work performance against women and thus hamper women from climbing up the organizational ladder. Relatedly, Eckel and Grossman (2002) note that employers may offer women lower initial wages in employment negotiations and bargain more aggressively if they expect women to be more risk averse and hence more willing to accept a given offer than men. In the context of developing countries, gender stereotypes may explain why microcredits are primarily given to women rather than men (Morduch 1999): If women are expected to be more risk averse, the perceived chances of debt retirement are higher.

While women in Western societies are generally more risk averse than men, men perceive women to be even more risk averse than they actually are (e.g., Eckel and Grossman 2002, Dravula 2007, Eckel and Grossman 2008a). Men's biased perception persists even if information about women's actual risk preferences is provided (e.g., Grossman 2013).[4] Beyond statistical discrimination, incorrect stereotypes further worsen suboptimal decision making and the associated welfare and efficiency losses. This is especially so when stereotypes are internalized,

[3] Stereotyping can be taken as the most cognitive component of category-based reactions, i.e. reactions to people from groups perceived to differ significantly from one's own (Eagly and Chaicken 1998, Petty and Wegener 1998).

[4] Similar evidence exists for the stereotype that women are less talented and interested in mathematics and science. In spite of equal performance, men are much more likely to be hired for an arithmetic task than women even if information on performance is provided (Reuben et al. 2014).

thus lowering the self-esteem and confidence of the stereotyped group (Crocker and Major 1989, Jones et al. 1984, Rosenberg 1979).[5] For instance, Carr and Steele (2010) show that concerns about their risk stereotype increase women's risk aversion in financial decisions. Following Akerlof and Kranton's (2000) identity model, the internalization of risk stereotypes may also explain women's occupational sorting into jobs that require relatively less risk taking. In order to address the internalization of stereotypes, we also analyze women's self-confidence and engagement in economic activities that are typically performed by men.

We find no significant gender differences in actual risk preferences in each of the two island societies. However, consistent with culture-specific stereotypes, we are the first to show that men from a patrilineal society (the Palawan) overestimate women's actual risk aversion and men from the matrilineal society (the Teop) underestimate women's actual risk aversion. Hence, men in both societies use female sex as a significant signal for risk preferences, but in reversed directions. Men's biased perception of women's risk preferences implies suboptimal opportunities and choices for women. The fact that these biases are culture-specific suggests that stereotypes are not universal by nature, but (co)determined by nurture.

## 2 Subject pool: The patrilineal Palawan and the matrilineal Teop

To isolate the effect of culture and women's social status on stereotypes, the ideal experiment would randomly assign different gender roles to otherwise identical societies. Such an experiment is, however, not feasible. To get as close as possible to this ideal experiment, we study two societies that are very similar along many important dimensions but have opposite cultures when it comes to women's social status: the patrilineal Palawan in the Philippines and the matrilineal Teop in Papua New Guinea. Both the Palawan and the Teop are originally indigenous tribes and live in small-scale island societies located in the Pacific Ocean. They share the same geo-ecological conditions and their remote location has limited exposure to external cultural influences.

In both societies, the social status of women and men is based on social norms that regulate land ownership and resource-related user rights. These norms are in favor of men among the patrilineal Palawan and in favor of women among the matrilineal Teop. The following paragraphs provide more details on each society.

The Palawan are an indigenous ethnic group of the Palawan archipelago in the Philippines. Our subjects were recruited from small coastal settlements located in the Rizal area in the south of

[5] This argument is similar to the stereotype threat theory (Steele 1997).

Palawan Island. Their main source of livelihood is farming and fishing. Although the household is not strictly organized along patriarchal ideology, the husband is the publicly acknowledged head of a household and main decision-maker. As such, he is expected to be the breadwinner for the family. Conversely, the wife is credited primarily for her ability to have children, take good care of them and her husband, and manage the household finances (Alcantara 1994). Men hold user rights over land and other resources including those provided by the sea. Traditional leadership in Palawan communities is based on the blood line. Community members who have "royal" blood are eligible for leadership, but only if they are men (Limsa 2014).

The Teop form a unique language group of Bougainville Island in Papua New Guinea and represent a matrilineal and matrilocal island society. Our subjects were recruited from small coastal settlements located in the northern part of the main island. Similar to the Palawan, the mainstay of the Teop is farming. This subsistence pattern is supplemented by fishing, hunting and foraging (Reagan and Griffin 2005). Women's social position in Bougainville culture has its origin in land. The matrilineal kinship structure gives women considerable power over material resources and activities that are economically and ritually important. Women's prerogative over land includes defining land boundaries, giving permission to hunt or to harvest timber, and the exclusive right to veto decisions on land-related matters. While male relatives have rights to ownership, their rights are limited and conditional on female relatives' permission (Saovana-Spriggs 2003). Moreover, unmarried, divorced, or widowed brothers and sons reside in the home of their female relative. Even married men who live with their wife's family are expected to spend much of their time in their mother's or sister's household. Still, there are some predominantly male domains. Women hardly participate in politics and do not physically take part in tribal or civil conflicts. Priesthood also remains a male profession. Moreover, the Teop rely on big men (chieftains) to enforce norms in everyday life (Cochrane 1970).

## 3 Experimental design and procedure

Our experimental design closely follows Eckel and Grossman (2002, 2008a). We implement a simple and incentivized task for measuring risk preferences. Subjects are shown five gambles and asked to choose which of the five they wish to play for real. The gambles include one sure thing with the remaining four increasing linearly in expected payoff and risk as measured by the standard deviation of expected payoff. All are 50/50 gambles. Table 1 provides an overview of the gamble choices, the payoffs associated with each possible outcome, expected payoffs, and the

standard deviations of expected payoffs. The gambles are represented in a way that is easy for subjects to understand. The use of 50/50 gambles keeps the task as simple as possible.[6]

This design can also be used to measure a subject's gender stereotypes about risk preferences in a simple way. After subjects choose their most preferred gamble, we ask them which of the five gambles an unidentified female and male subject from their society had chosen for her- and himself. Hence, the sex of the other person is the only information that a subject has to make a prediction of that person's gamble choice. We use monetary incentives to encourage subjects to spend effort on their prediction.

The experimental procedure is the same for sessions conducted in the two societies. For each session, we recruited adult subjects in advance and asked them to come to a central place in the village (school, church or community places).[7] After answering a short questionnaire, all subjects received a payment as an appreciation for completing the questionnaire and a show up fee to hold endowment effects constant. Together, these payments amounted to about US$ 1, equivalent to about a quarter of the daily minimum wage in each country.[8]

Subjects were then asked to move one by one into a private area where the experiment was conducted. The experimenter read out the instructions and explained the tasks. In the first task, subjects were asked to choose their preferred gamble. Each gamble was presented as a pair of money cards (see Figure 1). The chosen pair was then put into a bag and shuffled.

Before subjects could draw their card from the bag, they were asked to complete the second task. In this task, subjects were shown two closed envelopes, one containing the gamble choice of an unidentified female subject and one containing the gamble choice of an unidentified male subject. Subjects were then asked to predict which gamble the other female and male subject had chosen for her- or himself.[9] For each correct prediction, they received an additional payment. Subjects were told that pairs in the envelopes were changed after each participant such they could not use any information they could have potentially received from previous participants. As a final step, subjects drew one card form the bag with their chosen gamble and received their payment.[10] On average, this additional payment summed up to about US$ 1.

[6] See Eckel and Grossman (2008b) for a discussion on advantages and disadvantages of measures of risk preferences.

[7] Village heads and our local assistant helped us recruit the subjects from the adult population in the villages.

[8] To make endowment effects and stakes comparable across the two societies, we adjusted payments based on purchasing power parity (http://unstats.un.org/unsd/mdg/SeriesDetail.aspx?srid=699).

[9] We changed the order of presenting the envelopes after each subject.

[10] For more details, see the experimental instructions in the Appendix.

To ensure that all subjects fully understood the instructions and could communicate with the experimenters, we hired local assistants. They translated our experimental instructions into the local language. Different assistants translated the instructions back into English, so we could check for accuracy. All instructions were read aloud to the subjects, first in English by the experimenter then in the local language by the assistant.[11]

# 4 Results

## 4.1 Subject characteristics

Table 2 summarizes the main socio-economic and demographic characteristics of the subjects from the two societies. In total, 103 people from the patrilineal Palawan (49 men, 54 women) and 96 people from the matrilineal Teop (48 men, 48 women) participated in the study. Several observations are noteworthy. First, the average age (41-42 years) is about the same across society and sex. Second, households of Teop people are slightly larger than those of Palawan people (six versus five members). The difference can be explained by the fact that married Teop men are still counted as members of their mother's household even if they reside elsewhere. Third, reflecting the different social status of women in the two societies, Teop women have higher educational attainment than Palawan women. While all Teop women in the sample have completed some form of formal education, about 25 percent of Palawan women have no formal education at all. Fourth, wealth, as measured by the number of comparable assets households own, is nearly equally distributed across the societies.[12] Fifth, farming and fishing are the main economic activities in both societies. However, wage labor, in particular as a secondary activity, is more prevalent in Palawan. Sixth, due to the strong presence of Christian missionaries in Bougainville all Teop subjects are Christians, while about 40 percent of Palawan subjects are Muslims.

## 4.2 Actual risk preferences

Figure 2 shows the mean gambles that women and men choose for themselves separately for the patrilineal Palawan and the matrilineal Teop. Table 3 lists the distribution of gamble choices by sex and society in more detail. Across sex, Palawan subjects are considerably less risk averse than Teop subjects. The mean gamble choice is 3.43 among Palawan subjects and 2.73 among Teop

[11] A male experimenter and a female assistant conducted each session to control for potential gender effects related to the experimental setup.

[12] We considered the following six assets which are of comparable value and use across the two societies: torch, lamp, chair, generator, mobile phone, radio.

subjects. The difference is statistically significant ($p < 0.01$).[13] About 55 percent of the Palawan choose the risky gambles 4 and 5, compared to 31 percent of the Teop. By contrast, 44 percent of the Teop people select the less risky gambles 1 and 2, compared to 23 percent of the Palawan.[14]

Although the Palawan and Teop appear to have different risk preferences, we observe no gender differences in risk preferences within the two societies. We cannot reject the hypothesis that the gamble choice of Palawan (Teop) women is different from the gamble choice of Palawan (Teop) men at usual significance levels (3.57 vs. 3.29, $p = 0.31$ for Palawan; 2.67 vs. 2.79, $p = 0.61$ for Teop).

To ensure that these findings are not confounded by different background characteristics of subjects across sex or society, Table 4 presents results from a simple regression model. We use ordinary least squares as expected payoff (and risk) increase linearly with gambles.[15] Columns 1-3 pool data from Palawan and Teop subjects and provide a sense of data patterns across the two societies. Columns 4-6 and 7-9 split the data by society, permitting the explanatory variables to have heterogeneous effects in each society. For each sample, we show three specifications. The first specification only controls for the sex of the subject. The second specification adds controls for age, education, wealth and religion. The third specification additionally controls for household size, being a household head, marital status and fishing as main economic activity.

In no specification do we find evidence for significant gender differences in risk preferences. Furthermore, consistent with previous experimental work in the lab (Holt and Laury 2000) and field (Henrich and McElreath 2002) sex, age, economic status and other characteristics do not predict risk preferences. We only find that among the Palawan Muslims are significantly more risk averse than non-Muslims.[16]

## 4.3 Stereotyping about risk preferences

In addition to choosing a gamble for themselves, subjects also made a prediction of the gamble choice of an unidentified female and male subject. Table 5 presents the distribution of predictions of others' gamble choices by sex and society.

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[13] All tests of gender differences in means are conducted using a Wilcoxon rank-sum test. Our results are robust to using a t-test.

[14] Palawan men's mean gamble choice is significantly larger than those of Teop men and women (3.29 vs. 2.79, $p = 0.07$ and 3.29 vs. 2.69, $p = 0.03$). The same is true for Palawan women's mean gamble choice (3.57 vs. 2.79, $p < 0.01$ and 3.57 vs. 2.67, $p < 0.01$).

[15] Our results are robust to using alternative regression models such as ordered probit.

[16] We checked for systematic gender differences within the Muslim and non-Muslim sub-samples and found no significant differences.

In line with the previous finding that Palawan subjects are less risk averse than Teop subjects, they also perceive themselves to be less risk averse. On average, all (female and male) Palawan subjects make significantly higher predictions of the gamble choice of both women and men than Teop subjects (3.36 vs. 2.81, $p < 0.01$ for women; 3.19 vs. 2.94, $p = 0.10$ for men).

Gender stereotyping is best assessed by comparing actual and perceived risk preferences for each sex. For this purpose, we define the prediction error as the difference between an individual's prediction of the gamble choice and the average actual gamble choice of a given sex:

$$prediction\ error_{i,\ sex} = prediction_i(gamble\ choice_{sex}) - average(actual\ gamble\ choice_{sex})$$

A prediction error of zero implies that stereotypes about risk preferences are on average correct. Accordingly, non-zero prediction errors are associated with incorrect stereotypes. Negative prediction errors correspond to overestimating, positive prediction errors to underestimating the risk aversion of a given sex. As argued above, the larger the bias in perception, the larger the degree of suboptimal decision making and the associated efficiency and welfare losses.

Figure 3 shows the mean prediction error for women's gamble choices (upper part) and men's gamble choices (lower part) by sex of the predictor and society. Consistent with the culture-specific social status of women, there are considerable differences in men's stereotypes about women's risk choices across the two societies. Men from the patrilineal Palawan overestimate women's actual risk aversion. Their mean prediction error for women's gamble choices of -0.49 is significantly different from zero ($p < 0.01$).[17] By contrast, men from the matrilineal Teop underestimate women's actual risk aversion. Their mean prediction error for women's gamble choices of 0.51 is also significantly different from zero ($p < 0.01$). Hence, men's perception of women's risk preferences is considerably biased in both societies but in opposite directions. The magnitude of the bias is considerable, amounting to almost half a standard deviation of women's actual risk preferences.

When it comes to women's stereotypes about men's risk choices, there are no such differences between the two societies. While Teop women slightly underestimate men's actual risk aversion, their mean prediction error of 0.21 is not significantly different form zero ($p = 0.24$). Palawan women correctly assess men's risk preferences. Their mean prediction error is close to zero (-0.03; $p = 0.88$).

Men and women in both societies have relatively accurate perception of their own sex' risk preferences. All prediction errors are relatively small and not significantly different from zero.

[17] We use a one-sample t-test to test whether prediction errors differ significantly from zero.

Accordingly, gender differences within societies only exist for stereotypes about women's risk preferences. The mean prediction error of Palawan (Teop) men is significantly different from the prediction error of Palawan (Teop) women (-0.49 vs. 0.04, $p < 0.01$ for Palawan; 0.51 vs. -0.21, $p < 0.01$ for Teop).

To assess the robustness of these results against potential confounders, we regress a subject's prediction error for a given sex on the subject's own sex and several control variables. We start with a model that pools data from the two societies. To identify culture-specific gender differences in stereotypes, all specifications include a dummy variable for belonging to the Palawan society, a dummy variable for being male, and their interaction.

Table 6 presents the results for prediction errors for women's risk choices. All our previous results hold. There are significant gender differences in stereotypes about women's risk preferences. According to column 1, men from the matrilineal Teop underestimate women's risk aversion. The positive and significant coefficient of the male dummy implies that Teop men, compared to Teop women, overestimate the gamble choice of women by about 0.7. By contrast, men from the patrilineal Palawan overestimate women's risk aversion. Combined with the coefficient of the male dummy the highly significant coefficient of the interaction implies that Palawan men, compared to Palawan women, underestimate the gamble choice of women by about 0.5. These point estimates are robust to controlling for age, education and wealth (column 2), the previous additional control variables (household size, being a household head, marital status and fishing as main economic activity) as well as for a subject's own gamble choice and prediction error for men's risk preferences (column 3). Our results are essentially the same when we analyze the data separately for the Teop sample (columns 4-6) and Palawan sample (columns 7-9).

Table 7 presents the results for prediction errors for men's risk choices. In line with the descriptive findings, we do not find evidence for significant gender differences in stereotypes about men's risk preferences. Neither the male dummy nor the interaction with the Palawan dummy turn out to be significant (columns 1-3). In addition, the point estimates of both variables are much smaller and relatively close to zero. The picture is the same when we look at the Teop sub-sample (columns 4-6) and Palawan sub-sample (columns 7-9).

## 5 Discussion

In this section we briefly discuss why only male stereotyping about women's risk preferences is biased and why the direction of the bias differs between the patrilineal and the matrilineal society. We also explore the relationship between stereotypes and economic decisions. In particular, we

look at occupational patterns and self-confidence in the two main subsistence activities, farming and fishing, which require different attitudes towards risk. Finally, we present an interpretation of not finding gender differences in actual risk preferences.

Although social norms that regulate the status of women differ between matrilineal and patrilineal societies, the division of labor is similar across the Palawan and Teop. In both societies, women do the housekeeping, gardening and childcare. Men are the main providers of the family. Their activities usually include outside tasks that require a higher degree of risk taking and physical strength such as fishing, hunting, logging, house building, etc. Moreover, communal activities like leadership and religious services are dominated by males. Hence, women's behavior in risky tasks and public activities is hardly or not at all observable to men. As a consequence, men in both societies are more likely than women to make biased assessments of the other sex' risk behavior. This may explain why only men's stereotypes about women's risk preferences are biased.

The opposite direction of this bias between the two societies can be explained by the different social status of women. Women in matrilineal societies enjoy more prestige and respect than women in patrilineal societies. Importantly, they also have more control over resources and hence better abilities to insure themselves against potentially adverse consequences of risk taking. These differences may explain why women's risk aversion is underestimated by men from the matrilineal Teop and overestimated by men from the patrilineal Palawan.

We cannot directly test the effects of men's misperception of women's risk preferences on women's economic decisions. We can, however, provide suggestive evidence on how this misperception correlates with women's self-confidence in farming and fishing and their economic activities.

To measure self-confidence in fishing and farming, we asked all subjects to assess their fishing and farming skills relative to those of other villagers on a three-point scale as worse (1), about the same (2), or better (3). Fishing is a task that is associated with more risk, competition and uncertainty in outcomes than farming in this geo-ecological setting. Figure 4 shows the mean self-confidence in fishing (upper part) and farming (lower part) by sex and society. Teop women and men are equally self-confident in their skills in both tasks. By contrast, Palawan women are significantly less confident in their fishing skills than Palawan men (1.61 vs. 1.92, $p = 0.01$). There is no significant gender difference in agricultural skills. Hence, among the patrilineal Palawan, men's overestimation of women's risk aversion is associated with lower levels of women's confidence in a risky task like fishing. This result is consistent with internalized stereotypes,

which may be the result of different socialization patterns in the two societies (Andersen et al. 2013).

These patterns of self-confidence are reflected in the patterns of economic activities across the two societies. While 42 percent of women from the matrilineal Teop engage in fishing as their main or secondary economic activity, the corresponding figure is only 13 percent for women from the patrilineal Palawan (see Table 3). Likewise, the women-men ratio in fishing among the Teop is twice as high as the ratio among the Palawan.

Finally, our result of no gender differences in risk preferences provides further evidence for the impact of nurture. In line with previous experimental work conducted in traditional and rural societies (Binswanger 1980, Henrich and McElreath 2002; Gneezy et al. 2009) sex is not a significant predictor of risk preferences. This may suggest that cultural factors that drive gender differences in Western and industrialized societies do not apply to traditional societies. This difference could potentially be explained by comparing the division of labor between traditional and Western societies after the industrial revolution. Sexual stratification coincided with increasing productiveness, specialization and complexity of society. The introduction of wage labor, the increasing scale of production and the mechanization of agriculture has led to long-lasting changes in gender roles. With the expansion of economic opportunities and separation of work from the home, men became economically less dependent on women, while women became more dependent on men (Hartmann 1976, Goldin 1995). This development has caused gender differences in employment, income and wealth and may explain why women in modern societies are more risk averse than men.

## 6 Conclusion

Using a simple gamble choice task developed by Eckel and Grossman (2002, 2008a), we analyze gender differences in risk preferences and stereotypes in a patrilineal and a matrilineal island society in the Pacific. We find no gender differences in actual risk preferences among the patrilineal Palawan and the matrilineal Teop. However, we find considerable evidence for culture-specific stereotypes about women's risk preferences. Similar to men in Western societies, Palawan men overestimate women's actual risk aversion. By contrast, Teop men underestimate women's actual risk aversion.

This suggests that nurture, which is reflected in the different social status of women in the two societies, affects men's stereotypes about female risk taking. As perceived, not actual risk preferences guide economic transactions with another party, men's biased perception of women's

risk preferences likely has adverse consequences for women. It may result in worse opportunities and choices, thus reducing efficiency and welfare.

Our findings may provide important information for policy makers. If gender stereotypes are driven by nurture, or an interaction between nature and nurture, policy makers may focus on promoting more equitable gender models. Less biased socialization and education may then pave the way for a more equal treatment of women and men.

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## Tables

Table 1: Gambles, expected payoff, and risk (for the Teop in Papua New Guinea)

| Gamble | Probability (%) | Option A | Option B | Expected payoff | Variance | Standard deviation |
|---|---|---|---|---|---|---|
| 1 | 50/50 | 4 Kina | 4 Kina | 4 Kina | 0 | 0 |
| 2 | 50/50 | 6 Kina | 3 Kina | 4.5 Kina | 2.25 | 1.5 |
| 3 | 50/50 | 8 Kina | 2 Kina | 5 Kina | 9 | 3 |
| 4 | 50/50 | 10 Kina | 1 Kina | 5.5 Kina | 20.25 | 4.5 |
| 5 | 50/50 | 12 Kina | 0 Kina | 6 Kina | 36 | 6 |

Gambles increase linearly in expected payoff and risk as measured by the standard deviation of expected payoff. 1 Kina ~ 0.4 US$. Gambles for the Palawan in the Philippines were adjusted based on purchasing-power parity.

Table 2: Subject characteristics

| | Teop (matrilineal) | | | Palawan (patrilineal) | | |
|---|---|---|---|---|---|---|
| | All subjects | Men | Women | All subjects | Men | Women |
| | mean (s.d.) | mean (s.d.) | mean (s.d.) | mean (s.d.) | mean (s.d.) | mean (s.d.) |
| Age | 42.06 | 44.23 | 39.90 | 40.65 | 40.61 | 40.69 |
| | (13.68) | (13.56) | (13.59) | (15.16) | (15.84) | (14.66) |
| Household size | 6.03 | 5.92 | 6.15 | 4.83 | 4.55 | 5.07 |
| | (2.11) | (2.10) | (2.14) | (2.12) | (1.88) | (2.30) |
| | percent | percent | percent | percent | percent | percent |
| Education | | | | | | |
| No school | 2.08 % | 4.17 % | 0.00 % | 16.83% | 8.16 % | 25.00 % |
| Elementary | 43.75 % | 47.92 % | 39.58 % | 42.57% | 46.94 % | 38.46% |
| High school | 40.63 % | 37.50 % | 43.75 % | 35.64% | 40.82 % | 30.77 % |
| Above high school | 13.54 % | 10.42 % | 16.67 % | 4.95 % | 4.08 % | 5.56 % |
| Wealth | | | | | | |
| 0 | 0.00 % | 0.00 % | 0.00 % | 4.85 % | 4.08 % | 5.56 % |
| 1 | 13.54 % | 8.33 % | 18.75 % | 20.39 % | 16.33 % | 24.07 % |
| 2 | 31.25 % | 31.25 % | 31.25 % | 26.21 % | 28.57 % | 24.07 % |
| 3 | 30.21 % | 31.25 % | 29.17 % | 31.07 % | 32.65 % | 29.63 % |
| 4 | 17.71 % | 22.92 % | 12.50 % | 15.53 % | 18.37 % | 12.96 % |
| 5 | 7.29 % | 6.25 % | 8.33 % | 1.94 % | 0.00 % | 3.70 % |
| Main activity | | | | | | |
| Farmer | 86.46 % | 89.58 % | 83.33 % | 60.19 % | 51.02 % | 68.52 % |
| Fisher | 2.08 % | 4.17 % | 0.00 % | 15.53 % | 26.53 % | 5.56 % |
| Wage labour | 2.08 % | 2.08 % | 2.08 % | 12.62 % | 6.12 % | 18.52 % |
| Other | 9.38 % | 4.17 % | 14.59 % | 11.66 % | 16.33 % | 7.40 % |
| Secondary activity | | | | | | |
| Farmer | 28.13 % | 18.75 % | 37.50 % | 36.89 % | 28.57 % | 44.44 % |
| Fisher | 54.17 % | 66.67 % | 41.67 % | 11.65 % | 16.33 % | 7.41 % |
| Wage labour | 5.21 % | 8.33 % | 2.08 % | 25.24 % | 24.49 % | 25.93 % |
| Other | 12.49 % | 6.25 % | 18.75 % | 26.22 % | 30.61 % | 22.22 % |
| Religion | | | | | | |
| Christians | 100 % | 100 % | 100 % | 50.49 % | 57.14 | 44.44 % |
| Muslim | | | | 34.95 % | 32.65 | 37.04 % |
| Other/no religion | | | | 15.02 % | 10.21 | 18.52 % |
| Observations | 96 | 48 | 48 | 103 | 49 | 54 |

Wealth is measured by the number of assets owned. We consider the following six assets: torch, lamp, chair, generator, mobile phone, radio.

Table 3: Summary of own gamble choice

| Gamble | Teop (patrilineal) | | | Palawan (matrilineal) | | |
|---|---|---|---|---|---|---|
| | All subjects (%) | Men (%) | Women (%) | All subjects (%) | Men (%) | Women (%) |
| 1 | 22 (23 %) | 11 (23 %) | 11 (23 %) | 16 (1 6%) | 8 (16 %) | 8 (15 %) |
| 2 | 20 (21 %) | 8 (17 %) | 12 (25 %) | 8 (8 %) | 7 (14 %) | 1 (2 %) |
| 3 | 24 (25%) | 13 (27 %) | 11 (23 %) | 22 (21 %) | 9 (18 %) | 13 (24 %) |
| 4 | 22 (23%) | 12 (25 %) | 10 (21 %) | 29 (28 %) | 13 (27 %) | 16 (30 %) |
| 5 | 8 (8%) | 4 (8 %) | 4 (8 %) | 28 (27 %) | 12 (24 %) | 16 (30 %) |
| Total | 96 (100 %) | 48 (100 %) | 48 (100 %) | 103 (100 %) | 49 (100 %) | 54 (100 %) |
| Mean (s.d.) | 2.73 (1.28) | 2.79 (1.29) | 2.67 (1.28) | 3.43 (1.38) | 3.29 (1.41) | 3.57 (1.34) |

Gambles increase linearly in expected payoff and risk as measured by the standard deviation of expected payoff (see Table 1). Figure 2 shows the mean gamble choices by sex and society.

Table 4: Own gamble choice

| | Pooled data | | | Teop (matrilineal) | | | Palawan (patrilineal) | | |
|---|---|---|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) |
| Male | 0.12 | 0.15 | -0.17 | 0.13 | 0.16 | -0.23 | -0.29 | -0.34 | -0.56 |
| | (0.26) | (0.27) | (0.31) | (0.26) | (0.28) | (0.30) | (0.27) | (0.28) | (0.57) |
| Palawan | 0.91*** | 0.92*** | 0.97*** | | | | | | |
| | (0.26) | (0.27) | (0.29) | | | | | | |
| Palawan*male | -0.41 | -0.42 | -0.40 | | | | | | |
| | (0.38) | (0.38) | (0.40) | | | | | | |
| Age | | -0.00 | 0.01 | | 0.00 | 0.01 | | -0.01 | -0.01 |
| | | (0.01) | (0.01) | | (0.01) | (0.02) | | (0.01) | (0.01) |
| No education | | 0.00 | -0.15 | | 0.17 | 0.15 | | 0.74* | 0.52 |
| | | (0.38) | (0.40) | | (0.58) | (0.57) | | (0.40) | (0.55) |
| Primary school | | -0.52 | -0.57* | | -0.84* | -0.81* | | 0.56 | 0.37 |
| | | (0.33) | (0.34) | | (0.47) | (0.47) | | (0.38) | (0.48) |
| High school | | -0.35 | -0.40 | | -0.40 | -0.31 | | 0.11 | -0.11 |
| | | (0.34) | (0.34) | | (0.51) | (0.50) | | (0.33) | (0.43) |
| Wealth | | 0.01 | 0.01 | | -0.01 | -0.05 | | 0.04 | 0.07 |
| | | (0.09) | (0.09) | | (0.12) | (0.12) | | (0.13) | (0.14) |
| Muslim | | | | | | | | -0.75** | -0.74** |
| | | | | | | | | (0.31) | (0.34) |
| Constant | 2.67*** | 3.09*** | 2.50*** | 2.67*** | 3.18*** | 2.38* | 3.57*** | 3.83*** | 3.58*** |
| | (0.18) | (0.53) | (0.80) | (0.18) | (0.79) | (1.35) | (0.18) | (0.56) | (0.91) |
| Other controls | no | no | yes | no | no | yes | no | no | yes |
| Observations | 199 | 197 | 197 | 96 | 96 | 96 | 103 | 101 | 101 |
| Adjusted R2 | 0.06 | 0.06 | 0.07 | -0.01 | -0.00 | -0.00 | 0.00 | 0.02 | 0.02 |

The table reports OLS estimates. The dependent variable is subject's own gamble choice (compare Table 1). Gambles increase linearly in expected payoff and risk as measured by the standard deviation of expected payoff. Other controls include household size, being a household head, marital status and fishing as main economic activity. Robust standard errors in parentheses. *** denotes statistical significance at the 1 percent level, ** at the 5 percent level, and * at the 10 percent level.

Table 5: Predictions of others' gamble choices

| Teop (matrilineal) | | | | | | |
|---|---|---|---|---|---|---|
| | Predictions by all subjects | | Predictions by men | | Predictions by women | |
| Gamble | For men (%) | For women (%) | For men (%) | For women (%) | For men (%) | For women (%) |
| 1 | 13 (14%) | 25 (27%) | 6 (13%) | 8 (18%) | 7 (15%) | 17 (35%) |
| 2 | 23 (24%) | 14 (15%) | 13 (27%) | 3 (7%) | 10 (21%) | 11 (23%) |
| 3 | 26 (27%) | 18 (19%) | 15 (31%) | 12 (27%) | 11 (23%) | 6 (13%) |
| 4 | 25 (26%) | 26 (28%) | 9 (19%) | 17 (38%) | 16 (33%) | 9 (19%) |
| 5 | 9 (9%) | 10 (11%) | 5 (10%) | 5 (11%) | 4 (8%) | 5 (10%) |
| Total | 96 (100%) | 93 (100%) | 48 (100%) | 45 (100%) | 48 (100%) | 48 (100%) |
| Mean (s.d.) | 2.94 (1.19) | 2.81 (1.38) | 2.88 (1.18) | 3.18 (1.27) | 3.00 (1.22) | 2.46 (1.41) |

| Palawan (patrilineal) | | | | | | |
|---|---|---|---|---|---|---|
| | Predictions by all subjects | | Predictions by men | | Predictions by women | |
| Gamble | For men (%) | For women (%) | For men (%) | For women (%) | For men (%) | For women (%) |
| 1 | 14 (14%) | 9 (9%) | 8 (17%) | 6 (12%) | 6 (11%) | 3 (6%) |
| 2 | 12 (12%) | 14 (14%) | 3 (6%) | 7 (14%) | 9 (17%) | 7 (13%) |
| 3 | 28 (27%) | 29 (28%) | 15 (31%) | 18 (37%) | 13 (24%) | 11 (20%) |
| 4 | 36 (35%) | 33 (32%) | 19 (40%) | 13 (27%) | 17 (32%) | 20 (37%) |
| 5 | 12 (12%) | 18 (18%) | 3 (6%) | 5 (10%) | 9 (17%) | 13 (24%) |
| Total | 103 (100%) | 103 (100%) | 48 (100%) | 49 (100%) | 54 (100%) | 54 (100%) |
| Mean (s.d.) | 3.19 (1.21) | 3.36 (1.18) | 3.13 (1.18) | 3.08 (1.15) | 3.26 (1.25) | 3.61 (1.16) |

Gambles increase linearly in expected payoff and risk as measured by the standard deviation of expected payoff (see Table 1).

Table 6: Stereotyping about women's risk choices

| | Pooled data | | | Teop (matrilineal) | | | Palawan (patrilineal) | | |
|---|---|---|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) |
| Male | 0.72** | 0.67** | 0.65** | 0.72** | 0.67** | 0.71* | -0.53** | -0.48** | -0.63* |
| | (0.28) | (0.29) | (0.32) | (0.28) | (0.30) | (0.40) | (0.23) | (0.23) | (0.34) |
| Palawan | 0.25 | 0.15 | 0.18 | | | | | | |
| | (0.26) | (0.27) | (0.32) | | | | | | |
| Palawan*male | -1.25*** | -1.14*** | -1.20*** | | | | | | |
| | (0.36) | (0.37) | (0.37) | | | | | | |
| Age | | 0.01 | 0.01 | | 0.01 | -0.00 | | 0.00 | 0.01 |
| | | (0.01) | (0.01) | | (0.02) | (0.02) | | (0.01) | (0.01) |
| No education | | 0.17 | 0.39 | | -1.29 | -1.29 | | 0.96* | 1.18** |
| | | (0.48) | (0.47) | | (0.94) | (0.99) | | (0.55) | (0.49) |
| Primary school | | 0.09 | 0.35 | | 0.01 | 0.05 | | 0.94* | 1.25*** |
| | | (0.38) | (0.38) | | (0.52) | (0.52) | | (0.50) | (0.42) |
| High school | | -0.00 | 0.22 | | -0.12 | -0.13 | | 0.80 | 1.14*** |
| | | (0.40) | (0.41) | | (0.57) | (0.60) | | (0.49) | (0.40) |
| Wealth | | -0.10 | -0.06 | | 0.11 | 0.11 | | -0.27*** | -0.21** |
| | | (0.08) | (0.08) | | (0.11) | (0.11) | | (0.10) | (0.10) |
| Muslim | | | | | | | | -0.24 | -0.07 |
| | | | | | | | | (0.27) | (0.26) |
| Gamble choice | | | 0.12 | | | 0.12 | | | 0.13 |
| | | | (0.08) | | | (0.12) | | | (0.10) |
| Prediction error (men) | | | 0.17** | | | 0.13 | | | 0.20* |
| | | | (0.08) | | | (0.12) | | | (0.11) |
| Constant | -0.21 | -0.42 | -1.13 | -0.21 | -0.97 | -1.05 | 0.04 | -0.29 | -1.42* |
| | (0.20) | (0.54) | (0.76) | (0.20) | (0.96) | (1.38) | (0.16) | (0.58) | (0.79) |
| Other controls | no | no | yes | no | no | yes | no | no | yes |
| Observations | 196 | 194 | 193 | 93 | 93 | 93 | 103 | 101 | 100 |
| Adjusted R2 | 0.06 | 0.07 | 0.11 | 0.06 | 0.06 | 0.04 | 0.04 | 0.12 | 0.21 |

The table reports OLS estimates. The dependent variable is the prediction error for women's gamble choice, which is defined as the difference between an individual's prediction of the gamble choice of an unidentified female subject and the average actual gamble choice of women. Positive (negative) prediction errors correspond to underestimating (overestimating) women's risk aversion. Other controls include household size, being a household head, marital status and fishing as main economic activity. Gamble choice is an individual's own gamble choice. Prediction error (men) is the prediction error for men's gamble choice. Robust standard errors in parentheses. *** denotes statistical significance at the 1 percent level, ** at the 5 percent level, and * at the 10 percent level.

Table 7: Stereotyping about men's risk choices

| | Pooled data | | | Teop (matrilineal) | | | Palawan (patrilineal) | | |
|---|---|---|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) |
| Male | -0.13 | -0.11 | 0.06 | -0.13 | -0.14 | -0.08 | -0.13 | 0.03 | 0.53 |
| | (0.24) | (0.25) | (0.29) | (0.24) | (0.26) | (0.36) | (0.24) | (0.24) | (0.37) |
| Palawan | -0.23 | -0.31 | -0.50 | | | | | | |
| | (0.24) | (0.26) | (0.32) | | | | | | |
| Palawan*male | -0.01 | 0.08 | 0.27 | | | | | | |
| | (0.34) | (0.35) | (0.38) | | | | | | |
| Age | | -0.00 | -0.01 | | 0.01 | 0.01 | | -0.02** | -0.01 |
| | | (0.01) | (0.01) | | (0.01) | (0.02) | | (0.01) | (0.01) |
| No education | | -0.18 | -0.09 | | -1.33** | -1.25** | | -0.07 | -0.60 |
| | | (0.45) | (0.42) | | (0.56) | (0.58) | | (0.62) | (0.63) |
| Primary school | | -0.23 | -0.08 | | 0.14 | 0.17 | | -0.40 | -0.85 |
| | | (0.34) | (0.33) | | (0.46) | (0.49) | | (0.59) | (0.56) |
| High school | | -0.49 | -0.32 | | 0.13 | 0.17 | | -0.97* | -1.16** |
| | | (0.35) | (0.36) | | (0.53) | (0.55) | | (0.56) | (0.52) |
| Wealth | | 0.02 | 0.04 | | 0.01 | -0.00 | | 0.08 | 0.09 |
| | | (0.08) | (0.08) | | (0.12) | (0.12) | | (0.10) | (0.11) |
| Muslim | | | | | | | | -0.11 | 0.16 |
| | | | | | | | | (0.28) | (0.28) |
| Gamble choice | | | 0.18** | | | 0.05 | | | 0.26*** |
| | | | (0.07) | | | (0.11) | | | (0.09) |
| Prediction error (women) | | | 0.16** | | | 0.11 | | | 0.24** |
| | | | (0.07) | | | (0.10) | | | (0.12) |
| Constant | 0.21 | 0.66 | -0.11 | 0.21 | -0.51 | -0.62 | -0.03 | 1.00 | 0.00 |
| | (0.18) | (0.54) | (0.74) | (0.18) | (0.90) | (1.21) | (0.17) | (0.66) | (0.89) |
| Other controls | no | no | yes | no | no | yes | no | no | yes |
| Observations | 198 | 196 | 193 | 96 | 96 | 93 | 102 | 100 | 100 |
| Adjusted R2 | -0.00 | -0.01 | 0.04 | -0.01 | -0.01 | -0.05 | -0.01 | 0.01 | 0.11 |

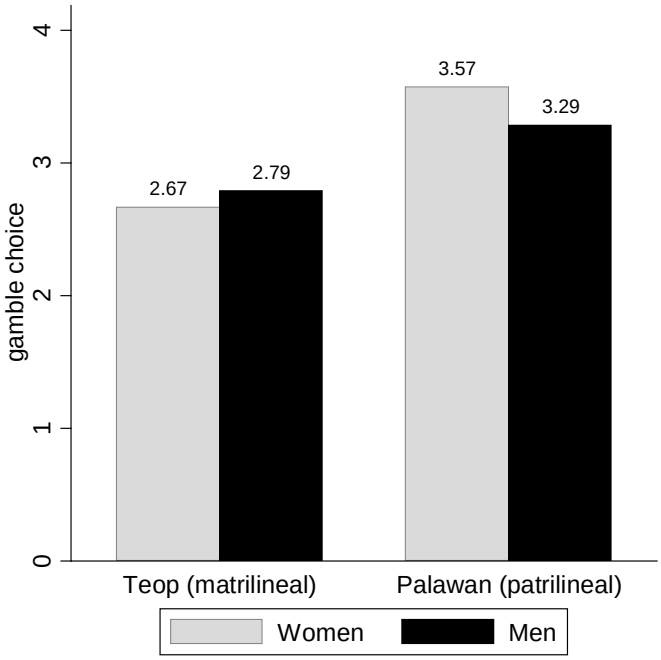
The table reports OLS estimates. The dependent variable is the prediction error for men's gamble choice, which is defined as the difference between an individual's prediction of the gamble choice of an unidentified male subject and the average actual gamble choice of men. Positive (negative) prediction errors correspond to underestimating (overestimating) men's risk aversion. Other controls include household size, being a household head, marital status and fishing as main economic activity. Gamble choice is an individual's own gamble choice. Prediction error (women) is the prediction error for women's gamble choice. Robust standard errors in parentheses. *** denotes statistical significance at the 1 percent level, ** at the 5 percent level, and * at the 10 percent level.

## Figures

Figure 1: Subject's gamble choice

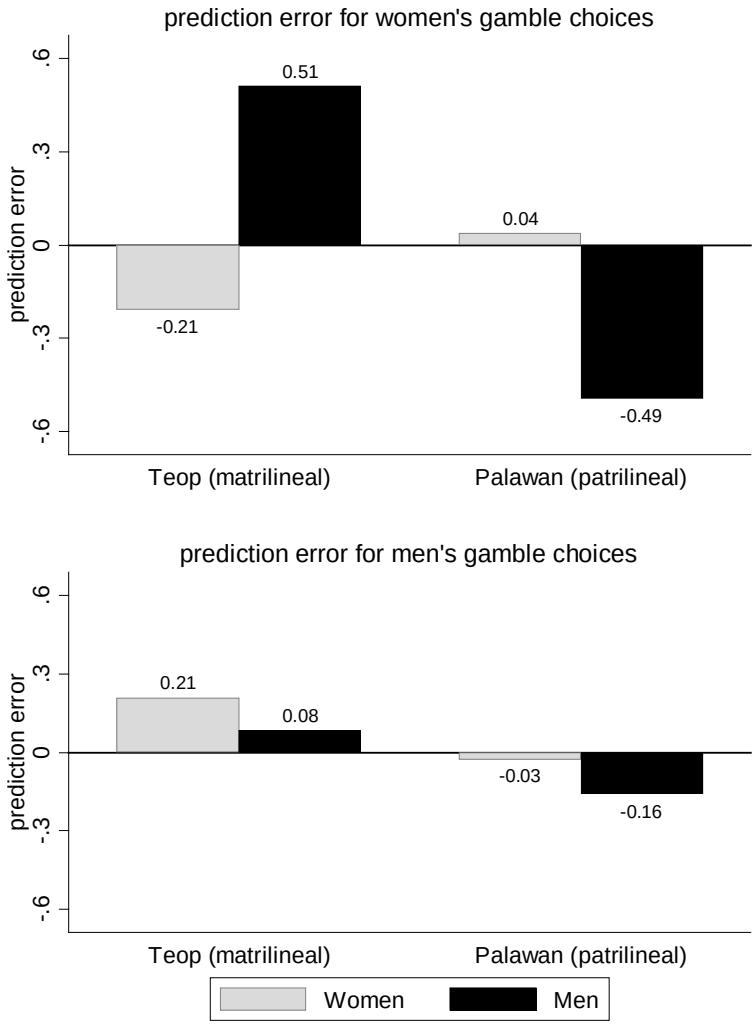
Each gamble (see Table 1) was presented as a pair of money cards. Gambles increase linearly in expected payoff and risk as measured by the standard deviation of expected payoff.

Figure 2: Mean gamble choices



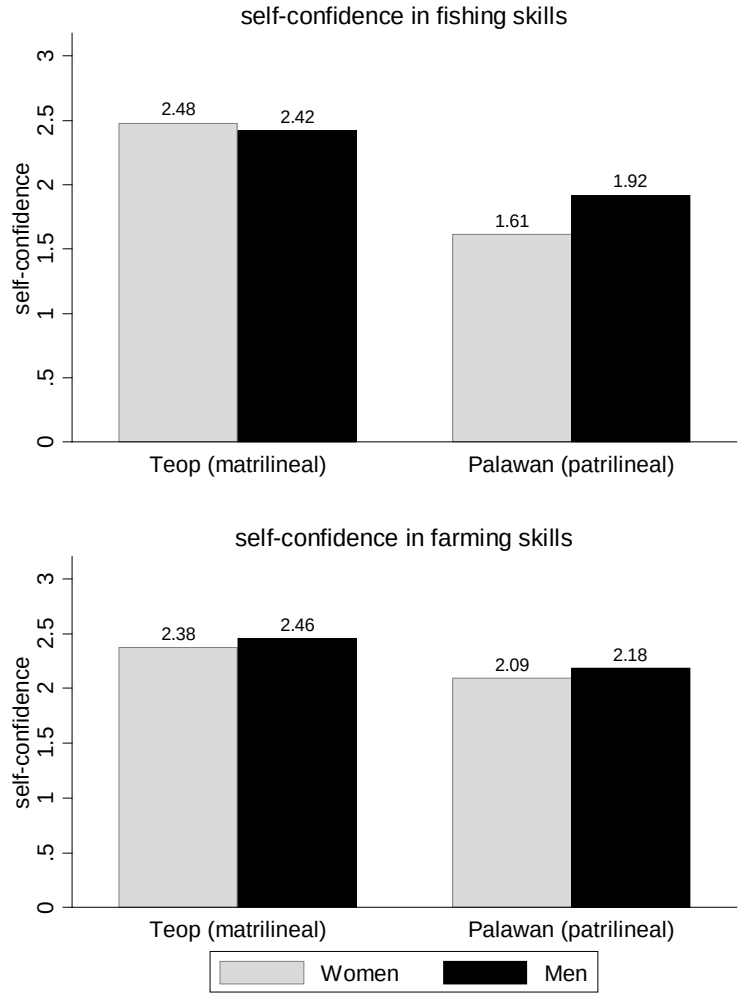

Gambles increase linearly in expected payoff and risk as measured by the standard deviation of expected payoff. Table 3 lists the distribution of gamble choices by sex and society in more detail.

Figure 3: Mean prediction errors for women's and men's gamble choices




The prediction error is defined as the difference between an individual's prediction of the gamble choice of an unidentified subject of a given sex and the average actual gamble choice of that sex. Positive (negative) prediction errors correspond to underestimating (overestimating) the risk aversion of that sex.

Figure 4: Self-confidence in fishing and farming skills




Subjects assessed their fishing and farming skills relative to those of other villagers on a three-point scale as worse (1), about the same (2), or better (3).

## Appendix

### Experimental instructions (for the Teop in Papua New Guinea)

Thank you for participating in this study. Here you have the 5 Kina for answering the questions in the interview you did. This is your money.

Now we will play two small games and ask you some short questions. In the game you can earn some extra money. There is no right or wrong answer in this game and you cannot lose any money. The money will be paid in cash immediately after we have finished. How much money you make depends to a large extend on your choices.

Now I am going to explain you how we play the first game. Please listen carefully and hold your questions until I have finished the explanations.

Part 1: Participant's Pair Selection

We will play the game using 5 different pairs of money-cards.

Please have a look at these pairs of money-cards. As you can see, each pair has different amounts of money on its cards.

Pair number 1 has one card with 4 Kina and another card with 4 Kina.

Pair number 2 has one card with 6 Kina and one card with 3 Kina.

Pair number 3 has one card with 8 Kina and one card with 2 Kina.

Pair number 4 has one card with 10 Kina and one card with 1 Kina.

Pair number 5 has one card with 12 Kina and one card with nothing on it.

You can choose from these 5 different pairs one pair you would like to play. After you have chosen a pair, I will separate the cards and put them into this empty bag and mix them up. After mixing the cards you draw one card from the bag and earn the amount of money which is on the card.

For example, let us consider you would choose pair number ___. I will separate the cards and put them into this empty bag. Now I am going to mix the cards. Then you would draw one card from the bag. In this case you would win ___.

Here is another example, let us consider this time you would choose pair number ___. Again, I will separate the cards and put them into this empty bag. Now I am going to mix the cards. Then you would draw one card from the bag. In this case you would win ___.

So to summarize, the money you earn depends on which pair of money-card you chose and which card you draw from the bag. You are free to choose any of the 5 different pairs of money-cards but only one of them. Now I finished my explanations. Do you have any questions?

Okay, now take your time, look at the pairs, and select the one you would like to play.

Part 2: Participant's Guess

Before we draw your card we will play the second game which is a guessing game. In this game you can also make some extra money.

Here I have two envelopes. Each envelope contains one pair that other people from villages in Teop had chosen to play. They played exactly the same game as you do here with us.

We also asked them which pair out of these 5 different pairs they would like to play. However, these people are not here today and after each game played, I change the pairs in the envelopes.

Inside this envelope there is a pair that a man from Teop had chosen to play. Which pair out of these 5 pairs do you think did this man choose? If your guess is correct you get 1 Kina. Please make your guess.

Inside this envelope there is a pair that a woman Teop had chosen. Which pair out of these 5 pairs do you think did this woman choose to play? If your guess is correct you get another 1 Kina. Please make your guess.

Part 3: Payout

Okay, now we look if your guesses were correct and we will play out the pair that you have chosen. First we compare your guesses with the pairs from the envelopes

Now we are going to play out the pair that you have chosen.

This is the money you have won.

Okay, my assistant will ask you a few questions on your views about some issues. This takes only 5-10 minutes. After finishing the questions you get your money.

Please don't talk about the game with your neighbours or other participants until we are finished the study here. Everyone should have the same chance to make his or her own choice in this game.