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## Common components of risk and uncertainty attitudes across contexts and domains: Evidence from 30 countries

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### **Discussion Paper**

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# Common components of risk and uncertainty attitudes across contexts and domains: evidence from 30 countries

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## Abstract

Attitudes towards uncertainty have been indicated to be highly context-dependent, and to be sensitive to the measurement technique employed. We present data collected in controlled experiments with 2939 subjects in 30 countries measuring uncertainty attitudes through incentivized measures as well as survey questions. Our data show clearly that measures correlate not only within decision context or measurements methods, but also across contexts and methods. This points to the existence of one underlying ‘risk preference’, which influences attitudes independently of the measurement method or choice domain. We furthermore find that answers to a general survey question correlate with incentivized lottery choices in most countries. Much more surprisingly, incentivized and survey measures also correlate significantly *between* countries. This opens the possibility to conduct cultural comparisons on risk attitudes using survey instruments.

**Keywords:** risk attitudes; uncertainty attitudes; context-specificity; experimental methodology;

**JEL-Classification:** D0; D81; C90; J10

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\* Corresponding author. Address: WZB, Reichpietschufer 50, 10785 Berlin, Germany; Tel. +49-(0)30-25491426; Email: [fvieider@gmail.com](mailto:fvieider@gmail.com). Ferdinand Vieider gratefully acknowledges generous financial support from the Excellence Initiative at the University of Munich. The following people provided help with translations and in organizing and running the experiments: Clara Inés Villegas-Palacio, Marta Serra Garcia, Xiangdong Qin, Shuwen Li, Eva Xie, Jing Yu, Haileselassie Medhin, Yoshi Saijo, Takao Kusakawa, Frauke Mattison Thompson, Maria Angélica Naranjo, Francisco Alpizar, Phanith Chou, Phumsith Mahasuweerachai, Nghi Truong, Jiang Chong, Sunday Adewara, Martine Visser, Jolanda Ygosse Battisti, Michal Bauer, Jorge Dresdner, Hrvoje Stojic, Lachlan Deer, Diego Aycinena, Jorge Chang, Ashraf Eid, Lubomir Cingl, Alexis Belianin, Gautam Gupta, Olivier l'Haridon, Daniel Schoch.

## 1. Motivation

Risk and uncertainty attitudes occupy a central position if one wants to understand economic behavior. Attitudes towards risk and uncertainty determine not only investment behavior, but also job choices, education decisions, and social interactions. It thus seems desirable to be able to easily and cost-effectively measure such attitudes. Incentivized measures of risk attitudes are, however, difficult and costly to obtain, which limits their usefulness in large-scale investigations. Survey-based instruments have thus been developed to quickly and cheaply measure self-declared risk attitudes. It remains, however, largely unclear what such survey questions about risk attitudes measure exactly, and to what extent they reflect real decisions under risk and uncertainty.

This question falls into the context of a wider dispute concerning the extent to which there exists one underlying ‘risk preference’, which determines choices across contexts and decision situations. On the one hand, some scholars have proposed that attitudes towards risk (generally designating outcome generating processes with known probabilities) and uncertainty (designating outcome generating processes for which probabilities are unknown or vague) are completely context-dependent, so that preferences measured with lotteries will not bear any relation to attitudes in other contexts, such as driving or the health domain (e.g., Weber, Blais, & Betz, 2002). On the other hand, some scholars have tried to isolate the underlying risk preference from decisions in different domains and contexts, showing that there indeed is some correlation between decisions across different domains (e.g., Einav, Finkelstein, Pascu, & Cullen, 2012).

We address these questions using data from controlled experiments in 30 countries with 2939 subjects. In each country, we obtained certainty equivalents for 44 lotteries or *prospects*, which among other dimensions differed in the domain (gains and losses) and source of uncertainty (known and unknown probabilities; Abdellaoui, Baillon, Placido, & Wakker, 2011). In addition, we elicited subjects’ self-assessed risk attitudes, both in general and across a number of contexts, including sports, the health domain, and social risks. Having obtained incentivized measures across different domains and uncertainty sources, as well as survey measures across different contexts, this allows us to investigate whether there is one common component underlying attitudes towards risk and uncertainty, or whether attitudes are specific to the context, domain, and source of uncertainty. Furthermore, these data permit us to conduct a validation exercise of survey questions to measure risk. We can thus show the extent to which a survey response intended to capture risk attitudes correlates with incentivized measures—still held to be the gold standard in economics—across a variety of countries, thus expanding an earlier validation by Dohmen, Falk, Huffman, Sunde, et al., (2011). Much more importantly, we are the first to analyze this correlation *between* countries at the macro-economic level, which is a very different issue from the within-country individual-level

comparison.

First and foremost, we find elicited attitudes to be correlated across different decision contexts, uncertainty sources (known and unknown probabilities), decision domains (gains versus losses), and elicitation methodologies (lottery choices and survey questions). Especially our index summarizing lottery choices in the gain domain and the general survey question are significant predictors of uncertainty attitudes across all contexts and domains. This points clearly in the direction that there exists one underlying ‘risk preference’ from which answers are derived in different elicitations. In some cases the correlations are, however, only of moderate strength, thus also indicating important differences between the different methods and representations. In terms of correlations with losses, we find that uncertainty averse choices in the gain domain predict uncertainty averse choices in the loss domain. We furthermore find that survey measures of uncertainty attitudes (henceforth understood to include risk as a special case) correlate with incentivized measures in the large majority of countries. We are also the first to show a significant *between-country* correlation of survey measures with incentivized measures. This indicates the possibility to conduct country and cultural comparison using survey instruments, which will allow to scale up such efforts without an explosion in costs.

This paper proceeds as follows. Section 2 provides a more in depth discussion of the issues at stake and the literature. Section 3 describes the experimental setup and questions. Section 4 presents the results. Section 5 provides a discussion of the results and concludes the paper.

## **2. Risk preferences: measurement and underlying components**

The survey question we use in this paper is the one of the German Socio-Economic Panel, *SOEP*. It reads “How do you see yourself: are you generally a person fully prepared to take risks or do you try to avoid taking risks? Please tick a box on the scale, where the value 0 means 'not at all willing to take risks' and the value 10 means 'very willing to take risks'.” This scale has increasingly been deployed over the last few years. For instance, Dohmen, Falk, Huffman, & Sunde (2011) used it to show that risk attitudes are transmitted within the family, with children's risk attitudes correlating with those of parents. Given the clear advantages of this scale over incentivized measures both in terms of costs and ease of deployment, it is likely to be increasingly used to study uncertainty attitudes in representative samples of the population and large-scale surveys. Nevertheless, revealed preferences remain for the time being the gold standard against which all other measurements of uncertainty attitudes must be assessed (Holt & Laury, 2002; Leuermann & Necker, 2011; Smith, 1976). Salient economic incentives in this view are supposed to ensure that subjects only care about the payoffs from their decisions, and that this economic motive overrides other potential motives,

such as pleasing the experimenter or conveying a specific image of oneself.

Beyond the issue of whether hypothetical questions provide a good assessment of risk attitudes, a central issue in the discussion on the relative merit of survey measures concerns what is meant by *risk*. In the literature on decision making, this concept is usually identified with the case of given and objectively known probabilities, such as in roulette wheels (e.g., Abdellaoui, Vossman, & Weber, 2005; Wu & Gonzalez, 1999). This concept, however, is too narrow for most real world processes, which are better characterized as *uncertainty*, where the probabilities of the outcome generating processes are unknown or vague (Knight, 1921). This case is often subsumed under the term “risk” at least in the popular terminology used by non-economists. Far from being a point of mere academic pedantry, this issue is central if one wants to explore the extent to which risk attitudes can be measured with simple survey questions on self-declared risk attitudes. Indeed, people’s attitudes towards uncertainty have been found to depend crucially on the outcome-generating process or *source* of uncertainty (Abdellaoui et al., 2011; Tversky & Fox, 1995).

There is also a more basic question about the extent to which different techniques devised to measure the same underlying preferences do indeed arrive at similar conclusions, or to what extent they differ. This issue is complex, and the answer may differ according to one’s underlying understanding of what attitudes are and how the measurement process may influence them. On the one hand, some people are inclined to think that there is no such thing as a ‘risk preference’ or ‘attitude’, but that such preferences are merely created in the process of eliciting them—a view that is known as the *constructed preference hypothesis* (Slovic, 1995). On the other hand, people who do believe in pre-existing preferences tend to assume that such preferences need to be recovered and that such recovery may be imperfect and depend on the particular elicitation mechanism—a view that is known as the *discovered preference hypothesis* (Cubitt, Starmer, & Sugden, 2001; van de Kuilen, 2007). While the former view is fully consistent with the view of preferences being unrelated across different contexts and domains, the latter is more consistent with a view according to which uncertainty attitudes ought to be correlated across domains and contexts, albeit imperfectly.

The issue of whether different techniques to measure risk attitudes arrive at the same conclusions has recently received increased attention. Dohmen, Falk, Huffman, Sunde, et al. (2011) compared answers to the survey question to incentivized answers to a 50-50 prospect in a representative sample of the German population and found them to be correlated. Lönnqvist, Verkasalo, Walkowitz, & Wichardt (2011) compared the performance of the survey question in terms of intertemporal stability of preferences to that of an incentivized task popularized by Holt & Laury (2002), and found the survey question to perform much better (see also Charness & Viceisza,

2012).

A more general issue is the extent to which there exists a common component underlying risk attitudes across different domains and contexts. This issue is in part raised by studies showing that even similar risk measures obtained within one and the same experimental session often show poor correlations (see Crosetto & Filippin, 2013, for a review of the literature and a discussion). On the other hand, Dohmen, Falk, Huffman, Sunde, et al. (2011) showed that the survey measures correlate quite strongly across different contexts. Einav, Finkelstein, Pascu, & Cullen (2012) used data on real-world employee choices on investment and insurance, and showed that indeed there are some underlying components to choices under uncertainty, with the correlations between the different choices being weakest across domains, i.e. between investment (gain) and insurance (loss) decisions. And using a representative sample of the Dutch population, Choi, Kariv, Müller, & Silverman (2011) showed that violations of common rationality principles are quite low across a large number of choices. There thus appears to be contradictory evidence on the degree to which different behaviors under uncertainty reflect one underlying preference or seem to be completely unconnected.

This is important not least because the predictive power of experimental preference measurements—as well as the extent to which they can be predicted by observable subject characteristics—continues to be fiercely disputed, with very mixed evidence to date. Von Gaudecker, Van Soest, & Wengström (2011) arrive at the conclusion that, while some stable predictors of risk attitudes do exist, most of the individual heterogeneity remains unexplained. Choi, Fisman, Gale, & Kariv (2007) also find large amounts of heterogeneity using a more homogeneous student subject pool. Pennings & Smidts (2000) showed that real world risk averse strategies by Dutch hog farmers is predicted by lottery measures, but not by survey measures (the latter, however, perform better at predicting attitude measurements). Cole, Giné, & Tobacman (2012) even found a more risk averse farmers to be *less* likely to take up insurance in a field experiment in India. Finally, Sutter, Kocher, Rützler, & Trautmann (2012) found no or very weak predictive power of risk attitudes measured with lotteries for risky behavior in children.

### **3. Experimental Setup**

*Subjects.* A total of 2939 subjects participated in 30 countries in controlled experimental sessions. Students were used to guard comparability with typical results from experiments in the West. Subjects were selected at major public universities in the different countries. Care was taken to obtain a subject sample that was balanced in terms of sex and study major (this was not always completely successful; for instance, in Saudi Arabia only males could be recruited because our male



contact was not allowed to interact with female students). In universities with a standing subject pool we only recruited subjects who had participated in less than 3 experiments before, so that they would be similar to subjects in developing countries for whom experiments were new. A table listing the average characteristics of subjects country by country can be found in the appendix.

*Experimental procedures.* Experiments across countries were kept as comparable as possible. The experiment was run in the teaching language of the university, since many countries included in the study are multi-lingual, so that the official teaching language is the only one shared by all students. Instructions were translated from the English and back-translated into English by a different person (Brislin, 1970). Differences were then eliminated by discussion. The payoffs were carefully converted using World Bank PPP data and then double checked using PPP conversion rates calculated from net wages of student assistants at the university where the experiments took place. Vieider (2012) tested explicitly whether small variations in payoffs in the order of  $\pm 20\%$  would make a difference in terms of measured risk attitudes and found none. Also, the experiment was run in two different cities in China—Beijing and Shanghai—and on two different campuses in Addis Ababa, Ethiopia, to determine whether differences found could be ascribed to differences in the subject pool, which would be troubling for an international comparison. No such differences were found once observable subject characteristics were controlled for—for details on the results, see Vieider, Chmura, Fisher, et al. (2012).

*Incentivized Task.* We elicited certainty equivalents (*CEs*) for 44 prospects—a complete list can be found in the appendix. We only used binary lotteries or *prospects*. We will henceforth represent a single prospects as  $\{p: X; Y\}$ , where  $p$  is the probability of winning or losing  $X$ , and  $|X| > |Y|$ . Values will be indicated in PPP Euros—see appendix for conversion factors. Subjects were asked to make a choice between the prospect and different certain amounts of money contained between the two extreme outcomes of the prospect. For gains, the certain amounts increased from the lowest amount that could be won in the prospect to the highest. For losses, the certain amounts decreased from the highest amounts to the lowest. We will henceforth adopt the language for gains. This means that in order for the discussion to be applicable to losses, we need to consider absolute values. For small amounts, subjects will generally choose the prospect, while as the sure amount of money gets larger they will eventually choose the sure amount (and vice versa for losses). This yields a *CE*, that is, a sure amount of money that is considered to be equally good as the prospect. The latter is encoded as the average of the last sure amount for which the prospect was chosen and the first sure amount for which the sure amount was chosen (vice versa for losses). It can serve as a direct measure of

uncertainty aversion (an alternative measure would be the number of save choice, see e.g. Noussair, Trautmann, & van de Kuilen, 2011; using that measure instead does not change our results). An example of such a task for gains is displayed in Figure 1. After completing all the tasks and filling in a questionnaire, one of the decisions was played out for real money. This provides incentives to respond according to one's true preferences and is the standard procedure in the literature (Baltussen, Post, van den Assem, & Wakker, 2012; Bruhin, Fehr-Duda, & Epper, 2010; Cubitt, Starmer, & Sugden, 1998). The experiment took about 1 hour, and the expected payoff was about €15, with a minimum of €4 (the show-up fee) and a maximum of €44.

#### Decision 6

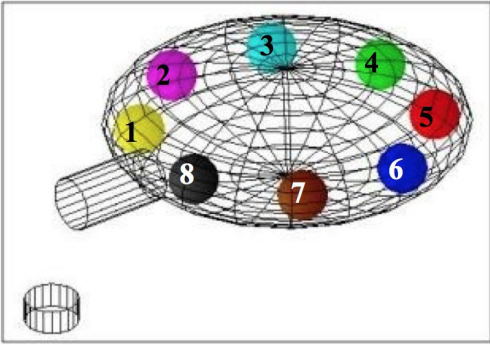
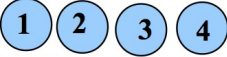
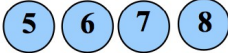
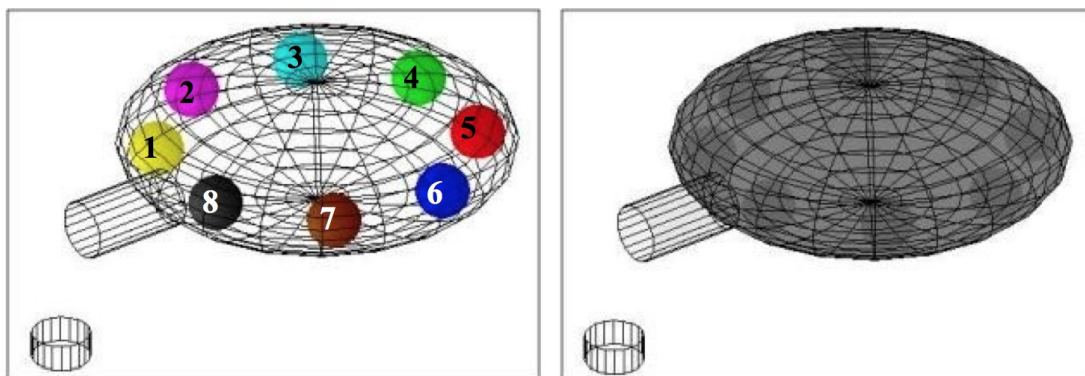
	Lottery	Sure	
	O	O	€ 20.50 for sure
	O	O	€ 21.00 for sure
	O	O	€ 21.50 for sure
	O	O	€ 22.00 for sure
	O	O	€ 22.50 for sure
	O	O	€ 23.00 for sure
	O	O	€ 23.50 for sure
	O	O	€ 24.00 for sure
	O	O	€ 24.50 for sure
	O	O	€ 25.00 for sure
	O	O	€ 25.50 for sure
	O	O	€ 26.00 for sure
	O	O	€ 26.50 for sure
Win € 30 if one of the following balls is extracted:	O	O	€ 27.00 for sure
	O	O	€ 27.50 for sure
	O	O	€ 28.00 for sure
Win € 20 if one of the following balls is extracted:	O	O	€ 28.50 for sure
	O	O	€ 29.00 for sure
	O	O	€ 29.50 for sure

Figure 1: Example of CE elicitation task

*Task characteristics and terminology.* The 44 tasks were distributed across different categories and domains. By decision domain we mean that choices were framed either as gains or as losses (plus one mixed prospects over gains and losses, which is not used here and which will not be mentioned further). Losses always came in a second part and took place from an endowment. Etchart-Vincent & l'Haridon (2011) tested whether decisions from an endowment are different from decisions involving real or hypothetical losses and found no differences. In each of the two domains, we had tasks with known probabilities, which we call *risky*; and decisions involving unknown probabilities, which we call *uncertain*. Notice how the latter is different from *ambiguity* (Ellsberg, 1961), which is given by the difference between choices under risk and under uncertainty, and which is not

discussed here (see e.g. Trautmann & Zeckhauser, 2013, for this use of terminology). The tasks were always kept in the same order, starting with risky gains and then uncertain gains; and in a second part, risky losses followed by uncertain losses. A large-scale pilot with 330 subjects showed that such a fixed ordering was less demanding for subjects, while not significantly affecting the measures used in this paper (results available upon request). In the implementation of both risk and uncertainty we closely followed the design by Abdellaoui, Baillon, Placido, & Wakker (2011). Figure 2 shows the urns used for visual display. In the experiment, the urns were not called risky or uncertain, but rather “transparent” and “opaque”. Concerning the risky urn, subjects simply learned that the urn contained exactly eight balls, numbered from 1 to 8 inclusive. About the uncertain urn they were told: “you cannot see what numbers the balls contained in the urn have. This means that you do not know the exact numbers that are present in that urn. All balls bear a number between 1 and 8 inclusive (have either 1 , 2 , 3 , 4 , 5 , 6 , 7 , or 8 written on them), but it is possible that some numbers are absent from this urn while others occur repeatedly. Thus you do not know the exact composition of the urn.” An extract of the instructions can be found in the appendix. Complete instructions in several languages are available for download at [www.ferdinandvieder.com/instructions.html](http://www.ferdinandvieder.com/instructions.html) .



**Figure 2: visual display of urns; risky or “transparent” urn (left) and uncertain or “opaque” urn (right)**

*Questionnaire tasks.* In addition to the incentivized tasks, subjects were asked a series of questions on their self-declared uncertainty attitudes. These questions were taken from the SOEP. Subjects were asked about their “willingness to take risks in general”, and had to indicate their answer on a scale ranging from 0 (“risk averse”) to 10 (“fully prepared to take risks”). The question was also asked for risk taking in specific contexts—driving, financial matters, the health domain, occupational risks, sports, and social risks (Dohmen, Falk, Huffman, & Sunde, 2010, 2011; Dohmen, Falk, Huffman, Sunde, et al., 2011). These questions were always presented in the final questionnaire. They were presented towards the end of the questionnaire, after subjects had

responded to a number of questions on demographics, as well as to some questions on cultural orientation. This makes it unlikely that subjects just answered in a way as to match their responses to the incentivized measures. This is indeed also apparent from the choices themselves—see discussion for further evidence.

## 4. Results

We present the results in two parts. The first part compares the general survey measure to incentivized data on risk taking for gains both within the different countries and across countries. It also compares different types of indices for the incentivized measures. The second part looks at correlations between different measures of uncertainty attitudes. In addition to the measures used in part 1, we will introduce a number of new measures, including context-specific survey questions and incentivized measures for uncertainty and for losses. Finally, we will explore the extent to which the different measures can be explained by the same independent variables.

### 4.1 Validation of survey measure

We start by looking at different scales and their correlations country by country. This addresses the issue of whether the correlation between a survey measure and incentivized measures holds in different countries or whether it is culture-dependent. Table 1 presents the average (together with its 95% confidence interval) of the general survey measure, and compares it to three different incentivized measures. The latter are constructed as the *risk premium*, given by the expected value of a prospect minus the certainty equivalent for that same prospect (EV-CE). We use three different incentivized measures: the risk premium for the 50-50 prospect offering €20 or nothing; the median risk premium over the 14 prospects involving risky gains; and the average risk premium per subject over the 14 prospects involving risky gains. We included the 50-50 prospect insasmuch as it is the measure closest to the one used by Dohmen, Falk, Huffman, Sunde, et al. (2011) in their validation exercise. The median is included as it may provide a more stable indicator of risk attitudes than any single CE. Finally, the mean summarizes attitudes over the probability space and across all prospects used. Since the survey questions asks for the “risk attitude in general”, this is the index that in our opinion reflects such general attitudes most closely for the incentivized measures.

We start by discussing the correlation between the survey measure and the different incentivized measures. We first consider correlations with the single 50-50 prospect (analogous correlations for all the 14 CEs for risky gains separately are reported in the appendix). One can see immediately that—although the correlation goes in the expected direction in all countries but two—the strength of the correlation varies widely, and it is significant in only 4 out of our 30 countries at the 5% level, plus 2 countries at the 10% level. The disadvantage of this single measure, however, is that it may capture relatively high noise levels, since people may make mistakes in their choices or even have uncertainty intervals in their preferences.

**Table 1: country level summary data and correlations; #  $p < 0.10$ , \*  $p < 0.05$ , \*\*  $p < 0.01$ , \*\*\*  $p < 0.001$**

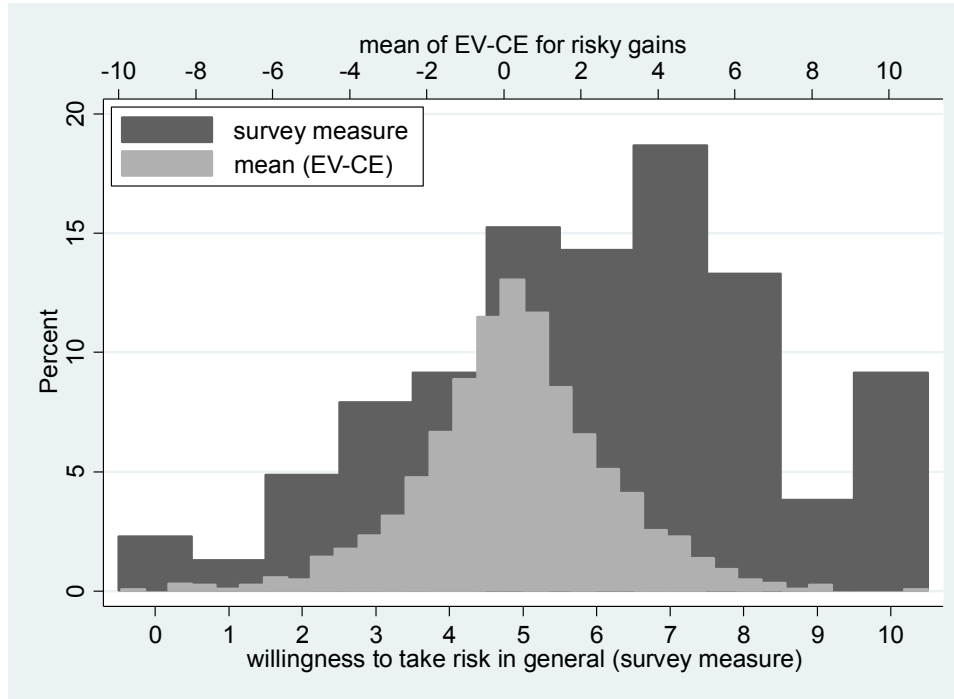
	Nr.	survey mean			CI (95%)			EV-CE {0.5: 20; 0}			CI (95%)			corr	median (EV-CE)			CI (95%)			corr	mean (EV-CE)			CI (95%)			corr
Australia	61	5.90			[5.41,	6.39]		0.95			[0.22	1.69]		-0.194	1.13			[0.51	1.75]		-0.330**	1.18			[0.54	1.81]		-0.315*
Belgium	91	4.84			[4.46	5.21]		0.71			[0.04	1.37]		-0.141	0.46			[0.09	0.84]		-0.162	0.60			[0.19	1.00]		-0.196#
Brazil	84	5.51			[5.03	5.99]		-0.11			[-0.83	0.62]		-0.311**	0.05			[-0.37	0.46]		-0.326**	0.05			[-0.42	0.51]		-0.324**
Cambodia	80	4.15			[3.60	4.70]		-0.40			[-1.38	0.58]		-0.142	-0.61			[-1.13	-0.09]		-0.171	-0.54			[-1.13	0.04]		-0.227*
Chile	96	6.01			[5.64	6.38]		0.94			[0.11	1.77]		0.005	0.90			[0.44	1.36]		-0.019	0.98			[0.49	1.47]		-0.011
China	204	5.20			[4.91	5.50]		0.64			[0.29	1.00]		-0.053	0.48			[0.25	0.71]		-0.120#	0.50			[0.26	0.74]		-0.157*
Colombia	128	6.62			[6.30	6.94]		1.24			[0.67	1.81]		-0.062	0.66			[0.25	1.07]		-0.164#	0.59			[0.18	1.00]		-0.249**
Costa Rica	108	6.42			[6.02	6.81]		0.90			[0.19	1.60]		-0.146	0.68			[0.24	1.12]		-0.204*	0.75			[0.30	1.19]		-0.220*
Czech Rep.	99	5.09			[4.65	5.53]		0.59			[0.10	1.09]		-0.236*	0.60			[0.29	0.91]		-0.219*	0.67			[0.35	0.99]		-0.251*
Ethiopia	140	5.73			[5.20	6.26]		-0.96			[-1.64	-0.29]		-0.156#	-0.69			[-1.12	-0.25]		-0.128	-0.77			[-1.23	-0.31]		-0.146#
France	93	5.87			[5.50	6.25]		0.88			[0.22	1.54]		-0.157	0.63			[0.18	1.08]		-0.169	0.73			[0.25	1.21]		-0.185#
Germany	130	5.04			[4.70	5.38]		1.15			[0.53	1.78]		-0.060	1.00			[0.63	1.38]		-0.252**	1.22			[0.83	1.61]		-0.287***
Guatemala	84	7.04			[6.65	7.42]		0.49			[-0.65	1.64]		-0.103	0.08			[-0.51	0.67]		-0.235*	0.05			[-0.56	0.66]		-0.241*
India	89	5.42			[4.90	5.93]		2.09			[1.25	2.92]		-0.075	1.28			[0.71	1.85]		-0.163	1.41			[0.81	2.01]		-0.157
Japan	84	3.98			[3.49	4.46]		1.01			[0.48	1.55]		-0.385***	0.41			[0.01	0.82]		-0.421***	0.58			[0.15	1.00]		-0.406***
Kyrgyzstan	97	6.46			[6.05	6.88]		0.07			[-0.63	0.78]		-0.105	0.09			[-0.30	0.48]		-0.189#	0.13			[-0.30	0.56]		-0.203*
Malaysia	64	5.77			[5.27	6.26]		-0.42			[-1.26	0.41]		-0.214#	-0.08			[-0.66	0.51]		-0.394**	-0.01			[-0.64	0.63]		-0.420***
Nicaragua	120	7.81			[7.40	8.22]		-1.55			[-2.62	-0.47]		-0.089	-1.03			[-1.55	-0.51]		-0.121	-0.95			[-1.48	-0.42]		-0.129
Nigeria	202	7.46			[7.03	7.88]		-0.55			[-1.38	0.28]		-0.099	-0.37			[-0.82	0.07]		-0.162*	-0.41			[-0.87	0.05]		-0.176*
Peru	95	7.12			[6.73	7.51]		0.26			[-0.66	1.17]		-0.035	-0.65			[-1.22	-0.09]		-0.168	-0.66			[-1.25	-0.07]		-0.220*
Poland	89	5.72			[5.27	6.17]		1.20			[0.57	1.83]		-0.067	0.69			[0.28	1.11]		-0.089	0.79			[0.36	1.22]		-0.168
Russia	70	5.89			[5.44	6.33]		0.52			[-0.15	1.19]		-0.161	0.60			[0.12	1.08]		-0.197	0.60			[0.12	1.09]		-0.217#
Saudi Arabia	65	5.78			[5.35	6.21]		-0.80			[-1.53	-0.06]		-0.068	-0.98			[-1.45	-0.51]		-0.184	-0.95			[-1.44	-0.45]		-0.140
South Africa	71	5.77			[5.24	6.31]		1.37			[0.56	2.18]		0.132	0.87			[0.32	1.42]		0.036	0.82			[0.25	1.39]		0.028
Spain	80	5.84			[5.40	6.28]		0.47			[-0.10	1.04]		-0.076	0.62			[0.25	0.99]		-0.190#	0.65			[0.24	1.05]		-0.193#
Thailand	79	5.89			[5.37	6.40]		0.83			[-0.14	1.79]		-0.249*	0.37			[-0.18	0.92]		-0.351**	0.42			[-0.14	0.98]		-0.352**
Tunisia	74	6.38			[5.76	7.00]		0.80			[-0.15	1.76]		-0.030	0.35			[-0.19	0.89]		-0.121	0.43			[-0.16	1.03]		-0.051
UK	80	5.81			[5.41	6.21]		-0.96			[-1.69	-0.23]		-0.129	-0.27			[-0.66	0.13]		-0.268*	-0.38			[-0.80	0.05]		-0.283*
USA	97	5.87			[5.45	6.28]		1.46			[0.92	1.99]		-0.106	0.86			[0.54	1.17]		-0.054	0.99			[0.65	1.33]		-0.031
Vietnam	87	6.77			[6.34	7.20]		-0.12			[-0.79	0.55]		-0.147	-0.13			[-0.54	0.28]		-0.204#	-0.09			[-0.52	0.34]		-0.154
All countries:	2939	5.96			[5.88	6.05]		0.39			[0.25	0.53]		-0.131***	0.38			[0.30	0.49]		-0.198***	0.39			[0.28	0.48]		

To avoid this problem, we can use aggregate measures at the subject level of choices across all 14 gain prospects under risk. This also seems to be a more appropriate measure, given that we are trying to find a correlation with the answer to a question on how willing people are to take risks *in general*, which may thus include different probability and outcome levels. We start by looking at the median risk premium for the 14 prospects. We see immediately that this measure is more correlated with the general risk question—indeed it is significant at the 5% level in 11 out of 30 countries (plus 5 at the 10% level), and goes in the wrong direction in only 1. The best-performing measure, however, is the mean of the 14 risk premia at the subject level. It correlates significantly with the survey question in 16 out of 30 countries at the 5% level and in an additional 5 countries at the 10% level (two-sided). It also shows the highest overall correlation across all countries ( $r = -0.21$  versus  $r = -0.20$  for the median and  $r = -0.13$  for the single 50-50 prospect, all  $p < 0.001$ ). Since it is also the most theoretically justifiable measure, given how it assigns the same weight to all the decisions, we will use this as our principal measure in the following sections.

Before moving on, however, it may be instructive to also look at the absolute values of the different indices. For our typical Western country (except for the UK) the CE is lower than the EV, which is reflected in a positive risk premium and indicates risk aversion. In some developing countries the value is negative, indicating risk seeking—this is discussed extensively by Vieider, Chmura, & Martinsson (2012). The median and mean follow a very similar pattern, except that in general the mean of the risk premium is somewhat larger than the median of the same difference ( $z = 4.045$ ,  $p = 0.0001$ , signed rank test). This is due to the fact that for small probabilities and small monetary amounts, people tend to be risk seeking (Abdellaoui, 2000; Kahneman & Tversky, 1979; Prelec & Loewenstein, 1991). The mean response to the survey question, on the other hand, mostly falls above the mid-points of the scale (5), even in countries that are risk averse according to the incentivized measures.

Figure 3 shows the distribution of answers to the survey question compared to the distributions of the mean risk premium for all countries jointly (country by country graphs as well as the corresponding graphs for the median and 50-50 prospect are shown in the appendix). The answer to the survey question is clearly skewed to the right. While the mode of the risk premium is found at 0 (the midpoint on the scale indicating risk neutrality), the mode of the willingness to take risk is at 7, and thus clearly above the midpoint of the scale (5). It remains somewhat unclear why this happens. This could be due to a general tendency to answer to the right of the scale, or a tendency towards self-reported optimism, given that risk seeking may be seen as the more optimistic strategy. It could also be that the median subject—who is risk neutral for the incentivized measure—considers that risk averse subjects will answer at the middle of the scale, and thus shifts

farther to the right to reflect this difference. A second anomaly that stands out is the peak at 10, the highest number on the scale, indicating very high risk acceptance. A look at country by country distributions indicates that this extreme peak is driven mostly by some countries that are indeed very risk seeking also using incentivized measures, in particular Nicaragua and Nigeria, and to a lesser degree, Ethiopia, Vietnam, and Peru.



**Figure 3: global distribution of risk preferences, survey and CEs**

Coming back to the relation between the different indices, we next test the robustness of the correlations discussed above. Table 2 shows an OLS regression for the three incentivized measures, using the survey measure as an independent variable. We then add controls such as biological characteristics (sex and age) and country fixed effects. The correlation can be seen to be very stable and highly significant for all our incentivized measures.

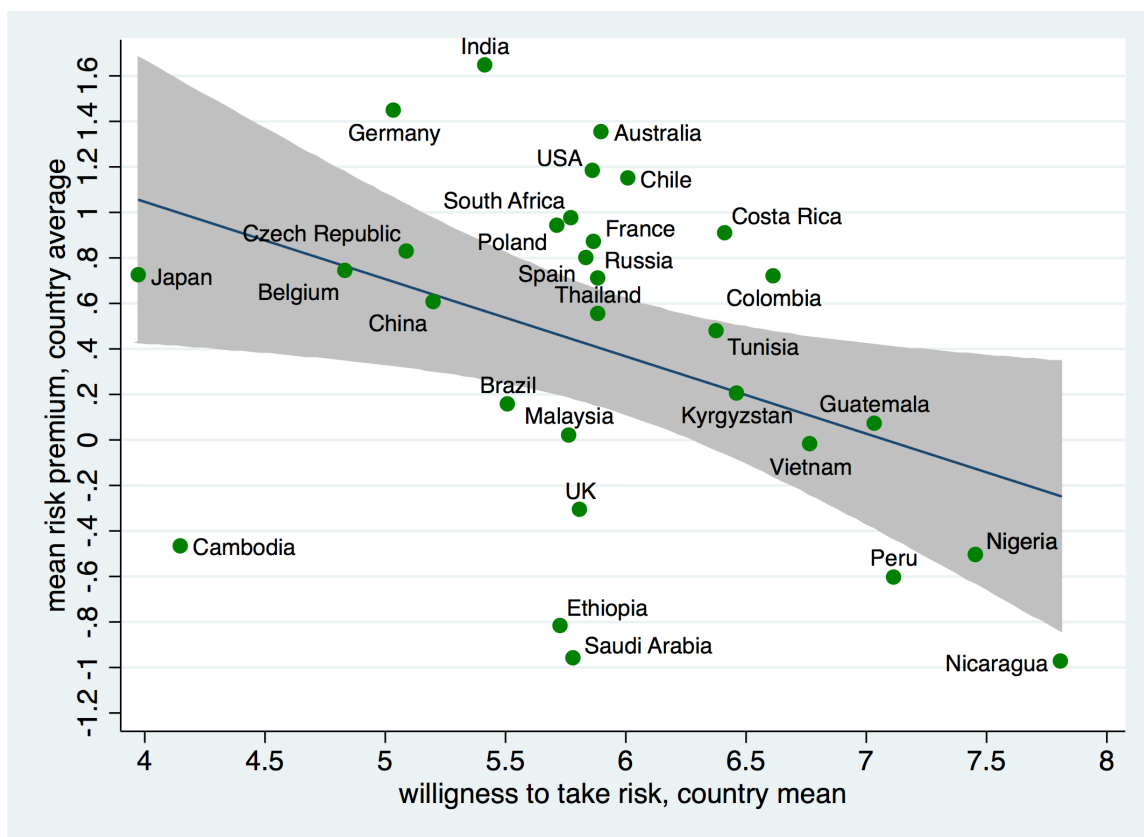
**Table 2: stability analysis of correlation between general survey measure and incentivized measures**

	EV-CE {0.5; 20; 0}		median(EV-CE)		mean(EV-CE)	
	I	II	I	II	I	II
risk perception	-0.200*** (0.030)	-0.187*** (0.032)	-0.181*** (0.018)	-0.174*** (0.019)	-0.206*** (0.019)	-0.196*** (0.020)
biological factors	YES	YES	YES	YES	YES	YES
study major	NO	YES	NO	YES	NO	YES
country fixed effects	NO	YES	NO	YES	NO	YES
constant	1.477*** (0.252)	2.298*** (0.486)	1.290*** (0.149)	1.925*** (0.284)	1.492*** (0.156)	2.262*** (0.297)
N	2939	2939	2939	2939	2939	2939
R <sup>2</sup>	0.021	0.065	0.048	0.109	0.056	0.115

Standard errors in parentheses.; # p < 0.10, \* p < 0.05, \*\* p < 0.01, \*\*\* p < 0.001.



The logical next step will be to look at a between-country comparison of the measures. Indeed, the fact that the correlation works within most countries and at the individual level does not guarantee that it will work between countries. Cultural factors may affect responses on the survey questions differently than they affect incentivized measures. It is important to stress once again how in this paper we are not interested in what describes between country differences, but rather in the extent to which different measurement methods will yield similar results. Since we are purely talking about country-level results, we take the average at the country level. Figure 4 shows the relation between the average survey measure in the different countries and the corresponding averages of the mean risk premium. The two are significantly correlated ( $r = -0.38$ ,  $p=0.034$ ,  $N=30$ ). We thus conclude that the survey measures correlates with our incentivized measurements quite well, and both at the individual and at the country level.



*Figure 4: Between country correlation of survey measure with average EV-CE*

#### 4.2 Context-specificity versus common components in risk attitudes

We have so far focused only on risk, i.e. given probabilities, and on the gain domain in terms of our incentivized measures. Also, we have only considered the answer to the general, neutrally framed, question on willingness to take risk. We now abandon these restrictions and add our incentivized

data on uncertainty, i.e. unknown probabilities, and on losses, as well as the survey questions on specific contexts (summary statistics of these measures can be found in the appendix). This will allow us to address the question of the extent to which uncertainty preferences correlate not only across different elicitation methods, but also across different domains, different probability representations, and different contexts.

Table 3 reproduces the correlation matrix for all subjects across the different countries. The correlations can be seen to vary widely, from a correlation of 0.73 between gains under risk and under uncertainty, to close to zero and nonsignificant. A few clear trends do, however, emerge. For instance, the mean risk premium for risky gains correlates significantly with all other measures, be they incentivized or survey-based, and under both gains and losses. The correlation is strongest with the incentivized measure for uncertain gains, followed by the survey questions on willingness to take risk in general, financial risks, and occupational risks. The correlation is weakest with willingness to take risks in sports and with other people. There is also a highly significant and non-negligible correlation with decisions for losses. The latter goes in the direction that people who are more willing to take risks in the gain domain are generally also more willing to take risks in the loss domain (the EV-CE is here best thought of as an *insurance premium*—the larger the difference, the more people are willing to insure, and the more risk averse they thus are).

A second measure that correlates with all other measures is the survey question on willingness to take risks in general. This measure correlates relatively strongly with most of the other survey measures, as well as with the incentivized measures over gains. It performs less well with the incentivized measures over losses. This finding runs counter to the argument that responses to the survey measures may have been influenced by previous choices in the incentivized tasks. Since losses were always presented after gains, we would expect responses to the survey question to be influenced rather by the responses to the loss questions than the gain questions if this were the case. As we can see it is not. By and large, we can conclude that most measures show a highly significant correlation with most other measures, pointing in the direction that there exists some underlying general component of risk attitudes that is picked up by all the different measures. The strength of the correlations follows closely the ones observed in Germany by Dohmen, Falk, Huffman, Sunde, et al. (2011). The correlations between gain and loss measures are somewhat stronger than the correlations found between employer-provided investment and insurance decisions by Einav, Finkelstein, Pascu, & Cullen (2012).

**Table 3: Correlations between different risk measures, global**

	EV-CE risky gains	EV-CE uncertain gains	EV-CE risky losses	EV-CE uncertain losses	general survey question	driving risk question	financial risk question	sport risk question	occupation risk question	health risk question	people risk question
EV-CE risky gains	1										
EV-CE uncertain gains	0.725***	1.000									
EV-CE risky losses	0.141***	0.173***	1.000								
EV-CE uncertain losses	0.185***	0.251***	0.732***	1.000							
general survey question	-0.215***	-0.218***	-0.085***	-0.073***	1						
driving risk question	-0.101***	-0.098***	0.000	0.022	0.280***	1					
financial risk question	-0.206***	-0.204***	-0.047*	-0.020	0.492***	0.438***	1				
sport risk question	-0.068***	-0.050**	-0.022	-0.037*	0.327***	0.328***	0.306***	1			
occupation risk question	-0.136***	-0.124***	-0.020	-0.018	0.424***	0.396***	0.474***	0.407***	1		
health risk question	-0.044*	-0.031 <sup>#</sup>	0.000	0.008	0.169***	0.424***	0.277***	0.280***	0.390***	1	
Social risk question	-0.043*	-0.055**	0.035 <sup>#</sup>	0.028	0.239***	0.201***	0.225***	0.252***	0.322***	0.316***	1

<sup>#</sup>  $p < 0.10$ , \*  $p < 0.05$ , \*\*  $p < 0.01$ , \*\*\*  $p < 0.001$

We now proceed to running regressions with the different measures of uncertainty attitudes to determine to what extent they share the same correlates. For reasons of comparability we use OLS regressions throughout (using interval regression or ordered probit instead does not change our results). The results are presented in table 4. Each regression includes a number of predictors, which fall into three categories. Biological predictors, specifically sex and age; the study major of the subject, measured relative to economics students; and macroeconomic factors, such as GDP per capita (measured as the difference in the log of GDP per capita in 2011 relative to the US, so that the measure indicates relative poverty) and the Gini coefficient (as a proxy for the income inequality in a country, again measured as the difference from the US).<sup>g</sup> We also add a dummy indicating whether somebody is a foreigner, plus an interaction of this dummy with the GDP variable.

Gender effects are commonly found for risk preferences, with women generally more risk averse than men (Croson & Gneezy, 2009; Eckel & Grossman, 2008). We confirm this effect for our incentivized measures for gains, but not for losses. In terms of the survey measure, we again find a gender effect for most contexts. The exceptions to this rule are the health context and the social context, where the gender effect is not significant. We find only weak (and inconsistent) effects in terms of age, although this is not surprising given the narrow age range of our subjects. Moving on to study majors, we find an interesting tendency amongst mathematics and natural science majors, who generally declare themselves to be less risk taking than economists in the survey questions, while in incentivized measures they take at least as much risk. In addition, students of the humanities and of the social sciences other than economics tend to have a lower risk acceptance, although this effect is only significant for some of the measures. One of the strongest effects is observed for the per capita income measure. Subjects from countries with lower GDP per capita are more willing to accept uncertainty for the incentivized measure, in terms of gains and losses, risk and true uncertainty. The same effect is also found for the general survey question, occupational risks, and financial risks. For sports it goes in the opposite direction, with people from richer countries declaring themselves more willing to take risks. The effect is not significant in terms of driving risks, health risks, and social risks. In addition, we find strong effects of the Gini coefficient—a proxy for income inequality in a country—on declared risk taking, but not on revealed risk taking. There are no consistent effects across different measures of being a foreigner in a country, or on the interaction between being a foreigner in a country and its GDP.

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<sup>g</sup> We also estimate specification with country fixed effects instead of macroeconomic factors. These do not change our main results. The macroeconomic data are taken from data tables published by the World Bank.

*Table 4: regression analysis, gains*

	Mean (EV-CE) risky gains	Mean (EV-CE) uncertainty gains	Mean (EV- CE) risky losses	Mean (EV- CE) uncertainty losses	General risk question	Driving risks	Financial risks	Sport risks	Occupational risks	Health Risks	Social risks
<b>male</b>	-0.533*** (0.091)	-0.752*** (0.118)	0.020 (0.087)	-0.052 (0.116)	0.594*** (0.088)	0.518*** (0.119)	0.718*** (0.099)	0.540*** (0.101)	0.215* (0.105)	0.125 (0.114)	-0.028 (0.111)
<b>age</b>	0.009 (0.013)	-0.001 (0.017)	-0.015 (0.013)	-0.050** (0.017)	0.026* (0.013)	-0.012 (0.017)	0.024# (0.014)	-0.047** (0.015)	0.025# (0.015)	0.000 (0.017)	-0.014 (0.016)
<b>math</b>	0.140 (0.127)	0.192 (0.166)	-0.007 (0.122)	0.006 (0.163)	-0.133 (0.123)	-0.562*** (0.168)	-0.699*** (0.139)	-0.395** (0.142)	-0.266# (0.148)	0.113 (0.160)	0.054 (0.157)
<b>natural</b>	0.345# (0.184)	0.359 (0.239)	0.120 (0.176)	0.054 (0.235)	-0.574** (0.178)	-0.651** (0.243)	-0.858*** (0.201)	-0.491* (0.204)	-0.235 (0.212)	-0.135 (0.232)	-0.446* (0.226)
<b>medicine</b>	0.023 (0.287)	0.185 (0.374)	0.216 (0.275)	0.177 (0.367)	-0.056 (0.278)	-0.221 (0.377)	-0.349 (0.312)	-0.072 (0.317)	-0.293 (0.334)	0.209 (0.360)	0.350 (0.351)
<b>social science (not econ)</b>	0.520** (0.165)	0.350 (0.214)	0.010 (0.158)	-0.028 (0.210)	0.162 (0.159)	-0.160 (0.217)	-0.367* (0.180)	0.113 (0.183)	0.065 (0.190)	0.192 (0.207)	0.358# (0.202)
<b>humanities</b>	0.472* (0.201)	0.334 (0.262)	-0.158 (0.193)	0.241 (0.258)	0.091 (0.195)	-0.597* (0.265)	-0.762*** (0.220)	0.029 (0.223)	-0.073 (0.232)	0.307 (0.253)	0.145 (0.247)
<b>arts</b>	-0.081 (0.234)	-1.026*** (0.305)	-0.541* (0.224)	-0.756* (0.299)	0.089 (0.226)	-0.410 (0.308)	0.330 (0.257)	-0.714** (0.260)	-0.039 (0.271)	0.118 (0.296)	0.299 (0.287)
<b>study_other</b>	0.377** (0.144)	0.058 (0.187)	0.063 (0.138)	0.088 (0.184)	0.224 (0.139)	-0.353# (0.190)	-0.181 (0.157)	-0.123 (0.160)	-0.140 (0.166)	0.106 (0.181)	0.169 (0.177)
<b>GDP per head (diff. from US)</b>	-0.358*** (0.044)	-0.618*** (0.058)	-0.375*** (0.042)	-0.438*** (0.057)	0.355*** (0.043)	0.068 (0.059)	0.468*** (0.048)	-0.092# (0.049)	0.156** (0.051)	-0.056 (0.056)	0.053 (0.054)
<b>Gini index</b>	-0.206 (0.481)	0.080 (0.627)	-0.007 (0.461)	0.926 (0.615)	2.149*** (0.466)	2.176*** (0.635)	3.452*** (0.525)	1.725** (0.533)	1.432* (0.556)	-1.099# (0.605)	1.133# (0.590)
<b>foreigner</b>	-0.540# (0.283)	-0.574 (0.369)	-0.345 (0.271)	-0.346 (0.362)	0.341 (0.274)	-0.503 (0.375)	-0.009 (0.311)	-0.357 (0.316)	-0.325 (0.329)	-0.928** (0.357)	-0.310 (0.350)
<b>foreigner*gdp</b>	0.688* (0.283)	0.986** (0.368)	0.314 (0.271)	0.431 (0.361)	-0.290 (0.274)	0.476 (0.372)	-0.247 (0.308)	-0.001 (0.313)	0.282 (0.326)	0.534 (0.355)	0.048 (0.347)
<b>constant</b>	0.910*** (0.134)	2.891*** (0.175)	0.391** (0.129)	1.311*** (0.172)	5.041*** (0.130)	3.449*** (0.177)	3.648*** (0.147)	6.726*** (0.149)	5.110*** (0.155)	3.391*** (0.169)	4.914*** (0.165)
<i>N</i>	2939	2939	2939	2939	2939	2904	2908	2909	2901	2911	2912
<i>R</i> <sup>2</sup>	0.05	0.07	0.03	0.03	0.06	0.02	0.09	0.02	0.01	0.01	0.01

Standard errors in parentheses; #  $p < 0.10$ , \*  $p < 0.05$ , \*\*  $p < 0.01$ , \*\*\*  $p < 0.001$

#### 4. Discussion and conclusions

From the results we can clearly conclude that survey instruments aimed at measuring risk attitudes do correlate with decisions in which real money is at stake. This does not only work within most of our 30 countries, but also at the macroeconomic level across countries—an encouraging finding that may lead the way for the use of survey measures in cross country comparisons of the uncertainty attitudes of general population samples. While the relative rankings of subjects obtained through the different measurements thus seem to be coherent at least to some degree, the absolute position on the different risk scales differs considerably. This, however, may not be surprising, nor does it necessarily constitute a problem. Even incentivized scales do not produce absolute rankings that are impervious to changes in elicitation, given that they have been found to be highly sensitive to the monetary stakes used (Binswanger, 1980; Kachelmeier & Shehata, 1992; Lefebvre, Vieider, & Villeval, 2010).

Another interesting insight derives from the correlation analysis of the various measures. Psychologists have generally concluded that uncertainty attitudes are context-specific, and that there exists no relation of uncertainty attitudes in one context to uncertainty attitudes in another (Weber et al., 2002). Economists, on the other hand, have tended to emphasize the underlying component common to choices across different contexts and domains (Dohmen, Falk, Huffman, Sunde, et al., 2011; Einav et al., 2012). Our results tend to support the latter view—we found uncertainty attitudes to be clearly related across most contexts and domains. Perhaps, however, it is wrong to think about the issue in a bipolar fashion, since it rather appears to be a matter of degree. Given our results, many scholars might still counter that the correlations found are rather weak, and preferences thus highly context-dependent. On the other hand, the correlations are highly significant and appear to be stable; and most measures present the same correlates in regressions, further indicating a common underlying component constituting uncertainty attitudes.

Finally, the existence of some underlying element of uncertainty attitudes allows us to address a more philosophical question on the existence of stable preferences. Slovic (1995) proposed three possible views on the nature of values and preferences in general: i) they exist a priori and are perfectly reported when elicited; ii) they do exist a priori, but will be reported only imperfectly when elicited, depending on the method used and possibly the context to which they are applied (*discovered* preference hypothesis); and iii) they are constructed during elicitation and may hence completely depend upon the particular circumstances of the elicitation method (*constructed* preference hypothesis). He indicated the last one to be most likely (see also Ariely, Loewenstein, & Prelec, 2003, 2006). Cubitt et al. (2001) and van de Kuilen (2007) lean towards the discovered preference hypothesis in applications of decision making under risk (see also Plott, 1996). The

underlying component to uncertainty attitudes elicited with different methodologies, across different domains, and in different contexts, clearly point to the conclusion that there does exist some fundamental ‘uncertainty attitude’. We thus conclude that preferences are indeed discovered and derived from an underlying preference, rather than constructed *ex nihilo*.

## Appendix A: Subject characteristics country by country

Country	Sub.s	age	female	econ	math	natural	hum	arts	social	PPP rate/€	Language
Australia	61	22	32%	26%	15%	15%	10%	6%	3%	2 AUD	English
Belgium	91	20	55%	41%	6%	10%	7%	3%	13%	€ 1	French
Brazil	84	21	40%	99%	1%	0%	0%	0%	0%	2 Real	Portuguese
Cambodia	80	21	51%	0%	21%	24%	13%	18%	18%	1500 Riel	Khmer
Chile	96	21	49%	5%	22%	13%	3%	14%	7%	500 Pesos	Spanish
China	204	21	39%	13%	45%	18%	8%	1%	6%	4 RMB	Chinese
Colombia	128	21	50%	6%	80%	5%	3%	2%	1%	1500 Pesos	Spanish
Costa Rica	106	22	35%	31%	20%	13%	1%	2%	14%	500 Colones	Spanish
Czech Rep.	99	22	40%	51%	11%	5%	11%	4%	10%	20 Kronas	Czech
Ethiopia	140	21	31%	59%	10%	8%	2%	0%	9%	6 Birr	English
France	93	21	49%	47%	6%	15%	4%	4%	3%	€ 1	French
Germany	130	25	47%	12%	39%	9%	14%	0%	3%	€ 1	German
Guatemala	84	21	45%	34%	18%	0%	12%	4%	13%	6 Quetzales	Spanish
India	89	21	69%	71%	0%	2%	11%	10%	3%	22 Rupees	English
Japan	84	22	49%	10%	42%	11%	11%	0%	5%	120 Jen	Japanese
Kyrgyzstan	97	19	52%	64%	0%	0%	6%	0%	29%	24 KGS	Russian
Malaysia	64	20	38%	58%	19%	6%	0%	2%	5%	2 Ringgit	English
Nicaragua	120	21	41%	92%	3%	0%	0%	0%	0%	10 Còrdobas	Spanish
Nigeria	202	22	50%	44%	0%	1%	3%	29%	12%	110 Naira	English
Peru	95	23	47%	42%	37%	0%	1%	0%	4%	2 N. Soles	Spanish
Poland	89	24	47%	42%	8%	7%	17%	0%	12%	2.4 Zloty	Polish
Russia	70	20	50%	73%	13%	0%	10%	0%	1%	22 Rubles	Russian
Saudi Ar.	65	22	0%	60%	30%	0%	0%	0%	0%	4 Riyal	English
S. Africa	71	22	39%	45%	21%	8%	6%	2%	4%	8 Rand	English
Spain	80	20	49%	46%	4%	0%	9%	4%	23%	€ 1	Spanish
Thailand	79	20	65%	33%	10%	14%	0%	1%	22%	20 Baht	Thai
Tunisia	74	23	46%	23%	49%	8%	0%	0%	0%	2 Dinar	French
UK	80	20	55%	75%	0%	3%	1%	3%	7%	1 GBP	English
USA	97	21	50%	19%	21%	13%	7%	4%	21%	\$ 1.20	English
Vietnam	87	21	46%	44%	15%	8%	0%	1%	10%	8000 Dong	Vietnamese



## Appendix B: List of prospects

prospects risky gains	prospects uncertain gains	prospects risky losses	prospects uncertain losses
$(\frac{1}{2}: 5; 0)$		$(\frac{1}{2}: 5; 0)$	
$(\frac{1}{2}: 10; 0)$		$(\frac{1}{2}: -10; 0)$	
$(\frac{1}{2}: 20; 0)$		$(\frac{1}{2}: -20; 0)$	
$(\frac{1}{2}: 30; 0)$		$(\frac{1}{2}: -20; -5)$	
$(\frac{1}{2}: 30; 10)$		$(\frac{1}{2}: -20; -10)$	
$(\frac{1}{2}: 30; 20)$			
$(\frac{1}{8}: 20; 0)$	$(\frac{1}{8}: 20; 0)$	$(\frac{1}{8}: -20; 0)$	$(\frac{1}{8}: -20; 0)$
$(\frac{1}{8}: 20; 5)$	$(\frac{1}{8}: 20; 5)$	$(\frac{1}{8}: -20; -5)$	$(\frac{1}{8}: -20; -5)$
$(\frac{2}{8}: 20; 0)$	$(\frac{2}{8}: 20; 0)$	$(\frac{2}{8}: -20; 0)$	$(\frac{2}{8}: -20; 0)$
$(\frac{3}{8}: 20; 0)$	$(\frac{3}{8}: 20; 0)$	$(\frac{3}{8}: -20; 0)$	$(\frac{3}{8}: -20; 0)$
$(\frac{5}{8}: 20; 0)$	$(\frac{5}{8}: 20; 0)$	$(\frac{5}{8}: -20; 0)$	$(\frac{5}{8}: -20; 0)$
$(\frac{6}{8}: 20; 0)$	$(\frac{6}{8}: 20; 0)$	$(\frac{6}{8}: -20; 0)$	$(\frac{6}{8}: -20; 0)$
$(\frac{7}{8}: 20; 0)$	$(\frac{7}{8}: 20; 0)$	$(\frac{7}{8}: -20; 0)$	$(\frac{7}{8}: -20; 0)$
$(\frac{7}{8}: 20; 5)$	$(\frac{7}{8}: 20; 5)$	$(\frac{7}{8}: -20; -50)$	$(\frac{7}{8}: -20; -5)$

## Appendix C: Instructions (extract; complete instructions are available for download at [www.ferdinandvieider.com/instructions.html](http://www.ferdinandvieider.com/instructions.html) in several languages)

Thank you for participating in this experiment in decision making! You will obtained 4 Euros for having come to the experiment—those 4 Euros are yours to keep independently of the outcomes in the experiment. In addition, you will be compensated with whatever you earn during the experiment according to the procedures described in the instructions.

The instructions will be read to you in a short while. You may consult these instructions at any time during the experiment. In case you should have any questions or doubts, please raise your hand and an experimenter will come and assist you in private.

Please consider each decision carefully. Take a careful look at outcomes and the probabilities associated to them before taking a decision. Remember that your final payoffs from this experiment will depend on the decisions you make (and of course, on chance).

Please remain seated when you are finished with the tasks. This experiment consists of two parts. Once everybody has finished the tasks in part I, new instructions will be read to you for part II. At the very end of the experiment, you will be asked to fill out a questionnaire. The answer to the questionnaire as well as all your answers to the tasks will be private, and cannot be traced back to you personally. Once you are done filling in the questionnaire, an experimenter will call you up. Your payoff will then be determined in private, you will be given the money you won, after which you can leave.

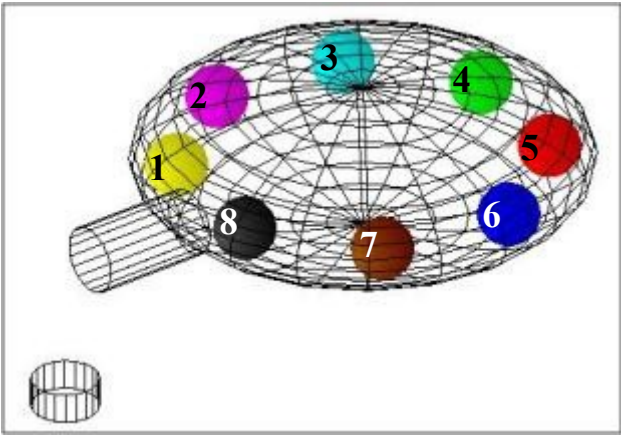
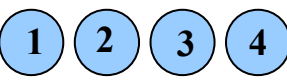
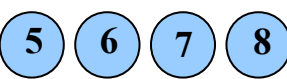
### PART I

#### Choice tasks

In the present experiment, you will be asked to choose repeatedly between a fixed amount of money and a lottery. The lottery will always give you a chance to win one of two amounts of money. Figure 1 shows a typical choice task. You are asked repeatedly to choose between playing the lottery and obtaining a sure amount of money. **For each row**, you are asked to indicate whether you would prefer to play the lottery or to obtain the sure amount of money by ticking the preferred option.

The urn indicated in the figure contains eight numbered balls. One ball will be extracted from the urn to determine your payoffs in case you should play the lottery. In the lottery displayed, if ball 1, 2, 3, or 4 is extracted, you obtain €10; if ball 5, 6, 7, 8 is extracted, you obtain nothing. Please pay close attention to the amounts to be won as well as the number of balls associated with each outcome, since they change across decisions.

**Fig. 1: Example of a typical decision task**

		Lottery	Sure amount	
Win € 10 if one of the following balls is extracted:		O	O	€ 0.50 for sure
		O	O	€ 1.00 for sure
		O	O	€ 1.50 for sure
		O	O	€ 2.00 for sure
		O	O	€ 2.50 for sure
		O	O	€ 3.00 for sure
		O	O	€ 3.50 for sure
		O	O	€ 4.00 for sure
		O	O	€ 4.50 for sure
		O	O	€ 5.00 for sure
		O	O	€ 5.50 for sure
Win € 0 if one of the following balls is extracted:		O	O	€ 6.00 for sure
		O	O	€ 6.50 for sure
		O	O	€ 7.00 for sure
		O	O	€ 7.50 for sure
		O	O	€ 8.00 for sure
		O	O	€ 8.50 for sure

	O	O	€ 9.00 for sure
	O	O	€ 9.50 for sure

We are interested in the amount for which you will switch from preferring the lottery to preferring the sure amount. Most likely, you will begin by choosing the lottery for small sure amounts, and at a certain point switch to the sure amount as the latter increases. If you do not want the lottery at all, you can choose to get the sure amount in the first row and then continue with the sure amount for all choices (logic: if you prefer €0.50 over the lottery you should also prefer €1.00 over the lottery, etc.). Where you will switch from the lottery to the sure amount depends entirely on your preferences—there are no right or wrong answers. However, **you should NOT switch back and forth several times between lottery and sure amount!** You will be excluded from the experiment if you do so or if it is not possible to clearly recognize your preference (for example, if you have not ticked any box for a given row or ticked both boxes for a given row).

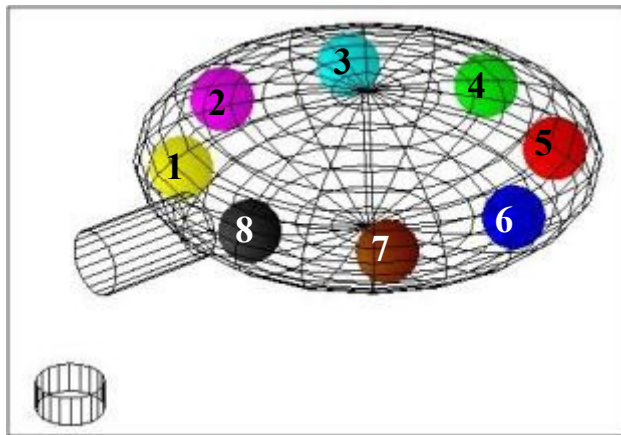
### Types of choices

You will be asked to take 22 decisions, for each one of which you will need to decide between a lottery and a series of sure amounts as exemplified in figure 1 above. **Please pay close attention to the amounts to be won as well as the number of balls associated with each outcome!** Indeed, both the higher and lower amount, as well as the number of balls, change between decision problems. Since your final payoff depends on these decisions, it is crucial for you to pay close attention to these features.

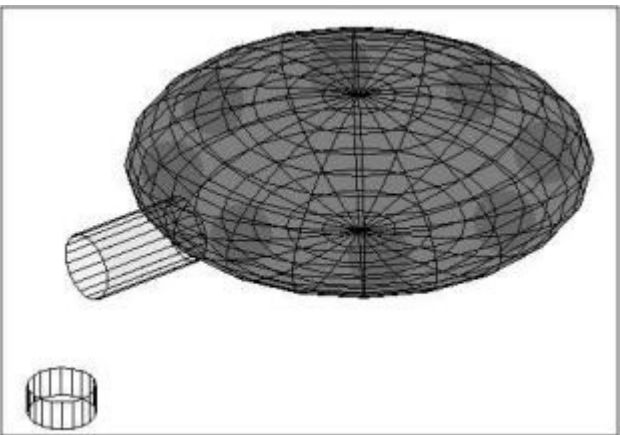
There are **two different types of lotteries** involved. Figure 2 below shows the two different types of lotteries that you will encounter. Fig 2a shows the urn already familiar from figure 1 above. It contains exactly eight (8) balls, numbered from 1 to 8.

In Urn in Fig. 2b also contains exactly eight (8) balls. However, you cannot see what numbers the balls contained in the urn have. This means that **you do not know the exact numbers that are present in that urn**. All balls bear a number between 1 and 8 inclusive (have either 1, 2, 3, 4, 5, 6, 7, or 8 written on them), but it is possible that some numbers are absent from this urn while others occur repeatedly. You thus do not know the exact composition of the urn.

**Fig. 2a: transparent urn**



**Fig. 2b: opaque urn**



### Payoff determination

After you have taken all the decisions, one of your decisions will be randomly drawn for real pay, i.e. **the amounts indicated in the decision problem will be paid out for real**. First, either part I or part II will be selected for real play by a coin flip. If part I is selected, then one of the decision tasks is drawn at random, using a chance device with equal probability for each decision task to be extracted. For the extracted decision task, one of your decisions, corresponding to one row for which you had to indicate your preference between the sure amount and the lottery, will then be drawn at random with **equal probability for each row**. If for the row that is drawn you have indicated that you prefer the sure amount of money, you will simply be paid that amount.

In case you have chosen the lottery for the randomly determined row, then that lottery will be played according to the probabilities indicated. For the transparent urn, this will involve drawing a ball from an urn in which all numbers from 1 to 8 inclusive are present. If you should desire to do so, you can verify that there are indeed all balls from 1 to 8 in the urn. You will then be paid the outcome corresponding to the ball you drew.

For the opaque urn, the procedure is exactly analogous, except that you will now draw a ball from a pre-

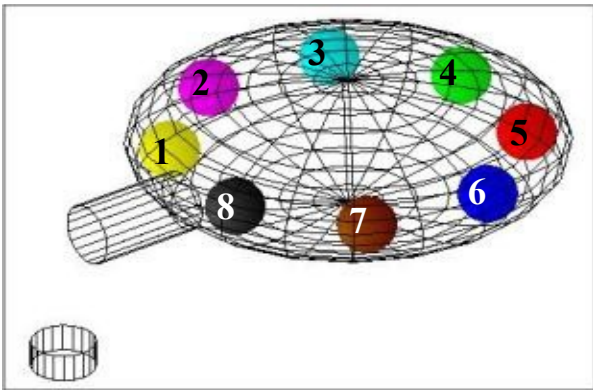
composed urn, the exact composition of which you do not know. You will also be paid the outcome corresponding to the ball you drew. If you should desire to do so, after the draw you can verify that there are indeed 8 balls with numbers between 1 and 8 inclusive in the urn.

## PART II

If part II should be chosen for real play, you are endowed with €20. These €20 are yours, but it is possible that you will lose part or all of the money in the experiment (but no more than that).

In part II you are again asked to repeatedly choose between the two types of lotteries you have already encountered in part I of the experiment and a series of sure amounts. However, the main difference now is that **the amounts involved are negative instead of positive**. Figure 4 shows an example of such a choice.

Fig. 4: example of a typical decision task from part II

	<input type="radio"/>	<input type="radio"/>	– € 0.50 for sure
	<input type="radio"/>	<input type="radio"/>	– € 1.00 for sure
	<input type="radio"/>	<input type="radio"/>	– € 1.50 for sure
	<input type="radio"/>	<input type="radio"/>	– € 2.00 for sure
	<input type="radio"/>	<input type="radio"/>	– € 2.50 for sure
	<input type="radio"/>	<input type="radio"/>	– € 3.00 for sure
	<input type="radio"/>	<input type="radio"/>	– € 3.50 for sure
	<input type="radio"/>	<input type="radio"/>	– € 4.00 for sure
	<input type="radio"/>	<input type="radio"/>	– € 4.50 for sure
	<input type="radio"/>	<input type="radio"/>	– € 5.00 for sure
<p><b>Lose € 10</b> if one of the following balls is extracted:</p> <div> <input type="radio"/> 1           <input type="radio"/> 2           <input type="radio"/> 3           <input type="radio"/> 4         </div>	<input type="radio"/>	<input type="radio"/>	– € 5.50 for sure
<p><b>Lose € 0</b> if one of the following balls is extracted:</p> <div> <input type="radio"/> 5           <input type="radio"/> 6           <input type="radio"/> 7           <input type="radio"/> 8         </div>	<input type="radio"/>	<input type="radio"/>	– € 6.00 for sure
	<input type="radio"/>	<input type="radio"/>	– € 6.50 for sure
	<input type="radio"/>	<input type="radio"/>	– € 7.00 for sure
	<input type="radio"/>	<input type="radio"/>	– € 7.50 for sure
	<input type="radio"/>	<input type="radio"/>	– € 8.00 for sure
	<input type="radio"/>	<input type="radio"/>	– € 8.50 for sure
	<input type="radio"/>	<input type="radio"/>	– € 9.00 for sure
	<input type="radio"/>	<input type="radio"/>	– € 9.50 for sure
	<input type="radio"/>	<input type="radio"/>	– € 9.50 for sure

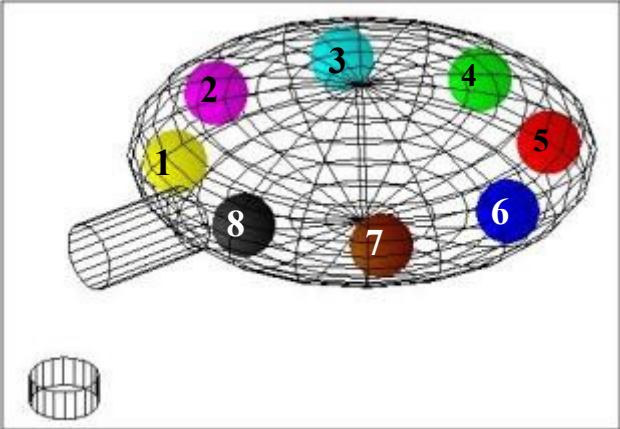
In the example displayed, you face the following lottery: if a ball with the number 1, 2, 3, or 4 is extracted, **you lose €10**. If a ball with the number 5, 6, 7, or 8 is extracted, you lose nothing. Please choose again for each row whether you would rather give up (i.e., pay) the sure amount indicated to the right or play the lottery.

Notice that, most likely, you will now **begin to the right** by choosing to give up the sure amounts as long as this implies giving up small amounts, and then switch to the lottery at a certain point. If you do not want to give up sure amounts at all, then in the first row you can choose the lottery and then continue with the lottery for all choices (logic: if you are not willing to pay €0.50 to avoid playing the lottery, then you should not be willing to pay €1.00 to avoid it). Once again, when exactly you switch from the sure loss to the lottery depends entirely on your preferences—there are no right or wrong answers. However, **you should NOT switch back and forth several times between lottery and sure amount!** You will be excluded from the experiment if you do so or if it is not possible to clearly recognize your preference (for example because you have not ticked any box for a given row or ticked both boxes for a row).

In addition to the pure loss choices described above, you will also face some choices in which **both negative and positive amounts are involved**. Also, what changes is now not the sure amount to the right, which is always equal to

zero, but rather the amount you can lose in the lottery. Figure 3 shows an example of this kind of choice problem.

**Fig. 3: decision task where lottery amount changes**



**Win € 20** if one of the following balls is extracted:

1
2
3
4

If one of the following balls is extracted, then:

5
6
7
8

<b>Lose € 20</b>	<input type="radio"/>	<input type="radio"/>	€ 0 for sure
<b>Lose € 19</b>	<input type="radio"/>	<input type="radio"/>	€ 0 for sure
<b>Lose € 18</b>	<input type="radio"/>	<input type="radio"/>	€ 0 for sure
<b>Lose € 17</b>	<input type="radio"/>	<input type="radio"/>	€ 0 for sure
<b>Lose € 16</b>	<input type="radio"/>	<input type="radio"/>	€ 0 for sure
<b>Lose € 15</b>	<input type="radio"/>	<input type="radio"/>	€ 0 for sure
<b>Lose € 14</b>	<input type="radio"/>	<input type="radio"/>	€ 0 for sure
<b>Lose € 13</b>	<input type="radio"/>	<input type="radio"/>	€ 0 for sure
<b>Lose € 12</b>	<input type="radio"/>	<input type="radio"/>	€ 0 for sure
<b>Lose € 11</b>	<input type="radio"/>	<input type="radio"/>	€ 0 for sure
<b>Lose € 10</b>	<input type="radio"/>	<input type="radio"/>	€ 0 for sure

What is required of you in this task is exactly the same as for the other tasks. For each row, you should choose whether you prefer the sure amount to the right (which is now always zero), or the lottery to the left. Pay attention however: **what changes is now the amount that can be lost in the lottery**. Most likely, you would thus start from the right and choose zero for high losses, and then switch to the left as the losses in the lottery get smaller. You can however also start with the lottery and continue with it if that is your preference (if you prefer a lottery in which you can win €20 or lose €20 to zero, then you should also prefer the lottery when you can lose only €19). At what point you switch from the zero sure amount to the lottery depends only on your preferences—there is no right or wrong answer. However, **you should NOT switch back and forth several times between lottery and sure amount!** You will be excluded from the experiment if you do so or if it is not possible to clearly recognize your preference (for example because you have not ticked any box for a given row or ticked both boxes for a row).

#### Payoff determination

In case part II should be chosen for real play, your payoff from part II will be determined in a way analogous to the

payoff determination in the first part. First, one of the decision tasks will be chosen at random, and then one of the rows for which you had to indicate a choice. In each case, every choice task or row has an equal probability of being selected. According to your choice, you will then either have to pay the sure amount or the lottery will be played out by drawing a ball from the indicated urn.

## Appendix D: Risk survey questions

How do you see yourself? Are you generally a person who is fully willing to take risks or do you try to avoid taking risks? Please tick a box on the scale below, where 0 means “risk averse” and 10 means “fully prepared to take risks”:

Risk averse											Fully prepared to take risks
	<b>0</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>	<b>7</b>	<b>8</b>	<b>9</b>	<b>10</b>
	O	O	O	O	O	O	O	O	O	O	O

People can behave differently in different situations.

How would you rate your willingness to take risks in the following areas?

How is it ...

risk averse

fully prepared  
to take risks

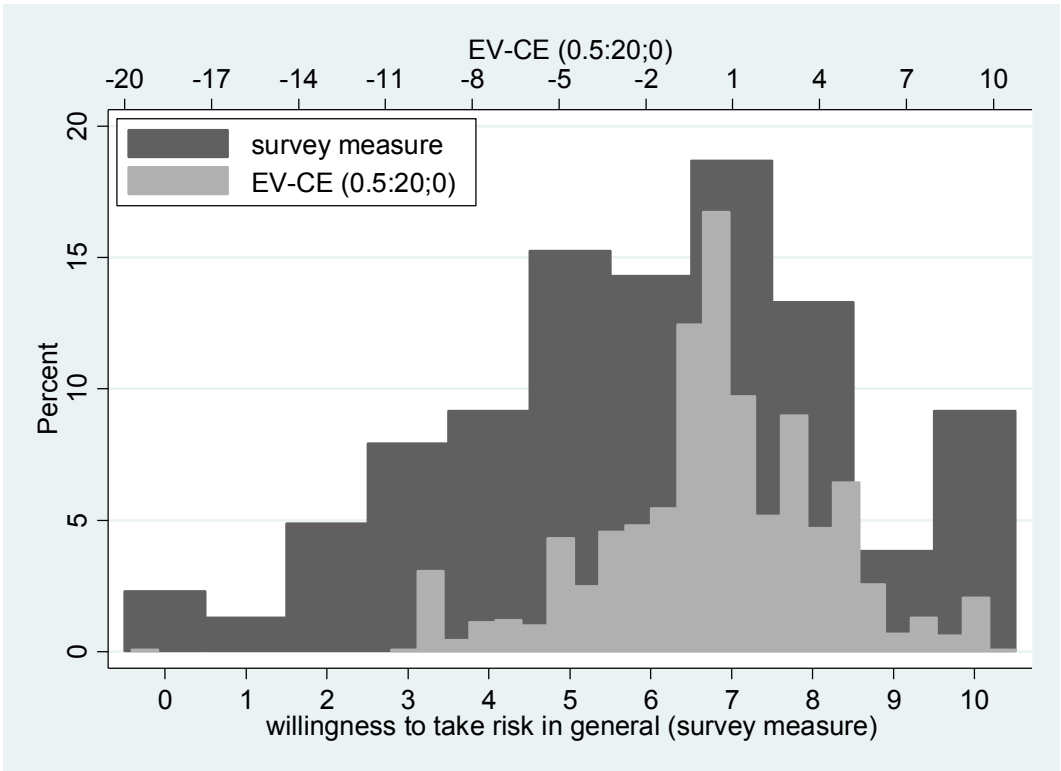
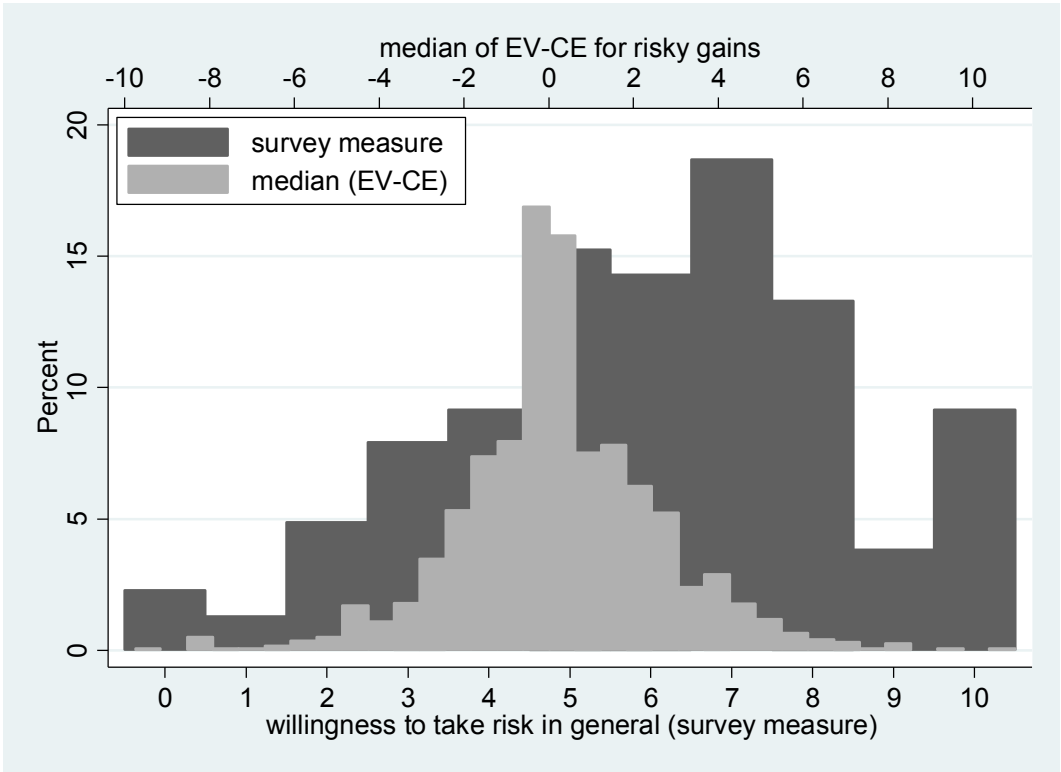
	0	1	2	3	4	5	6	7	8	9	10
– while driving?	O	O	O	O	O	O	O	O	O	O	O
– in financial matters?	O	O	O	O	O	O	O	O	O	O	O
– during leisure and sport?	O	O	O	O	O	O	O	O	O	O	O
– in your occupation?	O	O	O	O	O	O	O	O	O	O	O
– with your health?	O	O	O	O	O	O	O	O	O	O	O
– your faith in other people?	O	O	O	O	O	O	O	O	O	O	O

## Appendix E: Correlations of survey measures with single gains prospects

	Nr.	CE-EV {0.5; 5; 0}	CE-EV {0.5; 10; 0}	CE-EV {0.5; 20; 0}	CE-EV {0.5;30; 0}	CE-EV {0.5; 30;1 0}	CE-EV {0.5; 30;20}	CE-EV {0.125; 20; 0}	CE-EV {0.125; 20; 5}	CE-EV {0.25; 20; 0}	CE-EV {0.375; 20; 0}	CE-EV {0.625; 20; 0}	CE-EV {0.75; 20; 0}	CE-EV {0.875; 20; 0}	CE-EV {0.875; 20; 5}
Australia	61	-0.194	-0.250#	-0.194	-0.262*	-0.186	-0.126	-0.321*	-0.161	-0.315*	-0.283*	-0.304*	-0.280*	-0.325*	-0.222#
Belgium	91	-0.082	-0.180#	-0.141	-0.108	-0.115	-0.0963	-0.225*	-0.287**	-0.204#	-0.199#	-0.062	-0.078	-0.059	-0.139
Brazil	84	-0.120	-0.320**	-0.311**	-0.231*	-0.190#	-0.0697	-0.462***	-0.0485	-0.271*	-0.304**	-0.253*	-0.217*	-0.189#	-0.124
Cambodia	80	0.003	-0.0980	-0.142	-0.0905	-0.0768	-0.0654	-0.0349	-0.110	-0.233*	-0.196#	-0.199#	-0.197#	-0.225*	-0.194#
Chile	96	-0.033	-0.118	0.00529	0.00785	0.0342	0.0221	0.0514	0.0231	0.0467	0.039	-0.063	-0.097	0.040	-0.123
China	204	-0.071	-0.130#	-0.0534	-0.183**	-0.0218	-0.0148	-0.0951	-0.0690	-0.114	-0.109	-0.191**	-0.116#	-0.111	-0.104
Colombia	128	0.0484	0.0385	-0.0624	-0.121	-0.296***	-0.0649	-0.242**	-	-0.256**	-0.166#	-0.193*	-0.129	-0.063	-
Costa Rica	108	-0.108	-0.143	-0.146	-0.242*	-0.181#	-0.0617	-0.145	-0.210*	-0.183#	-0.104	-0.125	-0.137	-0.063	0.126
Czech Rep.	99	-0.287**	-0.333***	-0.236*	-0.238*	-0.0123	-0.0351	-0.204*	-0.0551	-0.200*	-0.216*	-0.196#	-0.197#	-0.238*	-0.077
Ethiopia	140	-0.102	-0.116	-0.156#	-0.196*	-0.0404	-0.0505	-0.162#	-0.0190	-0.0715	-0.013	-0.100	-0.055	-0.199*	-0.126
France	93	-0.185#	-0.141	-0.157	-0.0606	-0.232*	-0.113	-0.0778	-0.0183	-0.147	-0.093	-0.191#	-0.213*	-0.072	-0.104
Germany	130	0.001	-0.201*	-0.0603	-0.232**	-0.179*	-0.190*	-0.115	-0.112	0.0272	-0.104	-0.189*	-0.291***	-0.354***	-0.373***
Guatemala	84	-0.130	-0.243*	-0.103	-0.239*	-0.249*	-0.332**	-0.0306	-0.171	0.0117	-0.186#	-0.121	-0.151	-0.015	-0.182#
India	89	0.107	-0.120	-0.0748	-0.0709	-0.0564	-0.166	-0.249*	-0.214*	-0.148	-0.077	-0.113	-0.116	-0.053	-0.065
Japan	84	-0.362***	-0.424***	-0.385***	-0.349**	-0.160	-0.261*	-0.302**	-0.162	-0.172	-0.243*	-0.271*	-0.307**	-0.357***	-0.393***
Kyrgyzstan	97	-0.184#	-0.137	-0.105	-0.159	0.0529	-0.0650	-0.251*	-0.0406	-0.203*	-0.189#	-0.151	-0.178#	-0.125	-0.088
Malaysia	64	-0.261*	-0.250*	-0.214#	-0.331**	-0.374**	-0.359**	-0.0232	-0.283*	-0.238#	-0.247*	-0.365**	-0.362**	-0.431***	-0.304*
Nicaragua	120	-0.0755	-0.100	-0.0890	-0.103	-0.000	-0.222*	-0.0854	-0.0595	-0.0745	-0.052	-0.129	0.082	0.030	-0.151
Nigeria	202	-0.0685	0.0117	-0.0948	-0.129#	-0.0103	-0.101	-0.0847	-0.0955	-0.0627	-0.144*	-0.138#	-0.141*	-0.156*	-0.046
Peru	95	-0.139	-0.124	-0.0347	-0.0785	-0.156	-0.150	-0.0577	-0.212*	-0.196#	-0.084	-0.163	-0.143	-0.204*	-0.165
Poland	89	-0.225*	-0.193#	-0.0674	-0.157	-0.144	0.0170	-0.127	0.0838	-0.0923	-0.175	-0.218*	-0.187#	-0.058	-0.046
Russia	70	-0.0721	-0.195	-0.161	-0.236*	-0.229#	-0.185	-0.0488	-0.0189	-0.147	0.038	-0.272*	-0.158	-0.172	-0.210#
Saudi Arabia	65	-0.0795	0.00685	-0.0675	-0.0209	-0.0772	-0.00557	-0.0362	-0.000997	-0.178	-0.195	-0.166	-0.157	-0.251*	-0.014
South Africa	71	-0.0436	0.0656	0.132	0.124	-0.0330	0.179	-0.0694	-0.0704	-0.0772	-0.051	0.135	-0.060	0.027	-0.007
Spain	80	-0.0231	-0.141	-0.0763	-0.159	-0.195#	-0.0263	-0.0951	-0.101	-0.216#	-0.144	-0.243*	-0.160	-0.111	-0.068
Thailand	79	-0.241*	-0.249*	-0.249*	-0.257*	-0.197#	-0.132	-0.114	-0.0421	-0.367***	-0.330**	-0.358**	-0.357**	-0.124	-0.205#
Tunisia	74	-0.0431	0.141	-0.0304	-0.0607	0.0116	0.0167	-0.0169	-0.153	-0.217#	-0.095	0.011	0.123	-0.078	-0.001
UK	80	-0.194#	-0.135	-0.129	-0.196#	-0.0478	-0.126	-0.211#	-0.225*	-0.191#	-0.222*	-0.226*	-0.145	-0.229*	-0.192#
USA	97	-0.118	-0.0753	-0.106	-0.120	0.0494	-0.0312	-0.183#	-0.0791	0.0500	0.007	0.027	0.063	0.012	0.031
Vietnam	87	-0.263*	-0.115	-0.147	-0.0554	0.0645	0.151	-0.115	-0.0244	-0.216*	-0.182#	-0.133	-0.167	-0.054	-0.224*



Appendix F: distribution graphs for median and 50-50 prospect



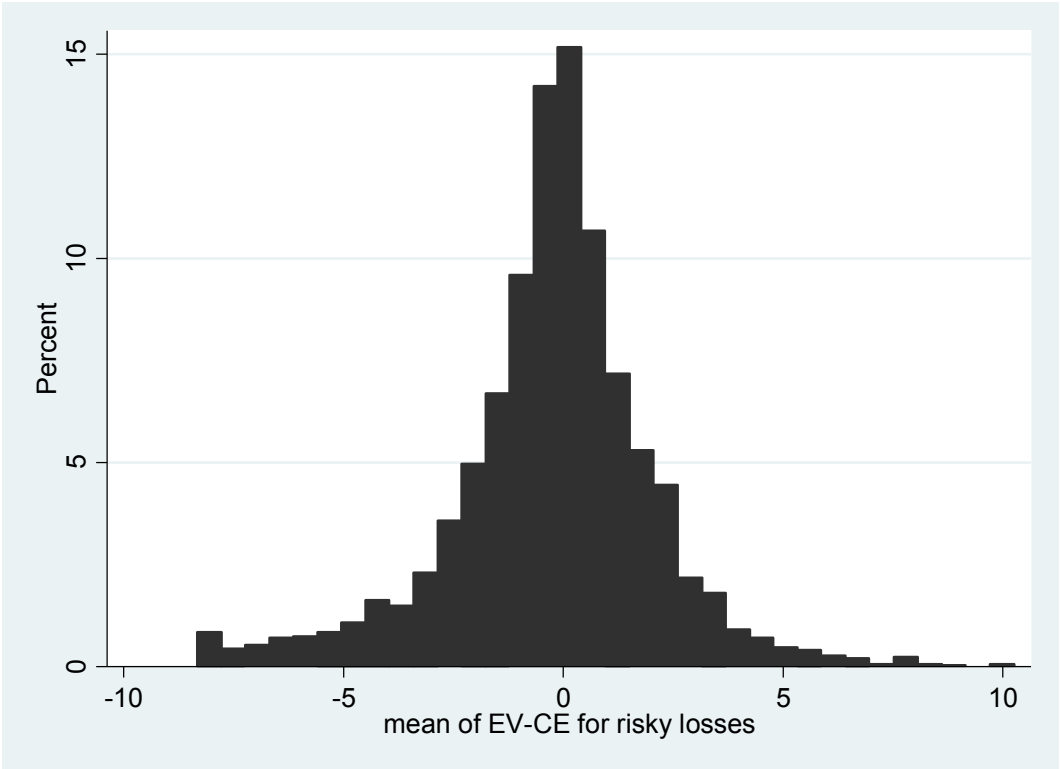
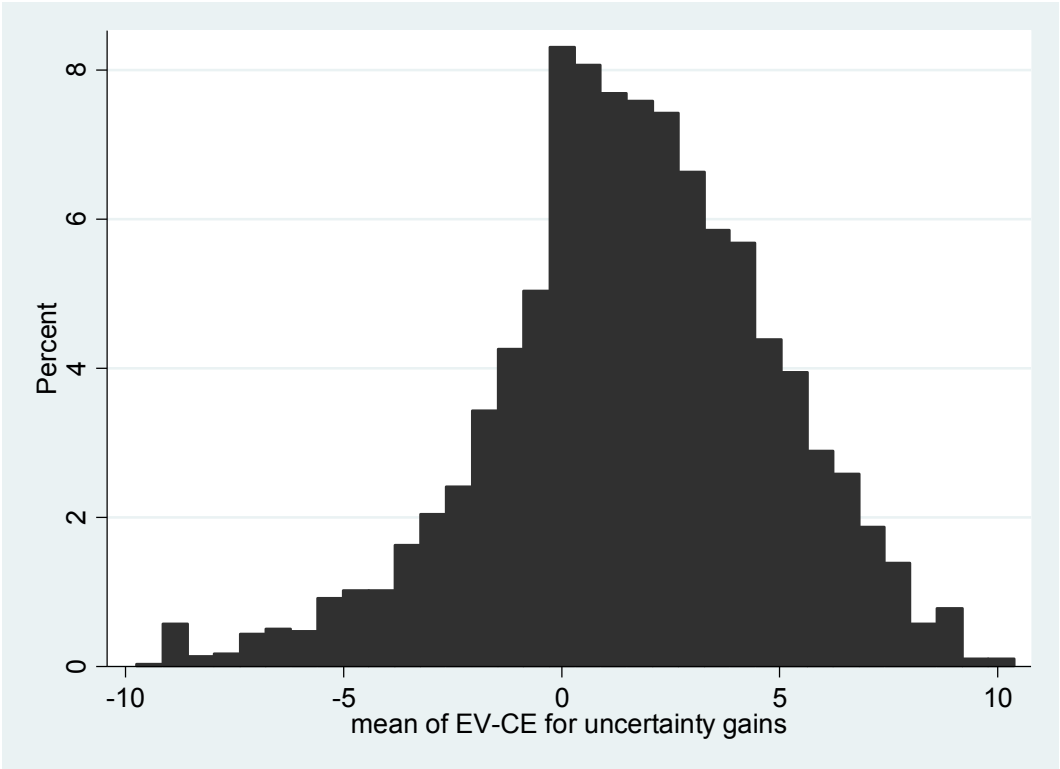
## Appendix G: distributions country by country

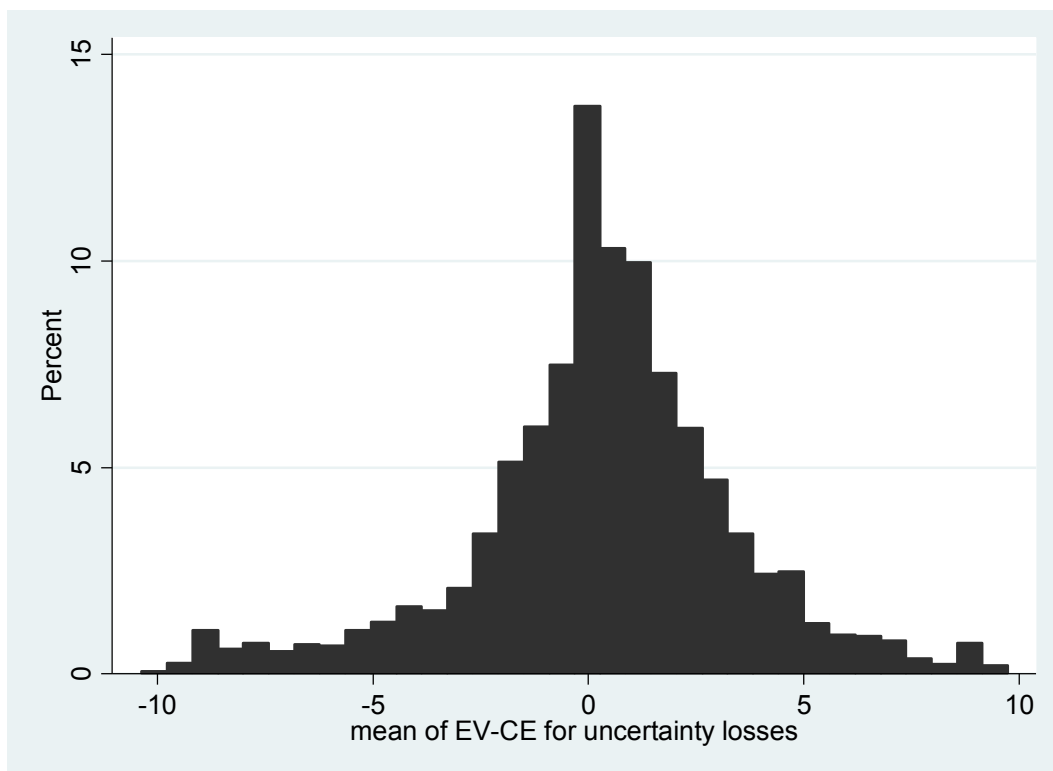


## Appendix G: Summary of other incentivized measures

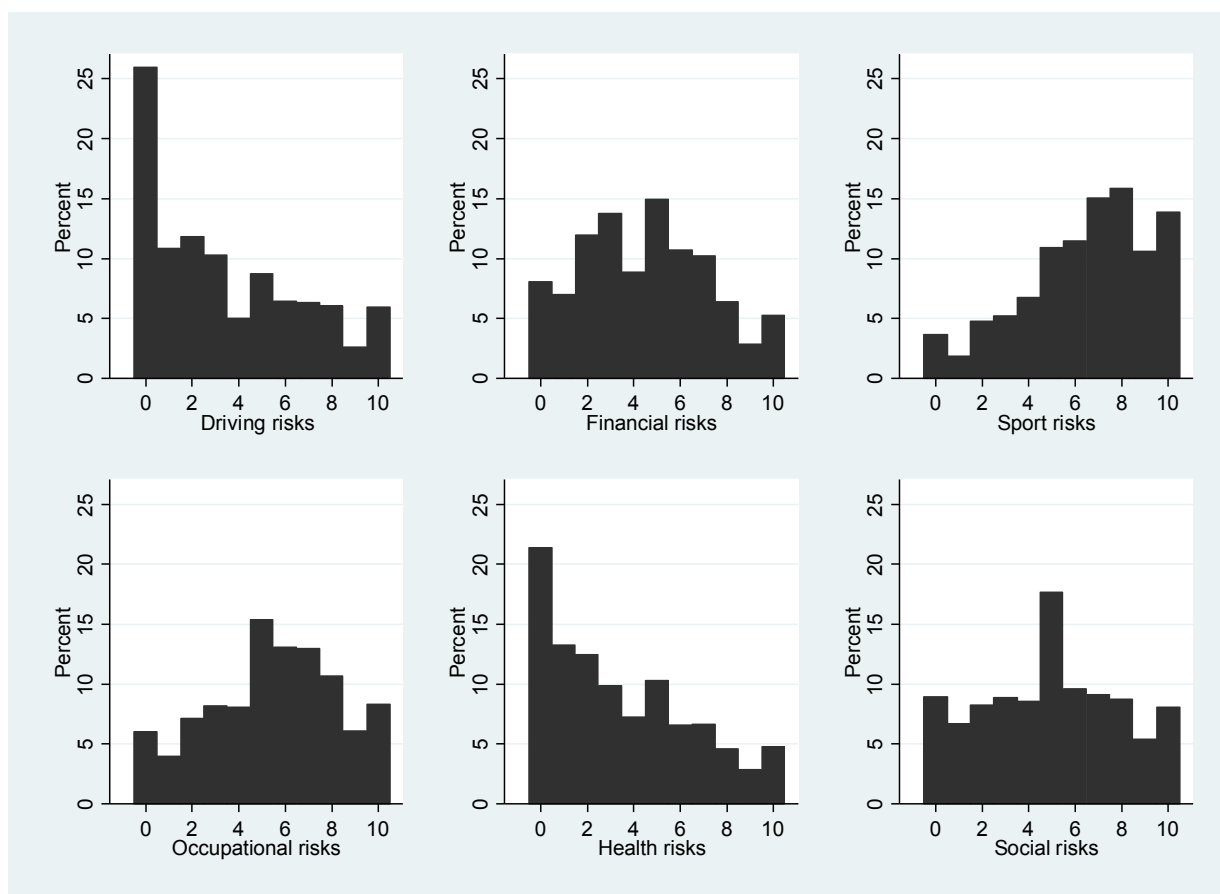
	Nr.	Uncertainty gains			Risk losses			Uncertainty losses		
		mean (EV-CE)	CI (95%)		mean (EV-CE)	CI (95%)		mean (EV-CE)	CI (95%)	
Australia	61	2.76	1.87	3.66	0.61	0.26	0.97	1.45	0.76	2.15
Belgium	91	2.47	1.97	2.97	0.39	0.06	0.73	1.19	0.72	1.66
Brazil	84	2.18	1.55	2.81	0.28	-0.04	0.61	1.27	0.82	1.72
Cambodia	80	0.99	0.33	1.65	-1.85	-2.43	-1.27	0.74	0.06	1.43
Chile	96	2.99	2.42	3.56	0.23	-0.21	0.68	1.30	0.66	1.93
China	204	1.51	1.22	1.80	0.22	0.02	0.42	0.58	0.33	0.84
Colombia	128	2.54	1.89	3.19	-0.22	-0.62	0.17	1.03	0.40	1.66
Costa Rica	108	2.27	1.69	2.85	-0.50	-0.89	-0.10	0.09	-0.40	0.58
Czech Rep.	99	2.62	2.20	3.03	0.41	0.15	0.67	1.13	0.76	1.50
Ethiopia	140	0.80	0.22	1.38	-0.69	-1.13	-0.26	-0.37	-0.93	0.19
France	93	2.17	1.57	2.76	0.17	-0.19	0.54	0.51	0.05	0.96
Germany	130	2.74	2.28	3.20	0.19	-0.12	0.50	0.68	0.22	1.14
Guatemala	84	1.04	0.29	1.80	-0.62	-1.10	-0.15	-0.35	-0.97	0.26
India	89	2.33	1.56	3.10	-1.53	-2.07	-1.00	-0.99	-1.74	-0.24
Japan	84	2.00	1.43	2.57	0.22	-0.13	0.57	0.86	0.34	1.38
Kyrgyzstan	97	1.41	0.85	1.97	-0.83	-1.28	-0.38	-0.01	-0.58	0.55
Malaysia	64	1.39	0.71	2.08	0.25	-0.33	0.83	1.11	0.47	1.75
Nicaragua	120	-0.53	-1.22	0.15	-0.90	-1.48	-0.32	-0.60	-1.33	0.13
Nigeria	202	-0.60	-1.16	-0.04	-0.82	-1.38	-0.26	-1.06	-1.75	-0.38
Peru	95	0.38	-0.36	1.11	-0.32	-0.91	0.26	-0.12	-0.88	0.64
Poland	89	2.40	1.80	3.00	-0.14	-0.45	0.17	0.53	0.09	0.97
Russia	70	1.97	1.26	2.69	-0.51	-0.96	-0.07	0.30	-0.33	0.93
Saudi Arabia	65	0.97	0.15	1.80	0.05	-0.41	0.50	0.93	0.24	1.63
South Africa	71	1.98	1.27	2.68	-0.44	-0.99	0.10	0.25	-0.52	1.02
Spain	80	2.30	1.78	2.83	0.34	-0.04	0.71	1.16	0.63	1.70
Thailand	79	2.56	1.82	3.29	-0.15	-0.59	0.29	0.69	0.06	1.31
Tunisia	74	1.47	0.66	2.27	-0.57	-1.19	0.05	-0.68	-1.52	0.17
UK	80	0.94	0.39	1.50	-0.87	-1.31	-0.44	-0.83	-1.42	-0.23
USA	97	2.51	1.97	3.04	0.22	-0.12	0.56	0.82	0.26	1.38
Vietnam	87	0.97	0.44	1.50	-0.24	-0.61	0.12	0.57	0.09	1.04
All countries:	2939	1.61	1.49	1.73]	-0.27	[-0.35	-0.18]	0.33	0.22	0.44]

**Appendix H: Distribution graphs for uncertain gains, risky losses and uncertain losses**





## Appendix I: Distribution of context specific survey questions



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