Determinants of risk and time preferences - A multi-country representative survey.

Xavier Gassmann*†[1], Corinne Faure*[1], Thomas Meissner*[2], and Joachim Schleich*[3,1]

[1]Grenoble Ecole de Management (GEM) – Grenoble École de Management (GEM) – 12 Rue Pierre Sémard 38000 Grenoble, France

[2]Maastricht University – Universiteitssingel 40;6200 MD Maastricht, Netherlands

[3]Fraunhofer Institute for Systems and Innovation Research (Fraunhofer ISI) – Breslauer Str. 48, 76139 Karlsruhe, Germany

Abstract

Introduction

Risk and time preferences have been shown to predict a wide range of decisions, such as investment in health or retirement, savings, or environmental involvement. Because of the relevance of these preferences, recent literature has focused on understanding their antecedents. While the earlier research mostly focused on explaining one or the other of the preferences (e.g., Binswanger, 1980; Coller and Williams, 1999) and used non-representative samples, recent research has either used representative samples in single countries (e.g., Bruderer Enzler et al., 2014; Dittrich and Leipold, 2014; Dohmen et al., 2011) or non-representative samples in cross-cultural comparisons (e.g. Rieger et al., 2014; Wang et al., 2016), with a call for including multiple preferences in cross-cultural comparisons with representative samples (Falk et al., 2015). This project is building upon this trend and focuses on a large scale (roughly 15,000 respondents) multi-country study with representative samples that includes standard time preferences, present bias, risk aversion, and loss aversion. Following accepted standards, the study is using multiple price lists and incentivization for the elicitation of the preferences and testing for stake effects and order effects; preference parameters are estimated jointly to account for their interdependencies. Furthermore, the study includes a rich set of antecedents, with a wide range of socio-demographic characteristics as well as individual characteristics such as cognitive reflection (Frederick, 2005) and cultural values (Schwartz, 2012).

Concerning our model, we used the Cumulative Prospect Theory (CPT) framework for decisions under uncertainty (risk and loss aversion), and a quasi-hyperbolic time discounting function for time preferences. The Cumulative Prospect Theory framework (Tversky and Kahneman, 1992) considers (besides risk aversion) both loss aversion and probability distortion. Because probabilities are difficult to understand for less educated respondents, we decided to only focus on loss aversion and simplified choices by only including one probability value of 50%, which can be easily conveyed in everyday language as coin flip; as a consequence, we did not assess probability distortion. For time preferences,, we considered standard time discounting but also modeled present bias (Laibson, 1997). Our study therefore included four parameters for time discounting, present bias, risk aversion, and loss

*Speaker

†Corresponding author: xavier.gassmann@grenoble-em.com

aversion. In previous literature, only few studies have included such a rich set of preference parameters (Tanaka et al., 2010)

We based our elicitation design on the commonly used Multiple Price List (MPL) design introduced by Holt and Laury (2002). This design is incentive compatible and easy to understand; it also allows for elicitation of time preferences, risk aversion, and loss aversion using similar tasks. In the behavioral literature, the MPL design is one of the most used and robust way to elicit preferences. We used real incentives and elicited more than one preference. In the literature, few studies have simultaneously considered more than one preference (Dohmen et al., 2010; Tanaka et al., 2010). Even those that did include multiple preferences did not estimate them jointly; as a result they omitted the effects of risk on the curvature of the utility function while estimating time preferences. We jointly estimate four parameters of preferences using a Maximum Likelihood estimator on all choices made, which provides a more robust estimate of the preferences.

We briefly describe the method used before turning to the results.

Methodology

An online survey was implemented in July and August 2016 via computer-assisted web interviews (CAWI), using existing household panels from Ipsos GmbH. the study was conducted in eight EU countries (France, Germany, Italy, Poland, Romania, Spain, Sweden, and the United Kingdom) which together account for about 80 percent of the EU population. Participants were selected via quota sampling to be representative of a particular country in terms of gender, age (between 18 and 65 years), and region of origin.

To elicit preferences, we used four Multiple Price Lists, adapted from Holt and Laury (2002) for risk preferences and from Coller and Williams (1999) for time preferences. These four MPLs were used to elicit parameters for time discounting, present bias, risk aversion and loss aversion. The first MPL (time discounting) involved 7 choices between two gains: one in 6 months, the other in 12 months. The second MPL (present bias) was an exact replicate of the first but with gains today and in 6 months. The third MPL (risk aversion) involved 14 choices between two lotteries (one lottery becoming more and more risky with high gains versus a relatively safe lottery with low gains). The fourth MPL (loss aversion) involved 7 choices with similar lotteries but where one outcome was a loss rather than a gain.

Most of the participants were exposed to *baseline* monetary amounts in each of the decisions (with amounts of a few hundred euros); in addition, we implemented two manipulations when eliciting time preference, risk aversion, and loss aversion: in the *high stake scenario* (ca. 10% of the total sample) the amounts shown were multiplied by 10, relative to the baseline treatment; in the *low stake scenario* (ca. 7% of the total sample), the amounts shown were divided by 10, relative to the baseline treatment. Besides stake level, we manipulated incentivization: of those incentivized (a bit more than half the sample was incentivized), a random subset of 1% of the participants was paid based on their actual choices. Incentivization was only implemented for the baseline and the low stake scenarios. For each selected participant, one question was randomly chosen as the pay-out question. In total, 75 participants among the roughly 7500 incentivized ones were randomly selected to be paid, with an average gain of 54.34 euros; roughly 4,000 euros were paid out in incentives to participants in addition to the normal study participation fee. Finally, the study assessed presentation order, with the order of the columns in each lottery being alternated for half the sample. Study participants were randomly assigned to each of the experimental conditions (unique combination of stake level, incentivization or not, and AB or BA presentation order) but received the same combination across all four MPLs.

The demographic variables included were age, gender, education level, income, whether the respondent had children, lived in a couple, and lived in an urban area. To capture cultural differences, we included a ten-item subscale of the personal value questionnaire (Knoppen and Saris, 2009) measuring the following individual values: self-direction, stimulation, he-

donism, achievement, power, security, conformity, tradition, benevolence, and universalism (Schwartz, 2012). Finally, the score obtained on the standard cognitive reflection test (CRT, Frederick, 2005) was included to reflect respondent cognitive ability.

We run a joint estimation using logistic models for the four preference parameters as a linear function of the demographics and cultural factors. This estimation was first run for an *all countries* model, using data pooled from all countries (for a total of 522,970 choices made by 14,942 respondents) and including country-dummies to capture country-specific effects. In addition, we estimated eight individual country models.

Results

Due to space constraints, we will only focus on the *all countries* significant results (at the 1% level). We will present the determinants of the preference parameters in the following order: time discounting, present bias, risk aversion and loss aversion.

We found heterogeneous time discounting across the eight countries, with the lowest time discounting found in Sweden and the highest in Spain and Italy. Across all countries, the most robust determinant of time discounting was the CRT score, suggesting that participants with higher cognitive ability and reflection are discounting less. Overall, we also found that participants with higher income, higher education and without children were discounting less. We did not find any relations between any of the cultural items and time discounting. Finally, we found that incentivized participants as well as participants facing either low or moderate stakes discounted more.

For present bias, participants appeared to exhibit rather homogenous present bias behavior; across all eight countries, participants were either not or just weakly present-biased, with respondents in Italy being the more present biased, and Romanian respondents the least. Overall, our results suggest that participants who are younger, male, more educated, or with a higher CRT score were more likely to be present biased. The cultural values items were not significantly correlated with present bias. Finally, we found less present bias for incentivized participants, as well as for participants facing high stakes, and for participants facing the delayed outcomes on the left (first to be read).

For risk preferences, participants were in average risk averse, with the most risk aversion in Romania and the least in France, Sweden, and Italy. The most robust determinant appeared to be CRT score, which was significant in all countries: participants with a higher CRT score were less risk averse. Overall, we also found less risk aversion for participants who were younger, male, with higher income, with higher education, or who were living alone or in a rural area. Furthermore, we found some effects of cultural values (*Self direction*, *Power*, *Hedonism*, *Stimulation* and *Tradition*) on risk aversion. Finally, we found less risk aversion for incentivized participants, for participants facing either low or medium stakes, and for those facing the delayed outcomes on the right.

Concerning loss aversion, participants were in average loss averse, more so in France and less so in Romania. Overall, we found less loss aversion for participants who were older male, with higher income, not living alone, or with a lower CRT score. Loss aversion also appeared to depend on a few cultural values (*Stimulation* and *Tradition*). Finally, loss aversion was lower for incentivized participants or participants facing lower stakes.

Conclusions

This paper is the first to simultaneously study (and estimate) time discounting, present bias, risk aversion, and loss aversion in a large scale representative multi-country study and to include a rich set of antecedents for these preferences. The results obtained are generally consistent with those obtained through other representative surveys including time

and risk preferences such as those of Tanaka et al. (2010) and Falk et al. (2015). Divergences from previous findings may be explained through the samples used in previous studies (for instance, business undergraduate students in Rieger et al., 2014 and Wang et al., 2016), different stakes used, or the fact that we are the first to do such a large scale study with incentivization. Note however that results for single countries differ somewhat from the aggregate results presented above; while single-country results usually are directionally consistent with those presented above, some are different, therefore suggesting some heterogeneity across countries. One major take-out of this study is the importance of cognitive reflection, with participants with a higher CRT score being shown to be more patient, more present bias, less risk averse and more loss averse; this result is consistent with those found by Falk et al. (2015) and suggest the importance of such individual factors when studying individual preferences. Overall, the study seems to indicate few cultural values effects.

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