Route choice decision of spouses under risk: homogamy in matching

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Research questions

Route choice plays a central role in transportation economics, engineering and operations research. Most of the literature in these fields has focused more on the value of time than on the attitude towards the variability of travel time, although authors like Kenneth Small have stressed the importance of risk attitude (e.g. Noland and Small 1995, Noland et al. 1998). Moreover, to the best of our knowledge, the link between spouses risk attitudes has been studied in experimental economics (e.g. Bateman and Munro 2005, Beharry-Borg et al 2009, de Palma et al 2011) but never in the context of mode choice or departure time decisions.

As shown in a recent paper by de Palma, Picard and Dantan (2013), within family interactions play a key role in transport decisions, and couple mode choice results from a collective process. Since spouses’ route choice is likely to be governed by a similar process, we question the link between spouses’ risk attitudes. In this paper, we extend the method developed in de Palma and Picard (2005) and exploit the original data collected in the Mimmetic survey, in order to investigate this relation.

In Mimmetic survey, we collected information on a large sample of over 5,000 respondents, including both spouses on more than 1,000 couples. Participants to this survey were asked lottery-type questions as well as several questions related to socio-economic factors. This allows to measure individual risk aversion using a series of two lottery questions. A similar methodology has been used in de Palma and Picard (2005), using individual data from the Maddif survey.
The main innovation here is that risk aversion can be measured both for the husband and for the wife in a given couple, which allows us to measure the degree of homogamy of risk attitude within couples.

**Methodology**

For the first question, each respondent had to choose between a risk free alternative (a route with the guaranteed travel time) and a risky alternative (a route with a low travel time and a high travel time). From the travel times proposed, we can determine the threshold of risk aversion $\theta_1$ such that respondents with a higher (lower) risk aversion will choose the risk-free (risky) alternative.

For the second question, all individuals had to choose between the same risk free alternative and a new risky alternative. This risky alternative was more favorable for those who had previously selected the risk free alternative and less favorable for those who had previously selected the risky alternative. The thresholds of risk aversion $\theta_2$ and $\theta_3$ corresponding to these two cases are then respectively higher and lower than $\theta_1$. From these thresholds and from a methodology based on the Ordered Probit, we estimate the effects of individual characteristics on risk aversion.

We rely on the methodology developed in Picard and Wolff (2010) to compute the correlation between the observed and unobserved parts of spouses risk aversion parameters. The observed part corresponds to the effect of individual characteristics such as age or education on individual risk aversion of each spouse. The positive correlation between husband and wife’s age induces a positive correlation between husband and wife risk aversion (positive correlation between the observed components of risk aversions). The same holds for education. The results are more mitigate and more difficult to measure concerning the unobserved parts.

Interestingly enough, the estimate of the correlation between spouses risk aversion parameters depends on the utility function chosen to model risk attitude and measure risk aversion parameter (for example, CRRA and CARA utility functions).

**Results**

We test different utility function (CARA, CRRA). First, we study the impact of socio-economic characteristics on the level of risk aversion of the different members of a couple. Whatever the gender and the type of mode considered (private vs. public transport), risk aversion is found to be
lower among managers and white-collars than among employees, while it is found to be higher among blue-collars. Ceteris paribus, individuals are found to be less risk adverse when proposed a travel by private car than by public transport. When business is the travel purpose, risk aversion significantly increases.

Then, we analyze, using panel data techniques, the relation between the risk aversion of the man, and the risk aversion of the woman. This allows us to test two extreme theories about couple: in the first approach, (thus harmonized) couples get together, while in the second, different (and thus complementary) couples go together. The latter case means that a risk neutral man will get married with a risk adverse woman. Our results suggest that the first hypothesis is the most plausible.

References


