Schweizerische Gesellschaft für Agrarwirtschaft und Agrarsoziologie
Société Suisse d'Economie et de Sociologie rurales
Swiss Society for Agricultural Economics and Rural Sociology

Connecting farmers' risk perceptions, preferences and management strategies

Manuela Meraner, Robert Finger, ETH Zürich

Context/Theoretical background/Research question

Economic behavior is determined by personal characteristics and the perceived economic environment, which are interrelated (van Raaij, 1981). Along these lines, both farmers' perceptions of and personal characteristics (i.e. preferences towards risk) are important in understanding their risk behavior. In agricultural production farmers are confronted with a wide-range of potential risks to their farming income due to production, market and institutional risks. Farmers' subjective perception of these risk components determines which sources are major determinants for their risk behavior. Amongst the most prevalent farmers' characteristics to determine economic behavior involving risk is the farmers' attitude towards risk. In addition, the risk management is of highest and increasing importance for farmers. A rich body of literature has investigated the interrelationship between risk attitudes and risk management decision taking. In an early study, Meuwissen et al. (2001) examined the relevance of risk attitude for choices of risk management strategies, but restricted the elicitation of risk preferences to one method. However, especially since the seminal paper on risk preference elicitation methods of Holt and Laury (2002) the literature on the development of new methods has been growing rapidly (see Charness et al. (2013) for an extensive overview). As a result of applying different elicitation methods to the same individuals, it has been shown frequently that different methods not necessarily lead to similar, but often even to contrasting results (e.g. Reynaud and Couture (2012)). Simultaneously a growing number of studies investigate in the potential of different risk preference elicitation methods to actually explain real world (risk related) behavior. For instance, Dohmen et al. (2011) find in a large survey amongst a German general public sample that risk attitudes elicited via a lottery are not related to risk behavior, whereas a general self-assessing risk question relates to risk behavior better. Recently, Menapace et al. (2015) find in a study with Italian farmers differences when connecting results of different risk preference elicitation methods with their insurance uptake probability. To our knowledge, however, the consideration of a wider set of risk attitude elicitation methods together with a wider set of agricultural risk management measures (beyond insurances) has not been established so far. We aim to contribute to fill this research gap by investigating several risk attitude elicitation methods and risk management strategies simultaneously. We use a holistic approach by connecting results of three different risk preference elicitation methods with different risk management strategies, accounting for the interrelation between different risk management strategies.

Based on this background, we have three goals of our study: First, we aim to analyze how farmers' subjective risk perceptions as well as farm and farmers' characteristics affect different choices in risk management strategies, and how these components are interrelated. Second, we add to the literature on connecting measured risk attitudes with economic behavior by also including a comparison of three risk elicitation methods in this framework. In particular, we focus on the role of contextualized lotteries (Meraner et al. (submitted); Menapace et al. (2015)) to approximate responses towards risks by farmers.

Third, we aim to identify farm and farmer characteristics related to the risk perceptions and management strategies.

Methodology

We will conduct a mail survey amongst farmers in the German region North Rhine-Westphalia in December 2015. The paper pencil questionnaire includes the following aspects: i) subjective perception of risk, ii) risk preference elicitation, iii) information about the farm holding, iv) risk management strategies, v) farmers characteristics.

To measure the farmers subjective risk perception (i) we first analyze the major sources of perceived risks by introducing a scale from 1-5 to indicate the severity of risk perceived from three major risk types (i.e. weather and natural disasters, price volatility, political measures) (following Palinkas and Szekely (2008); Schaper et al. (2012)). Additionally, farmers are asked to choose one of the three types perceived to overall affect their farm the most. Based on the individually chosen major risk, we use the visual impact method (Hardaker et al. 2004) to elicit the subjectively perceived probabilities of past and expected income losses due to the most severe risk source. The farmers risk attitude (ii) is measured using three different elicitation methods: first, a general self-assessment question, following Dohmen et al. (2011), second, an agriculture specific business statement related to the farmers' willingness to take risks (following van Winsen et al. (2014); Meuwissen et al. (2001)), and third a Holt and Laury (2002) lottery experiment. In the latter, a contextualization towards agriculture will be used as proposed by Meraner et al. (2015). Moreover, we ask farmers to indicate information about the farm holding (iii), which include socio- economic aspects (e.g. production focus, succession, available labor force) and information on past losses. There are several risk management strategies (iv) that can be applied to cope with risk in agriculture. To identify the most relevant for our case study, we include a list of 10 different strategies in the survey that have been established based on expert interviews and literature review (Schaper et al. (2012); van Winsen et al. (2014)). We use factor analysis to group these strategies and reduce the dimension of strategies to be considered. Our survey also comprises information on farmers' personal characteristics (v) that are indicated in the literature to be potentially relevant to determine the choice of risk management strategy (van Winsen et al. (2014); Menapace et al. (2015)). In our study, these include the farmers' age, level of education, household size, farming experience and training.

In a next step, we connect the choice of specific strategies with farmers' personal characteristics (incl. risk attitudes) and subjective risk perceptions using a multinomial probit estimation. Thus we analyze the farm and farmers characteristics influencing the choice of different risk management strategies and interlinkages between these strategies. Additionally, following a similar approach as Menapace et al. (2013) we investigate which farmers' characteristics determine subjective risk perceptions using a regression analysis with the perceived probability of losses as dependent variable. Furthermore, we analyze the correlation of three different risk preference elicitation methods with the choice of risk management strategy separately to conclude which has the strongest positive evidence of behavioral validity.

Results

Our study will reveal unique insights how risk perception and risk attitudes affect the farmers' preferred risk management choices. Furthermore, it will shed further light into the important question which risk elicitation method is most appropriate to investigate farmers' decision making rationale.

Conclusion

This study explores the most severe sources of risk in the region North-Rhine Westphalia giving important insights for policy makers and agricultural advisors in the region. The here developed insights in the appropriateness of risk perception and risk elicitation methods to depict farmers' real world decision making will allow to develop procedures in which both risk perception and risk attitudes are identified and can be used for extension as well as to predict risk management decision to be taken.

References

Charness, G., Gneezy, U., & Imas, A. (2013). Experimental methods: Eliciting risk preferences. *Journal of Economic Behavior & Organization, 87*, 43–51.

Dohmen, T., Falk, A., Huffman, D., Sunde, U., Schupp, J., & Wagner, G. G. (2011). Individual risk attitudes: Measurement, determinants, and behavioral consequences. *Journal of the European Economic Association, 9*(3), 522–550.

Hardaker, J. B., Huirne, R. B. M., Anderson, J. R., & Lien, G. (2004). *Coping with risk in agriculture* (Ed. 2): CABI publishing.

Holt, C. A., & Laury, S. K. (2002). Risk aversion and incentive effects. *American Economic Review, 92*(5), 1644–1655.

Menapace, L., Colson, G., & Raffaelli, R. (2013). Risk aversion, subjective beliefs, and farmer risk management strategies. *American Journal of Agricultural Economics, 95*(2), 384–389.

Menapace, L., Colson, G., & Raffaelli, R. (2015). A comparison of hypothetical risk attitude elicitation instruments for explaining farmer crop insurance purchases. *European Review of Agricultural Economics*, 1–23.

Meraner, M., Finger, R., & Musshoff, O. (submitted). Involvement and inconsistencies in risk preference elicitation.

Meuwissen, M. P., Huirne, R. B., & Hardaker, J. B. (2001). Risk and risk management: an empirical analysis of Dutch livestock farmers. *Livestock Production Science, 69*(1), 43–53.

Palinkas, P., & Szekely, C. (2008). *Farmers' Risk Perception And Risk Management Practices In International Comparison* (47554).

Reynaud, A., & Couture, S. (2012). Stability of risk preference measures: results from a field experiment on French farmers. *Theory and Decision, 73*(2), 203–221.

Schaper, C., Bronsema, H., & Theuvsen, L. (2012). *Risikomanagement in der Landwirtschaft* (Schriftenreihe 36).

van Raaij, W. F. (1981). Economic psychology. *Journal of Economic Psychology, 1*(1), 1–24.

van Winsen, F., Mey, Y. de, Lauwers, L., Van Passel, S., Vancauteren, M., & Wauters, E. (2014). Risk perception, attitudes towards risk and risk management: evidence and implications. *Agricultural Economics*