

Risk Perception and Assessment in Austrian Agriculture and Forestry

Wahrnehmung und Bewertung von Risiko in der österreichischen Land- und Forstwirtschaft

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Summary

This article presents results of a postal survey on risk perception, assessment and management of Austrian farmers (N = 486). Results reveal that farmers with past risk experience are expecting risks to occur more likely and to be more damaging than farmers without past risk experiences. Both subgroups of farmers expect changes in EU regulations and agricultural policy to occur most likely in the future. The highest negative impact on the farm is expected from declining gross margins.

Keywords: risk perceptions of Austrian farmers, qualitative risk assessment, risk in agriculture and forestry

Zusammenfassung

Dieser Beitrag präsentiert die Ergebnisse einer schriftlichen Befragung von landwirtschaftlichen BetriebsleiterInnen in Österreich (N = 486) zu Risikowahrnehmung, -bewertung und -management. Die Ergebnisse zeigen, dass BetriebsleiterInnen mit Risikoerfahrung die Wahrscheinlichkeit und das Schadensausmaß von Risiken höher einschätzen, als jene ohne Risikoerfahrung. Beide Gruppen der BetriebsleiterInnen halten zukünftige Änderungen in den EU-Regelungen und der Agrarpolitik für am wahrscheinlichsten. Die negativsten Auswirkungen auf den Betrieb erwarten sie hingegen von sinkenden Deckungsbeiträgen.

Schlagworte: Risikowahrnehmung österreichischer LandwirtInnen, qualitative Risikobewertung, Risiken in Land- und Forstwirtschaft

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1. Introduction

Risk assessment and management are fundamental entrepreneurial activities in agriculture. Farmers are usually used to manage risks like adverse weather conditions, volatility of prices and availability of agricultural inputs and outputs or changing family relations. However, the spectrum of risks may increase due to climate change impacts, frequent agricultural policy reforms as well as dynamic markets and consumer trends (FRENTRUP et al. 2012, 6). Consequently, measures to raise awareness and assess risks, promote risk education and develop efficient risk management instruments have become important elements in farm policies and topics in extension services (EUROPEAN COMMISSION, 2005, 6; TANGERMANN, 2011, 12f; KAHAN, 2013). The scientific interest in the topic of risks in agriculture has risen as well. A literature review shows that especially since the turn of the millennium, several survey studies were conducted on risk perceptions and risk management in European agriculture, for example in the Netherlands, Norway and Germany (MEUWISSEN, et al. 2001; FLATEN, et al. 2005; SCHAPER et al. 2012a, 2012b; WAUTERS, et al., 2014). Considering mountainous regions, several studies have been published recently on risk perceptions and risk management of farmers and agricultural processors (SCHARNER and PÖCHTRAGER, 2013; PÖCHTRAGER and SCHARNER, 2014; HAMBRUSCH et al., 2015; JURT, 2016; ARNREITHER, 2016).

Methodologically the studies follow the psychometric paradigm (SLOVIC, 2007) focussing on individuals' risk perceptions measured by socio-economic scaling. Concerning risk perceptions of farmers VAN DUINEN et al. (2015, 3ff.) distinguish between objective (risk exposure, sensitivity to risk) and subjective determinants (socio-demographics, risk experiences, perceived level of control, social interactions). In order to contribute to the discussion on the influence of experiences on risk perceptions, this article presents results of a survey study on risk perceptions and management of Austrian farmers. The following research questions are considered: What type of risks and chances did Austrian farmers experience in the past decade? How do farmers with and without past risk experience assesses future risks?

The article is structured as follows. In section 2, we present the theoretical risk concepts of our study; and in section 3, we describe the empirical methods used. Results are presented in section 4. Finally in section 5, we draw some conclusions.

2. Risk Concepts

Risk is an important topic in many scientific disciplines and therefore a variety of risk concepts (syn. definitions of risk) exist (for an overview see RENN 2008a, 2008b). In our study, we refer to a social science approach combining two components: i) a real event or a human action causing a real outcome, and ii) the identification and interpretation of the impact of the outcome on the individual's welfare. The interpretation of the impact as being positive or negative and what is valuable depends upon a person's value system and preferences (RENN, 2008a, 54ff) and is influenced by public media and personal communication processes (RENN, 2008b, 196ff).

According to this theoretical approach we define risk as the perceived potential of a negative impact on something of value, caused by an event or an action. Risk is the opposite of chance, being the perceived potential of a positive impact. For structuring the field of risk in agriculture we distinguish seven types (MARTIN, 1996, 32; HARWOOD et al., 1999, 7): i) production risks (e.g. weather events, production events like diseases and pests, availability of production items and services), ii) market risks (e.g. input and output prices), iii) regulatory risks (e.g. national and international laws and regulations, taxes, agricultural policy), iv) financial risks (e.g. debt situations, interest rates, availability of capital), v) technological risks (e.g. use of machinery and equipment in production) vi) personal risks (e.g. family, social and health situation, farm succession), and vii) social risks (e.g. vandalism, theft, competition, social acceptance of agriculture).

3. Material and Methods

The data was compiled from a postal survey in January 2015. A four pages questionnaire was sent to a stratified sample of 2000 farmers in Austria. The strata were the six farm types: cash crop farms, permanent crop farms, forage-growing farms, intensive livestock farms, mixed

farms (crops and livestock) and forestry enterprises. The questionnaire contained five sections with questions and psychometric scales to: i) general attitudes with respect to risk and farm management, ii) past risk and chance experiences, iii) future risk and chance expectations, iv) risk management, and v) sociodemographic and farm characteristics.

The questionnaire contained an open ended question in order to collect a broad range of answers to past experiences. Farmers were asked to state up to three important events which affected their farm business positively or negatively within the past decade. For surveying future risk and chance expectations we used a qualitative assessment in the style of an expected value method: we measured the subjective perception of the farmers with regard to the probability of occurrence of a certain event on a Likert type scale (with 1 = very unlikely, 2 = rather unlikely, 3 = half-half, 4 = rather likely, 5 = very likely). On a second Likert type scale, we measured the expected impact in case of occurrence assuming that an event (e.g. a food scandal in the processing chain) with negative impacts on one group of farmers (e.g. contractors of the processor) may have positive impacts on others (e.g. farmers with direct marketing). Hence, we departed from scaling only negative impacts (e.g. SCHAPER, et al. 2012a; SCHARNER and PÖCHTRAGER, 2013; WAUTERS, et al., 2014) and used a symmetric scale covering positive and negative impacts as well. The coding with -2 = very negative, -1 = rather negative, 0 = no impact, 1 = rather positive, 2 = very positive enabled immediate identification of chances and risks by multiplying probability and impact for an overall assessment of events. For statistical analysis the answers to the open ended question were categorized and quantified according to the surveyed potential future events. Additionally further categories not listed in the questionnaire were developed. Past experiences and future expectations were analysed by using standard methods: frequency analysis, Chi Square test and Mann-Whitney U test.

4. Results

Until the end of March 2015 a total number of 486 questionnaires with sufficient answers was returned (response rate 25%). The sample contains farmers belonging to cash crop farms (21%), permanent crop farms (5%), forage-growing farms (49%), intensive livestock farms

(4%), mixed farms (10%), and forestry enterprises (11%). About 51% are full time farmers and 49% part time farmers. About 22% of the farmers are producing organically and 49% are situated in mountainous areas. One third of the farmers are female. The average age is 48 years.

4.1 Past Experiences on Risk and Chance

The open ended question on subjectively important events with either positive or negative impact on the farm experienced during the past ten years was answered by 311 respondents out of 486 (64%). They noted freely one event at least, which sums up to 647 events in total of which 576 answers addressing negative impacts (e.g. risks) and 71 addressing positive impacts (e.g. chances). About 70% of all reported chances are from personal sources, 11% from production, 10% from market, and 9% from technical inventions. The reported events with negative impact mainly concern production risk (41%), regulatory risk (22%), market risk (21%), and personal risk (15%) (table 1). Farmers reported only a few financial risks but no technical or social risks affecting their farm in the past decade.

Tab. 1: Experienced events with negative impact (risks) subjectively considered important by Austrian farmers in the past decade

Risk type	Risk source	Freq.	Percent	
Production risk	Adverse weather events	196	34%	41%
	Adverse production events (e.g. pests)	24	4%	
	Lack of inputs and services	10	2%	
	Other production factors	6	1%	
Regulatory risk	EU regulations and agric. policy	77	13%	22%
	National laws and regulations	53	9%	
Market risk	Adverse input and output prices	50	9%	21%
	Declining gross margins	41	7%	
	Adverse supply market conditions	29	5%	
Personal risk	Poor family relations and health problems	37	7%	15%
	Insufficient family labour supply	47	8%	
Financial risk	High debt burden and high lending rates	6	1%	1%

Source: OWN CALCULATIONS, Survey 2015

The most frequently mentioned production risk experienced in the past comes from adverse weather events (34%) followed by EU regulations and agricultural policy (13%), national laws and regulations (9%), and

adverse input and output prices (9%). About 8% of the reported events with negative impacts resulted from insufficient family labour supply, and 7% from poor family relations and health problems (table 1).

4.2 Future Risk and Chance Expectations

Farmers also assessed future events with regard to their probability of occurrence and impact. Assuming a relationship between experiences and future expectations, we compared responses of farmers who stated a certain risk in the past (see 4.1.) with those who did not. Table 2 shows the arithmetic means of probability of the two subgroups. Although not all differences are statistically significant, farmers with stated past risk experiences expect all risk sources to occur more likely than farmers without. In both subgroups, the average perceived probability is highest for changes in EU regulations and agricultural policy (4.05, 4.32), and lowest for poor family relations (2.26, 2.38).

Tab. 2: Risk assessment of Austrian farmers – perceived probability of occurrence

Risk source	Past Risk Experience of Farmers						Diff. Sig.
	no			yes			
	N	Mean	Rank	N	Mean	Rank	
Adverse weather events	336	3.45	6	150	3.74	6	***
Adverse production events	461	2.97	7	25	3.02	8	
EU regulations and agric. policy	434	4.05	1	51	4.32	1	**
National laws and regulations	437	3.59	4	48	3.90	3	**
Adverse input and output prices	442	3.80	2	43	3.89	4	
Declining gross margins	436	3.78	3	41	4.10	2	**
Adverse supply market conditions	460	3.56	5	25	3.82	5	**
Poor family relations	438	2.26	9	34	2.38	9	
Insufficient family labour supply	445	2.91	8	38	3.56	7	***

Notes: Mean on a 5 point scale (1 = very unlikely, 2 = rather unlikely, 3 = half-half, 4 = rather likely, 5 = very likely), Rank according to decreasing mean.
Differences between subgroups with $n \geq 20$: Mann Whitney U test, sig. *** $p \leq 0.001$; ** $0.001 < p \leq 0.05$; * $0.05 < p \leq 0.1$.

Source: OWN CALCULATIONS, Survey 2015

The scale for assessing the impact of an event in case of occurrence is from -2 = very negative to 2 = very positive, the calculated means can be either positive (farmers on average expect positive impacts) or negative (negative impacts expected). The results show that farmers expecting rather positive impacts (i.e. chances) include changing

consumption habits towards regional products (0.74), technical inventions (0.71), increased mechanization in agricultural production (0.68) and farm transfer to a successor (0.35). However, the expected negative impacts are prevailing (see Table 3). Furthermore, farmers with stated risk experiences are expecting higher negative impacts for the future than farmers who did not state past risk experiences. Both subgroups are expecting declining gross margins, to have the highest negative impact (-1.58, -1.29) and poor family relations to result in the lowest (-0.62, -0.90).

Tab. 3: Risk assessment of Austrian farmers – perceived impact in case of occurrence

Risk source	Past Risk Experience of Farmers						Diff. Sig.
	no			yes			
	N	Mean	Rank	N	Mean	Rank	
Adverse weather events	319	-1.03	6	141	-1.22	6	***
Adverse production events	432	-1.05	5	24	-1.27	5	
EU regulations and agric. policy	408	-1.01	7	49	-1.27	4	**
National laws and regulations	412	-1.16	2	46	-1.35	3	**
Adverse input and output prices	414	-1.09	4	42	-1.18	7	
Declining gross margins	414	-1.29	1	38	-1.58	1	**
Adverse supply market conditions	430	-0.92	8	25	-0.96	8	
Poor family relations	413	-0.62	9	31	-0.90	9	*
Insufficient family work craft	415	-1.10	3	36	-1.39	2	**

Notes: Mean on a 5 point scale (-2 = very negative, -1 = rather negative, 0 = no impact, 1 = rather positive, 2 = very positive), Rank according to increasing mean.
Differences between subgroups with $n \geq 20$: Mann Whitney U test, sig. *** $p \leq 0.001$; ** $0.001 < p \leq 0.05$; * $0.05 < p \leq 0.1$

Source: OWN CALCULATIONS, Survey 2015

5. Discussion and Conclusions

Results of a survey among Austrian farmers reveal a wide range of past risk experiences. About 89% of all reported events experienced in the past decade affected the farm business negatively. Only 11% of the reported events – mainly from the personal sphere of the family – had positive impacts. Production risks, in particular adverse weather events, were experienced most frequently. Nevertheless, farmers do not rate adverse weather events with the highest probability of future occurrence, but changes in EU regulations and agricultural policy

followed by declining gross margins and adverse input and output price developments. Our results confirm other study results conceptualising risk as perceived probability and perceived impact. German as well as Flemish farmers expect agricultural policy decisions as well as market and price risks (including low gross margins) to occur more likely than weather events or climate change (SCHAPER et al., 2012a, 154f; SCHAPER et al., 2012b, 24; WAUTERS, et al., 395). This is also supported by economic modelling studies indicating policy changes likely to be of larger importance than climate change in the next decades (e.g. SCHÖNHART et al., 2014).

With respect to the impact of occurrence, Austrian farmers expect declining gross margins as most negative for their farm business. However, related price and market risks are only ranked in the middle of the range. The second most important risk relates to national laws and regulations, which may be driven by a public debate on raising social security and real estate taxes during the survey period. The impact from EU regulations and agricultural policy is expected to be moderately negative, although public payments of the CAP contribute to farm household incomes with a constant share of about 36% on average (BMLFUW, 2015, 227). The negative perceptions may result from farmers' experiences of frequent reforms of the CAP, which shortens the planning horizon at farm level. In comparison to other European countries Austrian farmers are equally or even less worried about changes in EU regulations and agricultural policy (e.g. MEUWISSEN et al., 2001, 47; FLATEN, et al., 2005, 17; SZEKELEY and PALINKAS, 2009, 59; WAUTERS, et al., 2014, 396).

Finally results of our study also reveal that past risk experiences of Austrian farmers are influencing their risk perceptions. Farmers having experienced a certain risk in the past expect this risk to occur more likely and with a higher negative impact than farmers without past risk experience. This goes in line with VAN DUINEN et al. (2015, 12) showing that previous experiences of drought damage has led to higher risk perceptions among Dutch farmers. These results support evidence that risk experiences lead to higher risk awareness. Due to the fact, that learning from colleagues is one of the main sources of farmers in adopting knowledge or new farming methods and behaviour (e.g. in context with organic farming), the individual experiences could be

used for peer-to-peer training in risk management by extension services.

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