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RESEARCH ARTICLE

Analyzing strategic entrepreneurial choices in agriculture—Empirical evidence from Germany

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Abstract

Entrepreneurship in agriculture is a phenomenon that is growing in importance with the changing framework conditions for agricultural production and has led to heterogeneity in farm business development paths. To understand this phenomenon better, a classification scheme for strategic entrepreneurial choices in agriculture is developed for family farmers. The choices that are scrutinized are reduction, continuation, expansion, diversification, and the dual strategy of expansion and diversification. Each farmer is uniquely assigned to one of these choice classes according to their implemented entrepreneurial activities. Determinants influencing these choices are investigated with a multinomial logit model. The data are derived from a quantitative survey among German farmers ($N = 745$). Strong effects are observable within the area of personal factors; creativity and risk affinity benefit entrepreneurial strategies connected with diversification. Farmers with a third-level education qualification are less likely to follow expansion strategies, and those with off-farm employment and risk-averse farmers mainly choose a reduction strategy. Family involvement, especially the farmer's spouse, proves to have stabilizing and even enhancing effects on certain strategies.

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Implications for policymakers and actors within the agricultural sector can thus be derived.

KEYWORDS

entrepreneurship, farming strategy, multinomial logit model, strategic entrepreneurial choices

JEL CLASSIFICATION

M21; Q12; Q18

1 | INTRODUCTION

The context in which farmers operate is subject to continuous change. Over the last decades in the European Union (EU), this was caused, *inter alia*, by the liberalization of the Common Agricultural Policy (CAP). From the very beginning, market support policies were an integral part of CAP. Since the 1990s, this has steadily reduced, causing an increase in competitive pressures. In addition, societal demands, consumer behavior, and desires are changing. As is seen in policy requirements, agricultural production is currently under increasingly critical public consideration (Dias et al., 2019a; Weltin et al., 2017). The CAP is fundamentally modifying and incentives are being created for multifunctional agriculture to ensure the future viability of rural areas. In fact, planned amendments to the CAP after 2020 explicitly encourage entrepreneurship within agriculture (Grethe et al., 2018). Thus, common strategies of growth and expansion of known production activities do not work for all farmers anymore, leading to heterogeneity in farm business development paths (Morris et al., 2017).

Notwithstanding the importance of entrepreneurship in agriculture, interest in this field of research has only gained more interest recently, and is still being consolidated (Dias et al., 2019b). The topics currently investigated focus on the entrepreneurial skills of farmers, and the way they exploit their resources to adapt to structural changes. Up until about a decade ago, much research effort was made to create typologies and definitions of entrepreneurial concepts. In this context, the most prominent phenomenon discussed in the literature is diversification, which is generally defined as remaining in and growing the business by moving strategically and systematically away from core activities (McElwee & Robson, 2005). As diversification is a broadly defined concept comprising of also other more specific concepts, it has mostly been used in the respective literature to analyze the backgrounds and determinants of entrepreneurial strategies (Dias et al., 2019a, 2019b). Many of these studies focus on categorizing and describing farmers and their respective strategies, often with the help of a cluster analysis (e.g., Lauwere, 2005; Morris et al., 2017; Weltin et al., 2017). Studies dealing with conventional strategies, such as growth or decline in known areas, mostly focus on explaining structural change in retrospective (Glauben et al., 2006; Huettel & Margarian, 2009; Viira et al., 2013; Weiss, 1999). However, studies investigating the broader range of available entrepreneurial strategies in agriculture, including growth and decline in known areas as well as diversification altogether cannot be found.

Against this background, it is of major importance for politicians as well as decision-makers and consultants within the sector to know which factors drive farmers' choices toward certain farming strategies. This is particularly important as many new requirements for agricultural production aim to strengthen family farms and rural areas (Grethe et al., 2018), while expanding structures and withdrawing smaller farms (Deutscher Bauernverband [DBV], 2018). To the best of the authors' knowledge, there has been no study analyzing the determinants of the whole range of strategic entrepreneurial choices in agriculture in depth. Furthermore, while most studies in the fields described above focus on European countries, Germany has rarely been investigated (Dias et al., 2019b). This study aims to fill this research gap by developing a classification scheme describing strategic entrepreneurial

choices in agriculture as a basis for analyzing determinants of these choices. Data was collected from a quantitative survey among German farmers (N = 745). The proposed classification scheme is designed especially for family farmers and makes it possible to uniquely assign them to the respective groups of implemented entrepreneurial choices according to predetermined criteria. For this reason, the classification scheme can be applied in other countries with comparable structures. The determinants of the respective choices are analyzed with the help of a multinomial logit (MNL) model.

The paper is structured as follows. To prepare a basis for the analysis, in Section 2, the classification scheme and the possible determinants of strategic entrepreneurial choices in agriculture are derived from the literature. The theoretical and empirical model as well as the data are presented in Section 3. The results are presented and discussed in Section 4. Finally, conclusions are drawn in Section 5.

2 | CONCEPTUAL FRAMEWORK

As a basis for the analysis, in this section, the conceptual framework is described. First, a classification scheme is established and afterwards possible determinants of strategic entrepreneurial choices in agriculture are identified from the literature.

2.1 | Classification scheme

First, by using the existing literature, a classification scheme describing strategic entrepreneurial choices in agriculture is developed, as illustrated in Figure 1. This is especially applicable for family farmers as it implies a deep involvement in the farm and development pathways over time and serves as the basis for the analysis of the determinants influencing farmers' different choices when it comes to entrepreneurial strategies. Building on the works of Bowler (1992) and Ilbery and Bowler (1998), the classifications derived by García-Arias et al. (2015) and the diverse set of farm development strategies stated by McElwee (2006), the scheme divides stagnation and

Reduction Decrease of owned land of more than 20% or/and reduction of the complexity of the operation	stagnation
Continuation No considerable change, de-/increase of owned land less than 20%	
Expansion Increase of owned land of more than 20% or/and expansion of animal husbandry or/and expansion of already present diversification activities	growth
Expansion & Diversification Increase of owned land of more than 20% or/and expansion of animal husbandry or/and expansion of diversification activities started by the predecessor AND start-up of diversification activities	
Diversification Start-up of diversification activities	

FIGURE 1 Classification of strategic entrepreneurial choices in agriculture

growth. Stagnation refers to the reduction of farming activities and the continuation of the activities implemented by the predecessor. Growth refers to the expansion of existing activities. As expansion is deemed a rather conventional growth strategy, diversification is seen to be an innovative growth strategy. Diversification is mainly described in terms of on-farm diversification, as suggested by Welten et al. (2017), and structural and agricultural diversification, based on the basic typology of Ilbery (1991) and adjusted for the present situation. Conventional growth and decline strategies are usually investigated separately from innovative growth strategies, such as diversification. The classification scheme combines them and additionally introduces a category of farmers who follow a dual strategy of expansion and diversification, as is illustrated in Figure 1.

Due to the fact that pursuing a reduction strategy can be as successful as pursuing an expansion strategy (Appel & Balmann, 2018), depending on the respective situations, the division of categories does not judge any choices made by the farmer.

2.2 | Possible determinants of strategic entrepreneurial choices in agriculture

First of all, the existing literature on agricultural entrepreneurship, including the prevailing phenomena of diversification, pluriactivity, and portfolio entrepreneurship, as well as the literature on the growth and decline of farms, have been analyzed to identify the determinants of the strategic entrepreneurial choices in agriculture. In conformity with Bateman and Ray (1994) and García-Arias et al. (2015), these can be assigned to three fields: determinants concerning farmers; determinants concerning farm characteristics, both representing internal factors; and determinants concerning the context of the farm and the farmer, representing external factors. An overview of the possible determinants of entrepreneurship in agriculture is shown in Figure 2.

2.2.1 | Determinants concerning the farmer

The organization of the farm is motivated by the values, attitudes, and goals of the farmer (Lauwere, 2005; McElwee, 2008; McFadden & Gorman, 2016). Farmers typically have a deep personal involvement with their farm operations, and a strong identification with agriculture (Vesala & Vesala, 2010; Vik & McElwee, 2011).

Agriculture is currently a male-dominated field, which has led to some studies especially investigating the role of women. Women are credited with playing leading roles in facilitating the introduction of new practices and conceptions on the farm and hence act as important innovators (Barbieri & Mahoney, 2009; McGehee et al., 2007; Seuneke & Bock, 2015). However, Bock (2004) finds that their entrepreneurial activity on the farm is often

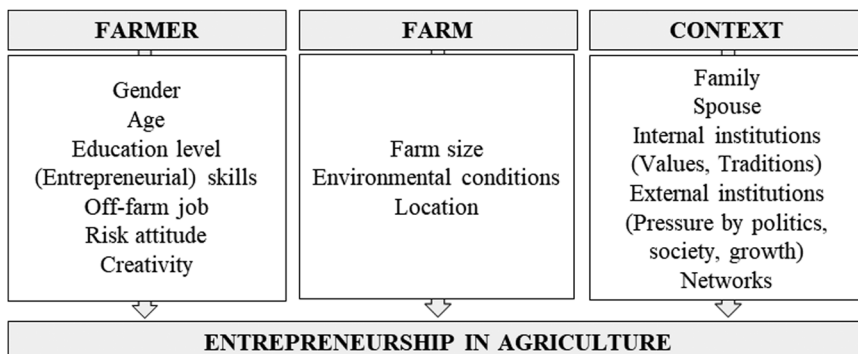


FIGURE 2 Determinants of entrepreneurship in agriculture

relatively that of a small scale and that they avoid liabilities. Along with the traditional farming activities, they not only start side-businesses but also simultaneously take care of their family. He describes the role of women in agriculture as “fitting in and multitasking” (Bock, 2004). Regarding men, Pindado and Sánchez (2018) observed a significant influence on growth-associated agri-entrepreneurship. That is, men are found to generally put more value on growth activities than women are (Bakucs & Fertó, 2009; Cliff, 1998; Weiss, 1999).

One of the most frequently investigated determinants is the farmer's age. Here, the results differ. In terms of farm growth, Weiss (1999) observed a nonlinear effect, while Viira et al. (2013) revealed that farm growth probability is highest for farmers aged 40–49 years. In terms of decline and exit, it is proved that the younger the age group, the lower the probability of the business declining and exiting the sector (Breustedt & Glauben, 2007; Glauben et al., 2006; Viira et al., 2013), as younger farmers tend to have more capacity to grow than older farmers do (Bakucs & Fertó, 2009). Considering portfolio entrepreneurship, Carter (1998, 2001) and Vesala et al. (2007) found that farmers with manifold business structures are younger than their peers. The same is found for diversification activities (García-Arias et al., 2015; Weltin et al., 2017). McElwee (2008) states in his taxonomy of entrepreneurial farmers that the type “farmer as entrepreneur” is usually younger than 45 years of age, while the “farmer as farmer” is usually older than 45 years of age and has been farming for over 20 years. In contrast, Ilbery (1991) observed that farmers with alternative enterprises are over 45 years of age, and have many years of experience.

In addition to age, education level seems to be of importance. For instance, higher entrepreneurial activity often results in an enlargement of the farm portfolio, which constitutes an increase in complexity (Carter, 1998, 2001; Gindele et al., 2015). To cope with this, many studies agree that farmers showing a high innovative entrepreneurial activity (Barbieri & Mahoney, 2009; Carter, 1998, 2001; Gellynck et al., 2015; Vesala & Vesala, 2010; Vesala et al., 2007) or growth activity (Bakucs & Fertó, 2009; Rizov & Mathijs, 2003; Viira et al., 2013) are better educated than their peers. In this context, Meert et al. (2005) regard education level as a crucial determinant of diversification. Referring to the work on drivers of organizational action by Chen (1996), it can be argued that diversification can be a function of awareness, motivation, and capability. Education may enhance awareness of possibilities as well as the capability to take action. As further aspects in this context, risk-taking and creativity are regarded as favoring entrepreneurial action, especially those associated with innovation, seizing of business opportunities, and growth (European Commission [EC], 2003; Hébert & Link, 1988; Van Praag, 1999).

The education level can cause an ambiguous overall effect; while a higher level of education might benefit the farm development, well-educated farmers have better job opportunities outside of the farm, and this could possibly lead to a reduction in farming activities (Rizov & Mathijs, 2003). This situation may also apply to the factor of the farmers' off-farm employment. On the one hand, an off-farm job is regarded as positive for innovation, as skills gained from an off-farm job can be applied to the family farm business and which introduces new perspectives and ideas (McFadden & Gorman, 2016). On the other hand, an attractive job outside the farm can increase the probability that the farmer will fail to return full time to farming (Viira et al., 2013). Viewed in a different way, Weiss (1999) regards multiple job-holding as a key factor relating to the course of structural change, as it may stabilize the income and have a decelerating effect (Breustedt & Glauben, 2007; Glauben et al., 2006; Goetz & Debertin, 2001; Viira et al., 2013).

2.2.2 | Determinants concerning the farm

Besides the farmers' attributes, the characteristics of the farm itself play a decisive role in determining strategic entrepreneurial choices. The size of the farm, mostly measured by the cultivated area of land, is a determinant often discussed in the literature. Accordingly, the initial size often correlates positively with the survival of the farm, that is, farm decline is more likely for smaller farms (Breustedt & Glauben, 2007; Glauben et al., 2006; Hennessy & Rehman, 2007; Rizov & Mathijs, 2003; Viira et al., 2013; Weiss, 1999). Larger farms have more

resources in terms of land, buildings, workforce, and financial power, which, along with managerial ability (Penrose, 1959), constitute a basis for entrepreneurial activity. This often leads to a higher tendency to think entrepreneurially and start diversification activities (Carter, 1999, 2001; García-Arias et al., 2015; Ilbery, 1991; Lange et al., 2013; McNally, 2001).

Apart from that, in some cases, diversification and pluriactivity can serve as a compensation strategy for any low profitability of bulk production due to low prices or bad production conditions (Bohnet et al., 2003; Weltin et al., 2017; Wolf et al., 2007). Therefore, these approaches can also result in a survival strategy for low-income farms, eventually leading to a new profitable source of income as an alternative form of growth (Bateman & Ray, 1994; Bohnet et al., 2003; Meert et al., 2005; Pfeifer et al., 2009). This is in accordance with the finding of Penrose (1959) that free managerial resources due to the absence of growth possibilities in terms of land can be redeployed to start new diversification activities. In contrast to this, farmers with good conditions for classical agricultural production often show less entrepreneurial activity, as they do not necessarily need alternative sources of income (Grande, 2011; Ilbery, 1991; Northcote & Alonso, 2011; Pfeifer et al., 2009). Furthermore, a number of studies found that smaller farms grow faster than larger farms (Bakucs & Fertó, 2009; Shapiro et al., 1987; Viira et al., 2013; Weiss, 1999).

Another farm factor influencing entrepreneurship in agriculture is the farm location. Existing studies found that the proximity to big cities or areas with a high number of tourists favor diversification as well as new venture creation as sales markets and consumers are in the vicinity (Lange et al., 2013; McNally, 2001; Northcote & Alonso, 2011; Pfeifer et al., 2009). In addition, Glauben et al. (2006) found that farms with a central location are less likely to decline and exit. In contrast to this, Goetz and Debertin (2001) detected an accelerating effect on exit rates. This may be due to the reason that especially in proximity to urban areas land prices are high (Hennig & Latacz-Lohmann, 2017; Lehn & Bahrs, 2018) constituting poor conditions for expansion strategies as structural decisions are considerably determined by the competitiveness of farms on the land market (Huettel & Margarian, 2009).

2.2.3 | Determinants concerning context

The third field of determinants is the context of the farm and farmer. Most farms are family-run, so entrepreneurial choices are not only dependent on the business but also on the family life cycle (Alsos et al., 2014; McNally, 2001; Pfeifer et al., 2009; Viira et al., 2013). According to existing studies, the family but especially the farmer's spouse, plays a decisive supporting role in the farm strategy, especially for the emergence of new ventures (Alsos et al., 2014; Ferguson & Hansson, 2015; McNally, 2001; Seuneke & Bock, 2015). Family involvement in the business also has a positive effect on the decision to continue farming (Breustedt & Glauben, 2007; Lansberg & Astrachan, 1994; Poza, 1989) and expand the business (Weiss, 1999).

Furthermore, internal and external institutions can be identified from the literature as relevant factors affecting entrepreneurial activity. Internal institutions consist of rules evolving within a group based on experience gained over time while external institutions are imposed externally from above (Kasper & Streit, 1998). In the agricultural setting, especially values and traditions are important internal institutions (Fitz-Koch et al., 2018) while politics, societal expectations, and technical progress all constitute external institutions influencing the agricultural sector nowadays. The pressure exerted by these actors is regarded as a push factor for entrepreneurship in agriculture (Burton & Wilson, 2006; Morgan et al., 2010; Wolf et al., 2007).

Moreover, the importance of networks is widely acknowledged and subject to research within the field. Farmers are often anchored in broad social networks (Wolf, McElwee, & Schoorlemmer, 2007) and mostly have wide networks of practise (Oreszczyn et al., 2010). This fosters new venture creation, diversification and the implementation of innovations (Ferguson & Hansson, 2015; Grande, 2011; McFadden & Gorman, 2016; Meert et al., 2005). Thus, networking and co-operation both constitute key entrepreneurial skills (Wolf & Schoorlemmer, 2007).

3 | METHOD AND DATA

3.1 | Theoretical and empirical model

The classification scheme presented in Section 2.1 assumes that the entrepreneurial activity of a farmer is the function of the farmer's choice between the different stagnation and growth strategies. The theoretical background of this choice model is based on the assumption that an individual i chooses a certain strategy s by comparing the utilities derived from all other alternatives S_i , and decides for the strategy maximizing their utility. This is reflected in McFadden's model of random utility maximization. Leaving out the subscript i in the first two equations, the random utility of outcome s can be described as

$$U_s = V_s + \varepsilon_s, \quad (1)$$

where V_s stands for the systematic component and ε_s for the random disturbance (Cramer, 2003). V_s in this case is a function of the observed attributes of the strategic entrepreneurial choice s and the characteristics of the decision-maker. The random component includes unobserved characteristics and imperfections of the alternative and the decision-maker and their individual behavior (Manski, 1977). The subscript t stands for all choices. The probability P that an individual makes a specific choice s can be expressed as

$$P_s = \Pr(U_s > U_t \text{ for all } t \neq s \in S). \quad (2)$$

Thus, the utility associated with a particular strategy is a function of a vector containing attributes of the strategy on the one hand, and a vector of socioeconomic characteristics of the decision-maker on the other hand. This is why factors increasing the utility associated with a certain strategy increase a farmer's probability of choosing that strategy. In this paper, the strategies are reduction ($s = 1$), continuation ($s = 2$), expansion ($s = 3$), the dual strategy of expansion and diversification ($s = 4$), and diversification ($s = 5$).

To identify which determinants have an effect on the choice of different entrepreneurial strategies, a MNL was estimated. The decision of a farmer i to choose a certain strategy s is modeled as a vector y_{is} with the decision for a certain strategy $s(i)$ equal to 1, and all other elements equal to 0. The probability P that a farmer i chooses strategy s is described as a function of the investigated determinants, the covariates x_i as well as the unknown parameters θ . The probability function contains separate parameter vectors β_s^* for each state s . Because these vectors are expressed as a difference to another vector, a reference category β_t^* needs to be specified, which will be reduced to 0. In this case, continuation $s = 2$ is chosen as the reference category because it represents the stage in which every farmer was at least in the beginning. The formulation of the probabilities is defined as (Cramer, 2003)

$$P_{is} = P_s(x_i, \theta) = \frac{\exp(x_i \beta_s)}{1 + \sum_{t \in S, t \neq 2} \exp(x_i \beta_t)}. \quad (3)$$

In this entrepreneurial choice model, factors potentially affecting the utility for the decision for a certain strategy are included as explanatory variables. In the area of farming, a similar model designed by Hennessy and Rehman (2007) has been estimated, for example, to determine the occupational choice of farm heirs.

3.2 | Data

The data used in the study were collected by a quantitative online survey of German farmers. As the subject of the study is future-orientated, farm successors who already work on the farm and are significantly involved in the management and development of the operation were also included in the sample (37% of the participants). This is a distinguishing feature of the sample at hand compared to census data, where only the officially-registered generation is included and some of the younger farmers are often missing. The description of the target group was:

"Farmers and farm successors who already work in the farm business and are significantly involved in the management and development of the farm." To ensure that the respondent is indeed in charge of the farm business, the very first question in the survey was "Are you primarily responsible for the management and development of an agricultural business?". The participant needed to select yes, otherwise the survey respondent would not have been able to continue with the survey. The structure of the survey was organized according to the three relevant areas identified from the literature (see Section 2.2): factors concerning the farm; factors concerning the farmer; and factors concerning the context. The questions were generated according to the findings from the literature and ten expert interviews. The experts were consulted in the form of semi-structured interviews. Among the interviewees were farmers (5), agricultural economists (3), a consultant (1) and an expert of agricultural education (1). The main contributions of these interviews consisted of a discussion of the determinants derived from the literature, an adaption of these to the German context and the addition of promising relevant aspects. The survey was pre-tested twice by 26 and 19 farmers, respectively. Data collection took place from November 2018 to February 2019. The survey link and barcode were distributed through different channels: institutions, such as education centers in rural areas, farmers' and young farmers' associations' homepages, social media channels, e-mail distribution lists, and newsletters. Additionally, farmers were asked directly to take part during an agricultural fair, and flyers were distributed at further farmer events. Furthermore, articles were published in regional as well as national agricultural magazines. This resulted in 926 completed questionnaires. From these, 62 participants did not fit the target group, and were automatically led to the end of the survey. Furthermore, the variables were checked separately for big outliers, for instance, unrealistic high or low amounts of rainfall or numbers of soil quality. This led to the exclusion of 31 observations. Afterwards, every single observation was checked horizontally with regard to the consistency across the different variables. Accordingly, another 26 observations were excluded (e.g., a 25-year-old farmer who stated to work for 30 years on the farm). Finally, respondents who are just managing the farm as "external" managers without any family affiliation were omitted from the sample (62 observations) as well because the classification scheme is explicitly designed for family farmers (see Section 2.1). This led to a total of 745 respondents for the data analysis and is also the reason for the age span from 19 to 74 years as well as for the area span from 1 to 3600 ha of initial farm size.

To assign the sample to the different groups of strategic entrepreneurial choices as introduced in Section 2.1, certain characteristics of the farm and the farmer describing their entrepreneurial action during their working period on the farm were used, as illustrated in Figure 1. Assignment procedure started with the group of continuation; according to our theory, this is the state in which every farmer was, at least at the beginning. If farmers had decreased the amount of their owned land by at least 20%, or stated that they majorly reduced the complexity of the operation, they were assigned to the first group called reduction. The change in land was measured by comparing the initial size of land owned at the point of time the farmer started farming on that farm with the current land ownership. To use the amount of land to measure farm size is a common practice (cf. e.g., Carter, 1999; Glauben et al., 2006; Huettel & Margarian, 2009; Ilbery, 1991; Pfeifer et al., 2009; Rizov & Mathijs, 2003; Vik & McElwee, 2011). The threshold of 20% was set as a result of extensive discussions during the expert interviews in preparation for the survey, taking the work of Viira et al. (2013) as a starting point for discussion who used a 15% change in standard output as threshold of growth. Apart from the change in the amount of land, all changes were coded as discrete variables. Farmers who increased their land ownership by at least 20% or expanded animal husbandry or other activities implemented by their predecessors were assigned to the third group labeled expansion. It is worth noting that intergenerational succession is implied by the term "predecessor." Furthermore, farmers who started diversification activities by themselves were assigned to the group diversification. These activities include the cultivation of unconventional crops, keeping of unconventional animal breeds, pursuing activities in the area of forestry, practicing agricultural contraction and wage services, offering overnight accommodation, performing leisure activities, using alternative marketing and distribution channels, processing agricultural products, and performing solidary, social, or educational activities. A relevant question was included in the survey to identify both the farmers who started these activities by themselves and those who just continued or

expanded their predecessor's diversification activities. According to the aforementioned criteria, the sample revealed that most farmers who started diversification activities by themselves also expanded existing agricultural or diversification activities. Finally, another group of a dual strategy was created. These farmers were assigned to the group expansion and diversification. The frequency distribution within the different groups of the dependent variable is described in Table 1.

As the survey covered a wide range of variables and was constructed according to the existing literature, most of the factors hypothesized to influence the strategic entrepreneurial choice of a farmer can be specified. The descriptive statistics of the independent variables are presented in Table 2. The effects of personal factors are tested using the gender, age, and education level, in terms of the presence of a third-level education of the farmer. Only 10% of German farms are managed by women (DBV, 2018), which leads to the conclusion that men are relatively underrepresented in the data—men in the sample have a share of 85%. The average age of the farmers in the data is 38 years, which is younger than the German average, given that 34% of all farmers are older than 55 years of age (DBV, 2018). This can be explained by the inclusion of the younger generation in the sample of the study. Of the respondents, 39% hold a degree from a university or a university of applied sciences, and clearly had a higher level of education than average German farmers do (12%) (DBV, 2018). This may be caused by greater open-mindedness for research topics among farmers with third-level education. Creativity was surveyed by calculating the average index of certain items according to Nandram and Samson (2000) and Lauwere (2005) and resulted in a mean of 5.66 on a 7-point Likert scale from 1 (*do not agree at all*) to 7 (totally agree). The risk attitude was measured according to Dohmen et al. (2011), and resulted in an average of 6.02 on an 11-point scale from 0 (*not at all willing to take risks*) to 10 (very willing to take risks), indicating a slight risk affinity (the scales can be found in the Appendix). Furthermore, the farmers were asked if they had an off-farm occupation besides the farming business.

To test the effects of farm characteristics, farm size, and location factors were used. To avoid endogeneity, and keeping in line with other studies, the size was measured by the total area under cultivation at the point in time when the respondent started working on the farm. This was done to determine the effect of the precondition of the initial farm size on the entrepreneurial activity of the farmer. The rather high initial average amount of land of 167 ha (actual amount of 231 ha) compared with the German average of 62 ha in 2017 (DBV, 2018) may be caused primarily by a high share of full-time farms in the sample (86%). The location factors were divided into soil quality and the amount of rainfall, prerequisites for agricultural production, and the geographical location was represented by the proximity to a metropolitan area or tourist and recreational region. As the structures of farms in Germany still differ significantly between the western and eastern regions due to the historical division of Germany, the geographical location of the farm in the western or eastern federal states was tested as a possible determinant as well.

The contextual effects were tested using family involvement in the operation by the number of family workers and the spouse's contribution to the business. The influence of internal institutions was measured by the anchoring

TABLE 1 Frequency distribution of the dependent variable

Strategic entrepreneurial choice	Number of observations	Frequency (%)
Reduction = 1	52	6.98
Continuation = 2	124	16.64
Expansion = 3	377	50.60
Expansion and diversification = 4	150	20.13
Diversification = 5	42	5.64
Total	745	100.00

TABLE 2 Descriptive statistics of the independent variables

Variable	Definition	Scale/measurement	Mean	SE	Min	Max
<i>Personal factors</i>						
Male	Gender	1 = male; 0 = female	0.85	0.01	0	1
Age	Age	Number of years	38.37	0.47	19	74
Degree	Third-level education; degree from a university or university of applied sciences	1 = yes; 0 = no	0.39	0.02	0	1
Job	Off-farm job of the farmer	1 = yes; 0 = no	0.31	0.02	0	1
Creativity	Creativity according to Nandram and Samson (2000) and Lauwere (2005), average index (C.A. = 0.8276)	1 = do not agree at all; 7 = totally agree	5.66	0.03	1	7
Risk	Risk attitude via subjective self-assessment according to Dohmen et al. (2011)	0 = not at all willing to take risks; 10 = very willing to take risks	6.02	0.07	0	10
<i>Farm factors</i>						
Size	Initial farm size, total area under cultivation in hectares	Number of hectares	167.2	12.48	1	3600
Soil	Average soil quality on the agricultural main site according to the German system of "Ackerzahl"	Points 1–100	47.61	0.65	12	100
Rain	Average rainfall on the agricultural main site in mm/year	Number mm/year	709.45	6.75	250	1500
West	Location of agricultural sites in the old German states	1 = yes; 0 = no	0.90	0.01	0	1
Central	Location of the agricultural main site near a metropolitan area or tourist/recreation region	1 = yes; 0 = no	0.10	0.01	0	1
<i>Context factors</i>						
WF_family	Number of family workers in the business	Number of family workers	2.00	0.04	0	6
WF_spouse	Spouse works/assists on the farm/in the business	1 = yes; 0 = no	0.37	0.02	0	1
An_values	Strength of anchoring of the farm manager and their actions in basic Christian values	1 = not strong at all; 7 = very strong	4.08	0.07	1	7
An_tradition	Strength of anchoring of the farm manager and their actions in farming tradition	1 = not strong at all; 7 = very strong	4.38	0.06	1	7
Pr_politics	Political/legal pressure (perceived) on the farmer and the operation	1 = not strong at all; 7 = very strong	6.08	0.04	1	7
Pr_society	Societal pressure (perceived) on the farmer and the operation	1 = not strong at all; 7 = very strong	5.61	0.05	1	7
Pr_progress	Technical progress and growth pressure (perceived) on the farmer and the operation	1 = not strong at all; 7 = very strong	4.63	0.05	1	7
Coop	Cooperation with other farmers	1 = yes; 0 = no	0.77	0.02	0	1

Note: Translated from German to English.

of the farmer in values and traditions and external institutions by the perceived pressure of politics, society, and technical progress. As networking and co-operation were mentioned in earlier studies, a variable indicating whether the farmer co-operates with others was included as well.

To test for multicollinearity, the variance inflation factors were calculated for the independent variables. With a mean of 1.23 and a range between 1.04 and 1.64, the numbers are far below the threshold level of 10. This indicates that multicollinearity is not a severe issue in the regression at hand. Correlation analysis confirmed this result (see Appendix B). To ensure that the independence of irrelevant alternatives assumption (IIA) as a prerequisite for the MNL holds, a Hausman test was performed. MNL is the appropriate model for the data at hand.

4 | RESULTS AND DISCUSSION

The results of the MNL investigating the effects of different determinants on strategic entrepreneurial choices in agriculture are presented in Table 3. Some independent variables from Table 2 have been excluded from the model because the Wald test of significance could not be rejected, meaning that the excluded variables have no significant influence on the choice of the different strategies. These variables include gender as well as the proxies for internal and external institutions. Co-operation with other farmers was also shown to have no significant effect.

The model is significant at the 1% level. The results of a confusion matrix reveal that 40% of the total observations were correctly predicted. This differs between categories and is a widely known issue in a study of this kind. An explanation for this is that the prediction accuracy is sensitive to the number of outcome categories. The predictive power of a model suffers from a large number of categories (Cramer, 2003). By combining groups $s = 1$ and $s = 2$ or $s = 4$ and $s = 5$, the prediction accuracy improves slightly, but the other goodness-of-fit measures as well as the informative value of the model concerning the choice of a certain strategy decrease, therefore the five categories are maintained.

TABLE 3 Effects of factors on different strategic entrepreneurial choices in agriculture

Variable	Reduction ($s = 1$)		Expansion ($s = 3$)		Exp. and div. ($s = 4$)		Diversification ($s = 5$)	
	Coeff.	SE	Coeff.	SE	Coeff.	SE	Coeff.	SE
<i>Personal factors</i>								
Age	0.126***	0.019	0.068***	0.013	0.110***	0.015	0.063***	0.019
Degree	0.305	0.382	-0.437*	0.233	-0.161	0.294	0.423	0.386
Job	1.642***	0.399	0.161	0.245	-0.079	0.314	-0.255	0.424
Creativity	0.165	0.247	-0.017	0.156	0.649***	0.203	0.655**	0.280
Risk	-0.169*	0.101	0.075	0.062	0.255***	0.079	0.041	0.100
<i>Farm factors</i>								
Size	-0.003*	0.002	-0.001**	0.000	-0.001**	0.001	-0.002	0.001
Soil	-0.008	0.010	-0.011*	0.006	-0.017**	0.008	0.004	0.010
Rain	-0.000	0.001	0.001*	0.001	0.002**	0.001	0.001	0.001
Central	-1.156*	0.681	-0.769**	0.344	-0.116	0.415	0.311	0.489
<i>Context factors</i>								
WF_family	-0.065	0.209	0.308***	0.114	0.055	0.143	0.224	0.186
WF_spouse	0.118	0.432	0.251	0.288	0.905***	0.331	0.627	0.436

Note: $N = 745$; Prob $> \chi^2 = 0.0000$; pseudo $R^2 = 0.1536$; Log likelihood = -828.42911. Percentage of correct predictions: total: 40%, $s = 1$: 62%, $s = 2$: 55%, $s = 3$: 30%, $s = 4$: 50%, $s = 5$: 24%. * $p < .1$; ** $p < .05$; *** $p < .01$.

4.1 | Determinants concerning the farmer

Regarding the results of the personal factors, the factor age significantly increases the likelihood of all strategies, meaning that the older the farmers are, the more likely they are to choose a strategy other than continuing their predecessor's activities. This effect may stem from the fact that older farmers have had more time to potentially change their business structures and demonstrate more entrepreneurial activity than younger farmers, who are new to the business. This is also in line with Ilbery (1991) who shows that farmers with alternative enterprises are often not young and new entrants to the business, rather they are older and more experienced farmers.

In terms of the education level, a farmer holding a third-level qualification is significantly less likely to expand on existing activities. This is in contrast to the agricultural growth literature (Bakucs & Fertó, 2009; Rizov & Mathijs, 2003; Viira et al., 2013). In opposition to the findings from the literature that the new perspectives and ideas gained in an off-farm job may encourage diversification activities (McFadden & Gorman, 2016) the results reveal that farmers holding a job outside the farm are more likely to follow a reduction strategy. This might be explained by the limited time and entrepreneurial resources available for their own businesses, and the attraction of the stable income offered by an off-farm job (Breustedt & Glauben, 2007; Glauben et al., 2006; Goetz & Debertin, 2001; Penrose, 1959; Viira et al., 2013).

In terms of creativity, a high expression significantly fosters diversification activities, with or without the expansion of existing activities. Furthermore, farmers with a high-risk affinity are significantly more likely to choose a dual strategy of expansion and diversification and significantly less likely to follow a reduction strategy. These findings are in line with the entrepreneurship literature (EC, 2003; Hébert & Link, 1988; Van Praag, 1999).

4.2 | Determinants concerning the farm

Results reveal that the larger the initial farm size, the less likely it is that farmers from this sample choose a reduction strategy. Furthermore, the larger the initial farm size, the less likely they are to pursue a dual strategy of expansion and diversification. This supports the findings from the literature that diversification can serve as a survival strategy (Bateman & Ray, 1994; Bohnet et al., 2003; Brandth & Haugen, 2011; Meert et al., 2005; Pfeifer et al., 2009) and compensation for low profits from certain agricultural production (Bohnet et al., 2003; Welten et al., 2017; Wolf et al., 2007). Finally, smaller farms may find niches and alternative sources of income within the diversification approach next to the expansion of existing activities (Grande, 2011; Ilbery, 1991; Northcote & Alonso, 2011; Pfeifer et al., 2009). At the same time, the probability of choosing an expansion strategy instead of continuing with what the predecessor has started decreases with a larger initial farm size. This might be explained by the fact that the necessity of an expansion is lower when the farm disposes over a large amount of land already. Other studies found accordingly that smaller farms grow faster than larger farms do (Bakucs & Fertó, 2009; Shapiro et al., 1987; Viira et al., 2013; Weiss, 1999).

The soil quality and amount of rainfall, as natural conditions for agricultural production, reveal contrasting significant results for the expansion and dual strategies. While a better soil quality implies a lower probability of being in one of these two groups, a higher amount of rainfall implies a higher probability. The results concerning soil quality support the findings from the literature that farmers with good conditions for classic agricultural production often show less entrepreneurial growth activity, as they do not necessarily need alternative sources of income, and, thus, continue doing what has always been done (Grande, 2011; Ilbery, 1991; Northcote & Alonso, 2011; Pfeifer et al., 2009).

When the farm is situated at a central location, (i.e. defined as the proximity to big cities or tourist areas), it has a significantly negative effect on expansion strategies. This may be due to the fact that land prices are high around urban areas (Hennig & Latacz-Lohmann, 2017; Lehn & Bahrs, 2018) and expansion activities usually require space and remote surroundings. At the same time, a central location decreases the probability of pursuing a reduction strategy.

TABLE 4 Marginal effects of factors on the strategic entrepreneurial choices in agriculture

Variable	Reduction ($s = 1$)	Continuation ($s = 2$)	Expansion ($s = 3$)	Exp. and div. ($s = 4$)	Diversification ($s = 5$)
<i>Personal factors</i>					
Age	0.0021	-0.0088	-0.0002	0.0071	-0.0003
Degree	0.0225	0.0324	-0.1115	0.0148	0.0418
Job	0.0815	-0.0199	-0.0003	-0.0393	-0.0220
Creativity	0.0007	-0.0188	-0.0982	0.0869	0.0293
Risk	-0.0098	-0.0109	-0.0061	0.0294	-0.0026
<i>Farm factors</i>					
Size	-0.0001	0.0001	0.0001	-0.0001	-0.0000
Soil	0.0000	0.0013	-0.0010	-0.0012	0.0008
Rain	-0.0000	-0.0002	0.0001	0.0001	-0.0000
Central	-0.0209	0.0682	-0.1713	0.0645	0.0596
<i>Context factors</i>					
WF_family	-0.0104	-0.0264	0.0617	-0.0260	0.0011
WF_spouse	-0.0089	-0.0439	-0.0644	0.1015	0.0158

4.3 | Determinants concerning context

Regarding the context of the farm, only the involvement of the family, in particular of the spouse, proved to be significant. The findings show that the more family members working on the farm, the significantly higher the probability of choosing an expansion strategy. This is in line with the literature stating that family involvement in the business supports the decision to continue farming (Breustedt & Glauben, 2007; Lansberg & Astrachan, 1994; Poza, 1989) and to expand the business (Weiss, 1999). The spouse's involvement proves to have a supporting influence on the dual strategy of expansion and diversification. This may stem from the fact that the spouse, who is most likely a woman as most farms are run by men (85%), are more likely to start new ventures (Barbieri & Mahoney, 2009; Bock, 2004; McGehee & Kim, 2004; McGehee et al., 2007; Seuneke & Bock, 2015). Women often play an active role in initiating diversification activities (Barbieri & Mahoney, 2009; Bock, 2004), while men are mostly regarded as being growth-oriented (Bakucs & Fertó, 2009; Cliff, 1998; Pindado & Sánchez, 2018; Weiss, 1999). Therefore, the involvement of both partners in the business may lead to a dual strategy.

The results of the MNL are presented as marginal effects in Table 4. Marginal effects describe the probability of change of a dependent variable given a one-unit change of an independent variable, all else being equal. This type of presentation illustrates, for example, the discussed strong influence of the spouse's involvement in the business on the dual strategy of expansion and diversification. If the spouse works in the business, the probability of choosing a dual strategy increases by 10.15%, other things being equal. Another strong factor is the influence of creativity on diversification; with every additional creativity point on the Likert scale, the probability of following a diversification strategy increases by 2.93%, and that for a dual strategy increases by 8.69%.

4.4 | Limitations and further research

Some limitations of the present study should be kept in mind when interpreting the results. First, comparability with representative national data is restricted, especially since the sample included the young generation of farmers. The paper does not claim generalizability, despite the study being relatively extensive with a sample size of $N = 745$. However, generalizability could be improved, particularly with regard to the distribution of educational

attainment and farm size. Furthermore, regarding the factor age, the results intuitively reveal that the longer a person works within the business, the more time they have to act, and thus to change to another group other than continuation. As successors are also included within the sample, it can be argued that these participants did not have enough time to act, and are therefore stuck within the group of continuation. Still, taking a closer look at the percentage of successors within the group of continuation, only 27% of the successors belong to this group. The other 73% has indeed changed strategy.

In addition, a general classification scheme for entrepreneurial activity in agriculture was derived from the literature. On this basis, a regression analysis in the form of a MNL model was conducted for the collected data. While this ensures broad applicability and comparability to other samples and regions, a clustering approach could allow more specific classifications. In further investigations, comparisons between the classification scheme derived from the literature and that derived from the results of a cluster analysis could be an interesting topic. An advantage of the use of this classification scheme, and another point for future research, is that it could also be applied to other countries and econometrically tested to compare and assess different systems and framework conditions influencing the determinants of strategic entrepreneurial choices in agriculture.

Moreover, to measure aspects like risk or creativity, self-reported scales were used. These are supported by previous studies, but still imply the risk of social desirability and subjective responses. Lastly, norms and values were mentioned in the entrepreneurship literature as further influential factors. Within our study, these constructs did not reveal significant results. However, as these are abstract phenomena that are hard to capture within a study like this, further research with different approaches could be done in this area.

5 | SUMMARY AND IMPLICATIONS

Entrepreneurship in agriculture is a phenomenon that is growing and becoming of greater importance with the changing framework conditions for agricultural production and increasing structural change. It leads to heterogeneity in farm business development paths. To understand this phenomenon better, and derive implications for farmers, agricultural consultants, and policymakers, a classification scheme of strategic entrepreneurial choices in agriculture is developed. These strategic entrepreneurial choices of family farmers are reduction, continuation, expansion, diversification, and the dual strategy of expansion and diversification. The classification scheme and the determinants of the respective entrepreneurial choices are investigated empirically by applying a MNL to a survey conducted Germany-wide among farmers ($N = 745$) from November 2018 to February 2019.

Among the factors concerning the farmer, important determinants of entrepreneurship are creativity and the risk attitude of the farmer. According to the present results, increasing the expression of a farmer's creativity may lead to more diverse business strategies. Furthermore, the results show that a higher affinity toward risk can increase the likelihood to follow the entrepreneurial strategy of expansion and diversification and lower the likelihood to follow a reduction strategy, instead of just continuing with what the predecessor has already implemented. Therefore, to create room for more diverse business strategies, farmers should be offered the opportunity to test and implement creative ideas under real, uncertain conditions. This could be in the form of creative training, the formation of working groups to exchange ideas and motivate each other, or the provision of financial support for realizing those new projects. Furthermore, the concepts of risk and creativity should be taught in the early years of agricultural training programs, to foster the respective self-awareness and understanding of future agricultural entrepreneurs. Farmers themselves should seek to actively participate in such programs as early within their tenure as possible, to be better equipped to identify promising diversification strategies and, if those are assessed as economically worthwhile, to consequently implement them. At the same time, they should encourage their potential successors to also participate in such programs and include them early in actual strategic entrepreneurial decisions which require taking risk and being creative.

Regarding the farm characteristics, the initial farm size with which the farmers started their tenure and its proximity to urban areas seem to play especially a big role. Looking at the initial farm size, the results suggest that

smaller farms are generally more likely to engage in a dual strategy of expansion and diversification. Especially farmers with a relatively small resource endowment (e.g. arable land) can learn from this to continuously analyze their long-term market position and viability as early as possible and, based on this, consider potential promising diversification activities. From a policy perspective, smaller farmers should especially receive further support to increase diversification activities and thus become more entrepreneurial. Moreover, a central location of the farm, its vicinity to cities or tourist areas, is likely to hinder expansion activities. Thus, both smaller farms and farmers in a central location without the possibility to expand the conventional way should be supported to develop alternative strategies to sustain themselves. Additionally, those programs need to be location-specific. This is where start-up activities come into play. Platforms may be established to build an inter-sectorial exchange. Start-up funding and extension services may also enhance these developments.

The strongest effects among the context factors are the involvement of not only family, but especially the spouse. Every additional family member involved in the business has an accelerating effect on an expansion strategy. It is striking that the active co-operation of a spouse within the business can have accelerating effects for the uptake of a dual strategy of expansion and diversification. From the perspective of farmers, this indicates that the involvement of their family members and especially spouses can have long-term stabilizing and enhancing effects on their businesses. From the perspective of policymakers, conditions should be created so that many family members, particularly the spouse, can have the opportunity to work in the business. As agriculture is currently dominated by men who are partnered with women, most spouses are women. The results support the theory that women play key roles in diversification activities and, thus, may function as important innovators in this field; they should also be supported.

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CONFLICT OF INTERESTS

The authors declare that there are no conflict of interests.

DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available from the corresponding author upon reasonable request.

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APPENDIX A: DIFFERENT SCALES, TRANSLATED FROM GERMAN

Personal risk attitude of the farmer according to Dohmen et al. (2011)

How do you see yourself: are you generally a person who is fully prepared to take risks or do you try to avoid taking risks?

not at all willing to take risks 0 1 2 3 4 5 6 7 8 9 10 very willing to take risks

Creativity according to Nandram and Samson (2000) and Lauwere (2005), (C.A. = 0,8276)

Please indicate to what extent you agree with the following statements.

- I can easily connect related matters
- I like to look at matters from different perspectives
- Other people find me inventive
- I like to consider new things
- If I see that something is going wrong, I like to consider how it can be corrected
- Problems stimulate me to reconsider

Scale used for each item:

do not agree at all 1 2 3 4 5 6 7 totally agree

Farmer's anchoring in values and traditions, items created by the authors

How strongly do you feel that you and your actions in agriculture are anchored in the following aspects?

- Basic Christian values
- Farming tradition

Scale used for each item:

not strong at all 1 2 3 4 5 6 7 very strong

Perceived pressure/external institutions, items created by the authors on the basis of Fitz-Koch et al. (2018)

How strong do you rate the respective pressure that is exerted on you and your farm?

- Political/legal pressure
- Societal pressure
- Technical progress (growth pressure)

Scale used for each item:

not strong at all 1 2 3 4 5 6 7 very strong

Co-operation, different forms derived from Theuvsen (2003)

In what way do you co-operate with other farmers on the farm?

- cooperation in markets through producer or purchasing groups
- division of labor through contractually regulated neighborhood assistance, machinery rings, or management contracts
- joint use of machinery by fractional communities or machinery companies
- joint management through joint use of facilities (e.g., warehouses, drying facilities, etc.), joint stables or operating (branch) companies (e.g., GbR, GmbH)
- I do not work with other farmers in any of these ways.

APPENDIX B: CORRELATION MATRIX

	1	2	3	4	5	6	7	8	9	10
1. Entrepren. choice	1.000									
2. Male	-0.012	1.000								
3. Age	0.014*	0.040	1.000							
4. Degree	-0.066*	-0.095*	-0.079*	1.000						
5. Job	-0.136*	-0.033	-0.141*	0.037*	1.000					
6. Creativity	0.150*	-0.025	-0.001	0.000	0.092*	1.000				
7. Risk	0.176*	0.106*	0.029	-0.036	0.023	0.332*	1.000			
8. Size	-0.077*	0.031	-0.081*	0.221*	-0.098*	-0.002	0.033	1.000		
9. Soil	-0.036	0.009	0.081*	0.008	0.024	-0.027	0.008	-0.024	1.000	
10. Rain	0.067*	0.095*	-0.098*	-0.158*	0.027	-0.045	-0.026	-0.195*	-0.024	1.000
11. West	-0.035	0.051	-0.141*	-0.190*	0.115*	0.025	-0.021	-0.515*	0.074*	0.285*
12. Central	0.040	-0.029	-0.027	0.078*	0.031	-0.024	-0.055	-0.002	0.054	0.059
13. WF_family	0.070*	-0.070*	-0.225*	-0.096*	-0.077*	0.077*	0.106*	-0.072*	-0.043	0.038
14. WF_spouse	0.172*	-0.075*	0.375*	-0.147*	-0.044	0.046	-0.006*	-0.091*	-0.070*	-0.019
15. An_values	0.051	-0.012	0.218*	0.053	0.042	0.067*	0.010	-0.069*	-0.009	-0.001
16. An_tradition	-0.058	-0.055	-0.140*	-0.076*	0.102*	-0.039	0.022	-0.099*	-0.037	-0.014
17. Pr_politics	-0.053	0.068*	0.024	-0.072*	-0.029	0.130*	0.018	0.002	-0.106*	-0.067*
18. Pr_society	-0.059	0.030	-0.046	-0.061*	0.056	0.070*	0.055	-0.019	-0.013	-0.029
19. Pr_progress	-0.058	-0.041	-0.041	-0.024	0.053	0.050	0.037	0.007	0.042	-0.109*
20. Coop	-0.040	-0.058	-0.022	-0.038	0.083*	0.086*	0.065*	-0.124*	0.050	0.086*

	11	12	13	14	15	16	17	18	19	20
1. Entrepren. choice										
2. Male										
3. Age										
4. Degree										
5. Job										
6. Creativity										
7. Risk										
8. Size										
9. Soil										
10. Rain										
11. West	1.000									
12. Central	-0.042	1.000								
13. WF_family	0.192*	-0.028	1.000							
14. WF_spouse	0.024	0.016	0.095*	1.000						
15. An_values	0.064*	-0.030	-0.027	0.194*	1.000					
16. An_tradition	0.025	-0.003	0.027	-0.017	0.322*	1.000				
17. Pr_politics	-0.050	-0.072*	0.068*	0.023	0.042	0.017	1.000			
18. Pr_society	0.041	-0.104*	0.075*	0.033	0.098*	0.125*	0.433*	1.000		
19. Pr_progress	0.038	-0.075*	0.023	0.029	0.118*	0.143*	0.115*	0.191*	1.000	
20. Coop	0.204*	-0.050	0.037	-0.030	0.077*	0.008	0.003	0.051	-0.012	1.000

*Significant at $p < .1$ or better.