

Farmers' conservative behaviour and adapted strategies: Economic foundation and implications for structural change

*Paper submitted for the EAEPE Conference 2009 in Amsterdam
Research Area [M] Social and Cultural Economics*

Anne Margarian
Johann Heinrich von Thünen-Institute (vTI)
Institute for farm economics
Bundesallee 50
38116 Braunschweig
Germany
phone: 49-531/596-5140
fax: 49-531/596-5233
mail: anne.margarian@vti.bund.de

Abstract: In real markets, manifold strategies of agents are observed. It is central for further economic analyses, whether these differences are attributed to exogenous differences or to endogenously evolving differences in behaviour. With respect to structural change in agriculture, attempts to explain different paths of development by exogenous economic conditions resulted in ambiguous results. Therefore, cultural differences have been proposed as final cause of differentiated developments. In contrast, it is proposed in the present paper that behavioural covariances evolve endogenously due to strategic interaction on the land-market; the coincidence of observed attitudes like “conservatism” and strategic behaviour, expected under certain structural conditions, is demonstrated empirically. Additionally, the relation between the resulting growth-orientation of farms, exogenous conditions and specific adoptions of different types of farms are analysed with the help of farm-advisors' assessments of farmers' behaviour in different districts. It is demonstrated that from the imperfect competition and the resulting endogenously evolving behavioural heterogeneity a high specificity of structural change evolves. Somehow counter intuitively, it might be the recognition of this specificity that could prepare for the formulation of a truly general theory of structural change (in agriculture).

Keywords: social interaction, economic behaviour, path-dependency, agriculture, structural change

1 Aim of the study

Within the science of economics between its different sub-disciplines a schizophrenic situation shows up. On the one side, management-science deals with the myriad of strategic options firms face in real life and industrial economics classifies these strategies into rough classes of strategies, which subsequently are explained by peculiarities of production and the market-structure. Neo-classically based macro-economic analyses of the whole economy or single sectors, on the other side, in order to motivate its mathematical models, require the existence of unequivocal equilibriums and optimal strategies. These macro-analyses assume “thick markets” (Makowski and Ostroy, 1995) without room for strategic variations, as they are explained by management-science and industrial organisation. Such thick markets require perfect information and therefore markets without price-externalities (ibid.). Makowski and Ostroy (1995) write:

In contrast to this, we will take a “thin-markets” approach. What we mean by this is that we shall try to avoid the fixed set of roads upon which individuals travel. The aim is to portray a world in which economic actors are connected not by several main highways, but by a myriad of individual byways of their own construction” (S. 811).

The authors formally show how, due to the possibility of multiple rational strategies, a multiplicity of possible alternative markets and therefore the thread of coordination-failures evolves. In contrast, advocates of the “thick-market-mentality” (ibid.) of general-equilibrium-analyses in order to cope with the empirical fact of existing strategic variances have to claim that they reflect adoptions towards differing exogenous conditions.

A sector where differing firm-development-strategies have been detected frequently is agriculture. For Germany, these strategies are described mainly in sociological studies (e.g., Patrick et al. (1983), Sinkwitz (2001), Herrmann (1993), Hildenbrand et al. (1992)). Due to the lack of economic foundation, the respective differences often were explained by assumed exogenous differences in attitudes, which can be subsumed under the labels “conservative” vs. “growth-oriented”. Differing dynamics of farm-structure-developments (Huettel and Margarian, forthcoming) as well as anecdotic evidence¹ and sporadic scientific observations (e.g., Ohe (1985), Roeder et al. (2006), Goetz and Debertin (2001), Weiss (1999) and Tietje (2004)) hint on regional differences or covariances in farmers’ strategies. Corresponding to the identified differences in attitudes, these covariances were sometimes explained by exogenous regional cultural differences (e.g., Roeder et al. (2006)). Attempts to explain these behavioural covariances by “hard” exogenous factors, especially regional labour-market-situations, produced ambiguous results (e.g., Breustedt und Glauben (2007), Glauben et al. (2006), Weiss (1999), Goetz und Debertin (2001)).

It has been shown, though, that structural development in agriculture might be largely determined by the initial structural situation due to existing rents of the status-quo and strategic interaction on the land-market (Huettel and Margarian, forthcoming; Margarian, 2009). Farmers, whose strategies are not strictly growth-oriented (quantity-followers on the land-market), might be judged as “conservative” by observers while growth-oriented farmers (quantity-leaders in strategic competition) leave an entrepreneurial impression on observers. Therefore, these different types of behaviour need not to be attributed to differing exogenous conditions or cultural differences anymore, but rather represent alternatives that evolve endogenously from strategic interaction. Beyond these rough classifications in quantity-leaders and quantity-followers, depending on specific and sometimes idiosyncratic circumstances, countless individual strategies of adoption evolve. This, in accordance with Makowski and Ostroy (1995), is due to the imperfect markets, resulting uncertainty and direct interaction among farmers.

Under these circumstances, not only determines farmers’ behaviour structural development but structural development also influences upon farmers’ behaviour. This interdependence enables self-reinforcing processes and the establishment of different regimes of development. Accordingly, regional behavioural (“cultural”) differences and the apparent predominance for

¹ See for example dlz 2/2007, S. 147; FAZ 126/2007, S. 15; SZ 135/2006, S. V2/4.

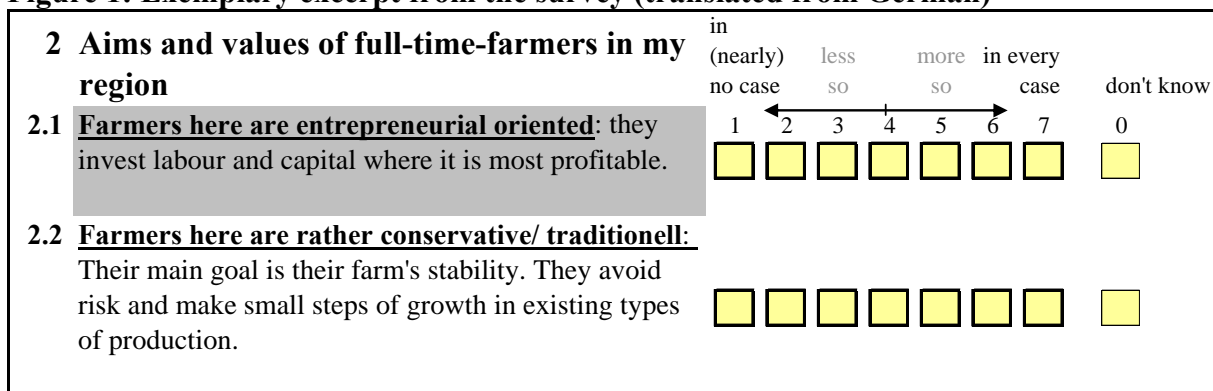
example of “conservative” farmers might now be open to economic explanations. The impact of exogenous factors like the regional labour-market-situation on farmers’ strategic choices then possibly depends on the type of development that has evolved. It is the aim of the present study to analyse the interdependence of the initial structural situation, farmers’ observed attitudes, exogenous influences and concrete strategic choices of different types of farms in the light of the foregone considerations. Therefore, the scattered knowledge of farm advisors in different German regions has been gathered and made accessible for further analyses.

The paper is structured as follows: Chapter 2 describes the survey among farm-advisors, on which the analysis is based. In chapter 2.1, from experts’ assessments a single indicator is constructed that describes farmers’ general attitudes towards farm-development; in chapter 2.1.1 the apparent “conservatism” of famers, which is attributed to strategies of reduced growth, is explained in a regression-model. The model is constructed based on hypotheses derived from the theory of strategic competition on the land-market. In chapter 2.2 more factors, which are extracted from experts’ assessments with a factor-analysis, are presented; they describe farmers’ strategies, restrictions and opportunities. The relation between general attitude, non-economic factors, the economic environment and concrete strategic decisions is analysed in a path-analysis (chapter 2.3); here, technical aspects concerning the applied structural-equation-model (SEM) are presented briefly in chapter 2.3.1, while chapter 2.3.2 describes the results of the SEM in path-diagrams. Chapter 3 summarises and draws conclusions.

2 Empirical analysis of farmers’ strategies

Agricultural advisors usually work within a restricted area. Within this area, they are natural experts on the farmers’ restrictions and opportunities, their strategies and processes of decision-making. 221 of these advisors from the western counties of Germany attended an email-survey that consisted of about 120 statements that were to be evaluated on a scale from 1 (corresponding to “in (nearly) no case”) to 7 (“in (nearly) every case”) (figure 1).

Figure 1: Exemplary excerpt from the survey (translated from German)



Source: Own figure

The experts were asked to concentrate on the situation in a district (“Landkreis”, the European NUTS III level) of high familiarity. Their assessments concerned 145 different districts of western Germany. Due to the multiple references of different experts to 61 of these districts, a validation of the assessments was possible. With a variance-analysis, the significance of the

variation of the advisors' assessments between districts as compared to the variance of the assessments between advisors was determined. Only after dropping assessments for the same districts that deviated from each other by more than two points, significance of differences in the assessments between districts was guaranteed for nearly all statements. In this manner, about 13 % of all statements were judged as deviating values and replaced by missing values. The same rate of misjudgement is expected for districts covered by only one expert. From the remaining values, the mean value was calculated for every district in order to reach a univocal assessment on the districts' farming sector. The resulting data set consists of one set of assessed statements for each of the 145 districts.

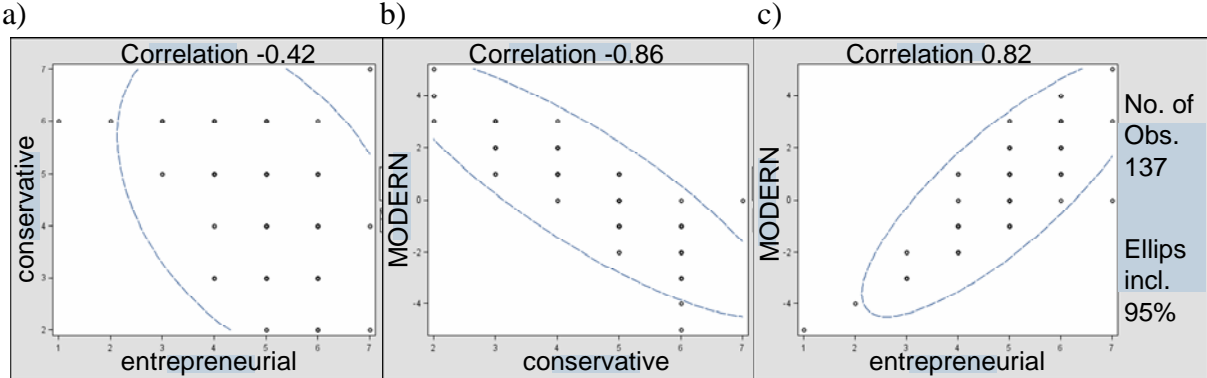
2.1 An assessment of farmers' conservative and entrepreneurial attitudes

In the survey, two dimensions classified farmers roughly. One dimension was traditional or conservative behaviour, which was ascribed towards farmers whose main aim consists in stabilising their farm, who therefore avoid risk and make small steps of growth. Observers perceive such a strategy as traditional, but it also corresponds to the strategy of quantity-followers in strategic competition on the land-market (Huettel and Margarian, forthcoming). Of the 221 respondents, five did not assess the corresponding statement. In more than half of the assessments, farmers in the respective districts were classified as rather conservative (five or more points on the scale), in less than a quarter as rather not conservative (three or less points on the scale). The remaining assessments were intermediate (four points on the scale). Even before removing 17 deviating assessments, the differences in the assessment of conservative behaviour of farmers between the districts according to the variance analysis were highly significant. Obviously, the dimension of conservative behaviour corresponded to an existing common mental construct among farm-advisors.

The second dimension for a rough classification of farmers according to their strategic behaviour was an entrepreneurial attitude, which was ascribed towards farmers, who invest capital and labour where they are most profitable. Four assessments were missing for the corresponding statement. The distribution of assessments revealed that obviously this dimension measured something different from the first dimension. The variance of assessments in this case was rather low, with 40 % of all assessments concentrated at five points on the scale. Accordingly, differences between districts in entrepreneurial attitude were not significant before removing 24 deviating values. While the first dimension determined the farmers' attitude with respect to their farm, this second dimension is concerned with general behaviour. Only if conservatism has a high and entrepreneurial attitude a low assessment, the farmers in a district are assessed as conservative in every respect. If both received high points on the scale, the respective farmers are conservative in agriculture but entrepreneurial otherwise. The case of low values in both dimensions did not occur (figure 2a). Additionally, if the first dimension received low values while the second was judged as predominant, farmers' entrepreneurial behaviour dominates in farming, too. By subtracting the assessments concerning traditional behaviour from those concerning entrepreneurial attitudes, a single indicator ("MODERN") was created that captured all of these nuances. Due to the fact that the case of low values in both dimensions did not occur, the middle values of MODERN are non-ambiguous in their interpretation. Therefore, MODERN shows a strong negative

correlation with assessments on conservative attitudes (“tradition”) (figure 2b) and a strong positive correlation with entrepreneurial attitudes (figure 2c). It was therefore successful in replacing the two seemingly loosely related dimensions (figure 2a) by a single factor.

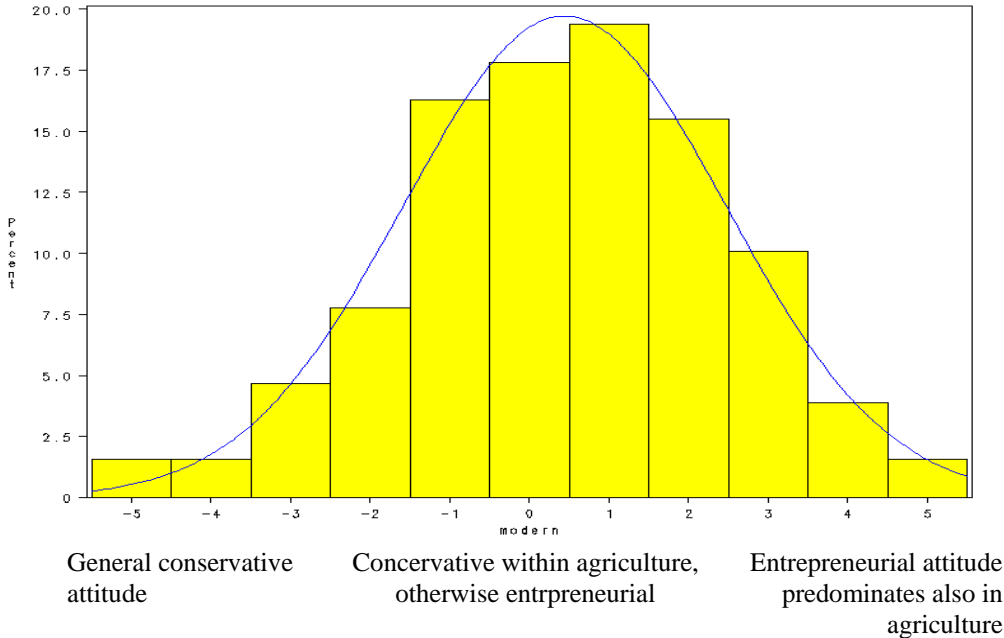
Figure 2: Scatter-plots of the dimensions of conservatism and entrepreneurial attitude and between each dimension and the factor MODERN



Source: Own figure

Moreover, this new indicator could remove possible biases in the assessments due to different interpretations of the scale of different experts. Figure 3 presents the distribution of the new indicator.

Figure 3: Distribution of “MODERN” across districts for an assessment of entrepreneurial attitude within and outside farming



Source: Own figure

Obviously, the judgement of predominance of general conservative behaviour is rather rare; this underlines the assumption that observed conservative behaviour of farmers is due to special structural conditions and restrictions of agriculture. The dependence of a conservative attitude on regional farm-structure and thereby its equivalence with the notion of quantity-

adopting behaviour in strategic competition on the land-market (Huettel and Margarian, forthcoming) will be demonstrated empirically in the following chapter.

2.1.1 Validation of relation between initial farm-structure and growth-orientation

Observers identify conservative behaviour if growth-orientation or maximisation of profits does not seem to be the overarching goal. Often, a seemingly cooperative behaviour among farmers might contribute to the assessment, too. In the presence of rents of the status-quo and alternative options for the utilization of factors, though, the risk-avoiding stabilising behaviour of reduced growth might be a rational strategy of farm-/firm-development. Considering game-theoretic approaches, this strategic option can only be stabilised if agents interact directly in imperfect competition (Margarian, 2009). In agriculture, the kind of direct competition on the land-market depends on the initial farm-size-distribution and on the regional dominant production-type as well as on natural conditions. The former determines the relative competitiveness of those farms that interact, the latter the level of realisable rents of the status quo as well as realisable rents of growth (Huettel and Margarian, forthcoming).

In the following analysis, whether farmers are judged as conservative shall be explained by these conditions in order to demonstrate the economic foundation of observed behaviour. The relevant conditions for those districts included in the analysis are represented by the variables in table 1.

Table 1: Variables representing the conditions, which determine farmers' strategic behaviour (district-level)

Variable	Meaning	Theoretical range	Mean	Std.dev.	Min	Max
GINI79	Inequality in land-distribution	0 - 1	0.41	0.05	0.33	0.59
LESSFAVOURED	Share of less favoured land	0 - 1	0.50	0.38	0.00	1.00
LANDQUALITY	Quality of land	0 - 100	47.47	10.46	28.62	75.44
ARABLE	Share of land cultivated by arable farms	0 - 1	0.30	0.23	0.01	0.91
MEANSIZE	Mean farm-size	> 0	30.32	12.35	9.46	70.11
COWS	Dairy Cows per 100 Hectares	>= 0	27.95	18.27	0.26	83.56
VALUEADDED	Value added of agriculture per 10 Hectares (1000€)	>= 0	15.79	8.16	4.63	47.62
RENTEDLAND	Share of rented land cultivated by farmers	0 - 1	0.43	0.10	0.20	0.71

Number of observations: 86

Source: FDZ (1999), Federal Statistical Office (VALUEADDED), and Agricultural Census 1979 (GINI79)

Those 30 % of the districts with the highest values in MODERN, that is, with entrepreneurial farmers, and those 30 % with the lowest values, that is, with conservative farmers, were attempted to be separated by the logistic model applied. Therefore, those districts with values between zero and one² in MODERN, characterising farmers that are conservative in agriculture but entrepreneurial otherwise, were dropped and only 86 observations (districts) remained in the sample for estimation³. The mean-size of farms in land (MEANSIZE)

² More symmetric cut-off points resulted in rather unequal classes. The score-test (see the following food-note) showed that in this case the assumption of proportional odds was rejected. Since the scales are arbitrary, the non-symmetric cut-off-points therefore are justified.

³ A score-test showed that the assumptions for a multinomial model concerning proportional odds were not justified for MODERN. The proportional-odds assumption could not be rejected, though, for the model with

determines the present full-time farms' necessity for growth (the realisable rents of growth), while the original farm-size-distribution (GINI79) is expected to have a high impact on the growth-history of farms in the districts (Margarian, 2009). The growth-history determines the strategic regime or the growth-orientation of farms in the district. It can be shown that the dominance of large farms, due to the ambiguity of the Gini-coefficient⁴, reaches its maximum at a value of about 0.5. Therefore, for the following regression, the indicator has been transformed with the function "Gini79*(1-Gini79)" (GINIQUADR), which consistently reaches its maximum (0.25) at a Gini-coefficient of 0.5. The value added of land (VALUEADDED) contributes positively to possible rents of the status-quo of agriculture. At the same time, high value-added is often accompanied by high capital- and labour-intensity, enabling quantity-leadership of single farms who under these circumstances can signal their will for growth believably (Margarian, 2009). Quality of land (LANDQUALITY) contributes positively and the share of less favoured land (LESSFAVOURED) negatively to the rents of growth. The share of rented land (RENTEDLAND) diminishes possible rents of the status-quo. Milk-production (COWS) is characterised by relatively low land-intensity of production. Additionally, high investments and asset-specificity contributing to higher rents of the status-quo due to sunk costs. Cash-crop farms (ARABLE) on the contrary are characterised by low capital- and labour-intensity in relation to land. Therefore, in order to grow substantively accompanied by a growth in labour, a sudden and massive growth in land would be necessary. Consequently, cash-crop farms often stick to their present form of labour-organisation; this organisational specificity restricts their growth-potential. This restriction could be interpreted positively as rents of the status-quo.

The logistic model explains the belonging to those districts, which have been characterised by their farmers' conservative behaviour (low values of MODERN). In the estimation, interactions among variables were controlled since these interactions allow for the test of conditional hypotheses (Brambor et al., 2006). For a thorough introduction in logistic regression with interaction-effects, refer for example to Jaccard (2001). In order to make coefficients in the presence of interactions easily interpretable, variables have been centred on their mean (Jaccard, 2001, p. 11). Some of the variables have been rescaled to create comparable values in order to facilitate convergence (table 2). A more complex model with a significant impact of land-quality has been estimated, too. The more complex model significantly reduced remaining variance but I refrain from presentation since it does not change the main rational but complicates interpretation. Considering the test statistics at the bottom of table 2, the model is highly significant: The differences in experts' assessments on farmers' conservatism in different regions are explainable by the theoretically relevant variables from secondary statistics. LANDQUALITY is excluded from this restricted model. The natural conditions are expressed by LESSFAVOURED100, which contributes only slightly significant to the probability of conservatism in the district.

three classes. The respective multinomial model including the 53 medium-class observations was estimated. The coefficients closely resemble results of the model presented in table 1.

⁴ The inequality of land-distribution measured by the Gini-coefficient would be very high in each of either two cases. The first is observed if an overwhelming number of very small farms were confronted with a neglectable number of larger farms. The dominance of large farms on the land-market only exists in the second case, though: if some very large farms on the one side were confronted with mainly small, and few or none intermediate, farms on the other side.

Higher sunk-costs (COWS) or higher transactions costs (ARABLE) and the connected higher rents of the status-quo reduce growth-orientation and strengthen the assessment of farmers' behaviour as "conservative". The opposite holds true if farms are large, probably because the growth-history determines experts' assessments in this case.

Table 2: results of the logistic regression explaining prevailing "conservatism" in a district via economic strategic behaviour

Parameter	Meaning	Coefficients
Intercept		4478.70 **
GINIQUADR100	Gini79*(1-Gini79) *100	188.50 **
LESSFAVOURED100	Share of less favoured land*100	0.03 °
ARABLE100	Share of land cultivated by arable farms*100	0.16 ***
MEANSIZE	Mean farm-size	-0.13 **
COWS	Dairy Cows per 100 Hectares	0.27 ***
VALUEADDED	Value added of agriculture per 10 Hectares (1000€)	1179.60 **
RENTEDLAND	Share of rented land cultivated by farmers	-502.30 **
GINIQUADR100* VALUEADDED		49.67 **
GINIQUADR100* RENTEDLAND		-21.15 **
Test statistics:		
Likelihood-Ratio test		<.0001
Score test		0.000
Wald test		0.05
Pseudo R-square		0.62

Probability of error: °: <=10%; *: <=5%; **: <=1%; ***: <=0.1%

Number of observations: 86

Source: FDZ (1999) and Agricultural Census 1979

The remaining three variables and their interactions are significant, too. Where few large farms initially dominated the land-market (GINIQUADR100) the probability that farms are assessed as conservative is higher. This observation is in accordance with theoretic expectations, since in these regions most farmers would behave as quantity-followers on the land-market and realise reduced growth only. Also in accordance with theoretic expectations are the impacts of value added per hectare (VALUEADDED) and of the share of rented land cultivated by farms (RENTEDLAND). While the former has a positive relation to rents of the status-quo, the latter contributes negatively to the rents. Consequently, farmers are assessed as conservative with a higher respectively with a lower probability. Finally, the respective influence of VALUEADDED and RENTEDLAND each is strengthened, where few large farms dominated the land-market initially (interactions with GINIQUADR100). Where the land-market is not dominated by single farms, the potential is higher for more presently competitive farms to establish as quantity-leaders especially under conditions of high asset-specificity. Where the share of rented land is high, farms potential to stabilise their farms on the land-market is reduced and quantity-leaders can easily oust less competitive farms from production, resulting in a higher mobility of farmers, accelerated structural change and the impression of less conservative attitudes.

Accordingly, farmers act conservatively in the observer's eyes in land-markets with reduced competition, where the possibility exists to stabilise farms. Here farmers minimise risks by

continual but restricted growth in order to secure sustainable realisation of rents of the status-quo. This general “attitude” (or growth-orientation) of farmers therefore can be explained economically. The concept of cultural differences, a theoretically weak argument anyway in a competitive environment, is not necessary any more in order to explain the different observed behaviour of farmers and the resulting different regimes of growth. It remains open, though, what impact traditions, the economic environment and the interaction of farms play in the determination of concrete strategic choices of farms. This question is addressed in the following chapter.

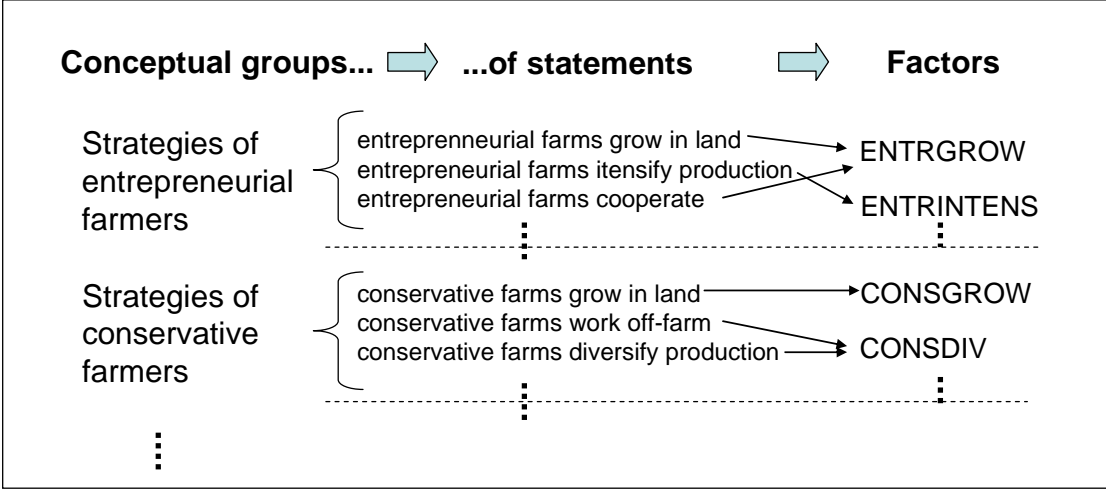
2.2 Assessments of farmers’ opportunities and strategies

While the indicator for the assessment of farmers’ general attitude was constructed by simple differencing the assessments concerning two separate dimensions from the survey, indicators characterising specific restrictions, opportunities and strategies of farmers were created by factor-analysis. Therefore, in a first step those statements of the survey were selected that were assumed to relate to a common underlying concept. The following concepts are supposed to characterise the farms’ situation in the districts:

- strategies of conservative farms,
- strategies of entrepreneurial farms,
- general strategic main focus,
- farmers’ opportunities,
- reasons for exiting from production and
- general attitudes.

With the assessed statements of each conceptual group, separately one factor-analysis has been conducted that usually allowed the identification of about five factors. These factors describe different dimensions of each concept. The following figure 4 illustrates the logical flow of the analysis.

Figure 4: Distribution of “MODERN” across districts for an assessment of entrepreneurial attitude within and outside farming



Source: Own figure

Factor-analysis is based on the correlation between single variables. If correlations are low, subsuming the respective variables in common factors might not be adequate. The “measure of adequacy (MSA)” showed, though, that the variables from the experts’ assessments were suitable. Due to the facts that unbalanced correlation-matrices were used because of many missing values and that the subjective assessments might be erroneous, it could not be expected that constructed factors would explain the total variance within the correlation-matrices. Therefore, a main-axis-analysis was conducted rather than an analysis of principal components (e.g., Backhaus et al., 2003). The necessary priors for expected communalities were estimated by the technique of “squared multiple correlations (SMC)” (Loehlin, 2004, p. 161). The creation of factors also served the aim to raise validity of the experts’ subjective assessments by compensating erroneous assessments of single statements with other assessments for additional statements. Due to the expected restricted validity of single values the decision on the number of extracted factors rested not on one formal criterion but rather by weighing up between Kaiser-criterion, Scree-Test (e.g., Backhaus et al., 2003) and considerations concerning the factors’ content.. Factors were rotated orthogonal and oblique (ibid.) in order to reach unambiguously interpretable factors. Factors were interpreted considering all variables with a loading of 0.3 or higher.

Here only those 14 extracted factors are discussed, which are of relevance for the following causal analysis. They belong to those six categories of mental constructs, which are necessary in order to characterise regional opportunities and restrictions as well as farmers’ attitudes and strategies of growth. The related statements that the experts assessed in the survey are presented in the appendix (table A1). Three of these factors describe opportunities of farmers in the district: PROFITAGR describes deficits in regional profitability of agricultural production. INVESTOPTION describes alternative opportunities to invest in the region within or outside agriculture. JOB describes the probability of an advantageous non-agricultural employment, which also reduces willingness to invest in agriculture even though accessibility to credit might be good.

In addition to MODERN (see above), two further factors were extracted that describe principal attitudes of farmers: STATUS describes whether being a farmer in the farmers’ eyes is related to a positive social standing. LIVESTILE describes whether belonging to the farmers’ community is associated with special values. Three other factors were created, which summarise possible reasons for farm-exits: JOBEXIT describes whether farmers give up due to better income-alternatives outside from agriculture and thereby expresses the farmers’ exit-mobility; DEFICITEXIT characterises exits that are due to deficits in farms’ efficiency. STRUCEXIT describes planned farm-exits due to structural reasons. Two factors describe growth-opportunities of farms in the region: GROWTH describes the general growth-orientation of farms in a district and LAND describes the situation on the land-market. The relations with the statements (table A1 in the appendix) shows, that demand for land is higher, where the relative competitiveness of milk-production compared to other types of production is restricted, that is, where land is arable. The last four factors, which are of interest here, deal with certain specific farm-development-strategies. The first two are farm-development-strategies of entrepreneurial farmers: ENTRGROW describes the orientation towards growth within agriculture of entrepreneurial farmers; ENTRINTENS describes the strategy of growth

in agriculture via intensification of production. The last two factors describe strategies of conservative farmers: CONSGROW describes a concentration of conservative farmers on growth in land; CONSDIV describes whether farms diversify their income-sources by taking on non-traditional activities.

The descriptive statistics of factors are summarised in table 3. Remembering that the original assessments could take on a value between one and seven, most of the factors show an intermediate mean-value of three to five. “JOB” shows a rather low value, which means that many experts judge on-farm-activities as advantageous as compared to off-farm-engagement.

Table 3: Factors, their meaning and descriptive statistics

Concept	Factor	Meaning	N	Mean	Std.dev.	Min	Max
Opportunities of farmers in the district	PROFITAGR	Lack of profitability of agricultural production	81	4.5	1.4	1.6	8.1
	INVESTOPTION	Investment-alternatives within or outside agriculture	81	3.6	0.9	1.4	5.5
	JOB	Probability of an advantageous non-farm employment	81	1.0	0.9	-1.0	3.4
Principal attitudes of farmers	STATUS	Positive social standing of farmers	101	3.5	0.9	1.2	5.4
	LIVESTILE	Special values of farming community	101	5.9	0.8	3.6	8.0
Possible reasons for farm-exits	JOBEXIT	Exit-mobility of farmers	108	-0.8	0.6	-2.4	0.5
	DEFICITEXIT	Exits due to low efficiency of production	108	5.4	0.9	2.4	7.2
	STRUCEXIT	Exits due to structural reasons	108	5.5	0.8	2.9	7.5
Growth-opportunities of farms	GROWTH	Growth-orientation of farms	86	1.3	1.1	-1.5	3.5
	LAND	Tightness of land-market	81	5.0	1.2	0.3	6.9
Strategies of entrepreneurial farms	ENTRGROW	Growth-orientation of entrepreneurial farms	109	3.6	0.9	0.8	6.0
	ENTRINTENS	Intensification of production of entrepreneurial farms	109	3.0	0.9	0.0	4.8
Strategies of conservative farms	CONSGROW	Growth in land of conservative farms	83	1.5	0.8	-0.6	3.3
	CONSDIV	Diversification of income-sources of conservative farms	83	4.7	0.9	2.6	7.6

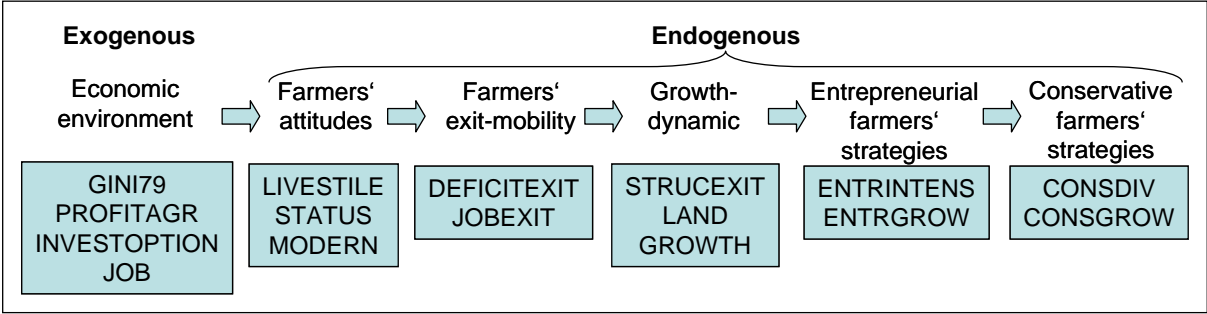
Source: Farm-advisor survey 2007

The prevalence of farm-exits (JOBEXIT) due to advantageous income-alternatives, which is interpreted here as exit-mobility of farms, is correspondingly low. The general growth-orientation and the growth-orientation of conservative farms have low values, too. These preliminary results support the theoretical assumption that it is less so non-economical behaviour but more so existing rents of the status-quo that cause reduced mobility.

2.3 Path-analysis

Interest now focuses on the relationship between farm-structure and the economic environment on one side and farmers’ attitudes and exiting-decisions as well as their realised strategies on the other side. These factors’ relation with each other and with the endogenously evolving situation on the land-market will be analysed in the following. The analysis relies on the factors described in chapters 2.1 and 2.2. The construction of the model to be estimated is guided by the simple logic of causation in structural change depicted in figure 5.

Figure 5: Simple logic of causation in structural change



Source: Own figure

Conditions exogenous to structural change are placed at the beginning of the causal chain. Following the chain from the left to the right, the degree of their endogenous character rises continually. In figure 5 one indicator, GINI79, has been added, which is constructed from secondary statistics, in order to describe the historical farm-land-distribution among farms. This indicator is the Gini-coefficient of farm-land-distribution between size-classes of farms in 1979 (see chapter 2.1.1). A higher initial Gini-coefficient, i.e. higher inequality in farm-sizes, causes higher competitiveness of larger farms on the land-market resulting in their accelerated growth but reduced growth of smaller farms (Margarian, 2009). Because the pattern of structural change therefore is determined partly by the initial structural situation as well as by the economic environment, farmers’ long-term-expectation concerning their own opportunities and the surrounding farmers’ decisions, too, relate to these factors.

Since farmers’ general attitudes result from these long-term-expectations (see chapter 2.1.1), the attitudes, too, are expected to depend on the exogenous economic environment. Farmers’ attitudes, which relate to each farmer’s expectation concerning the competitors’ future behaviour and his own opportunities, influence upon their exit-mobility. The exit-mobility in turn, due to the inevitable relatedness of agricultural production to the non-renewable resource of land, determines the remaining farms’ growth-dynamic. If realised demand for land is high, farm-exits might be accelerated further. These opportunities of growth determine the entrepreneurial farmers’ strategies. Entrepreneurial farmers are possible quantity-leaders (Huettel and Margarian, forthcoming) or first-movers in decisions. In contrast, conservative farmers as quantity-followers (ibid.) adopt their strategies after anticipating the entrepreneurial farmers’ decisions. Therefore, their strategic decision is placed at the end of the causal chain in figure 3. This causal logic of structural change from long-term conditions to short-term decisions is assumed for the following estimation of a respective formal model. It might be contested on the ground of theoretic considerations, but it is principally not open

for empirical validation (Pearl, 1998). Against it, the sign and the relative strength of the estimated causal relations or coefficients are open to empirical testing, once the assumed causal model is agreed upon.

2.3.1 The structural-equation-model

The relationship between farmers' fundamental mental disposition, their strategic decisions and their restrictions and opportunities were then analysed with a path-analysis. The simple version of a structural-equation-model (SEM) (Bollen, 1989; Loehlin, 2004) applied therein allows for the differentiated simultaneous formulation of complex hypotheses. By the estimation of latent variables within these models, factor-loadings might be estimated simultaneously with covariances and causal coefficients. Due to the complexity of the causal model in the present application, here the factors have been constructed separately on the cost of efficiency of estimation. Structural models also allow for feedback-loops as well as for intervening variables. Direct, indirect and total effects can be calculated. The estimation of bi-directed causation comes with the danger of non-identified estimators. Therefore, in the current application, a recursive model without feedback-loops is estimated.

The basic model is (Bollen, 1989, p.80-81)

$$\mathbf{y} = \mathbf{B}\mathbf{y} + \mathbf{\Gamma}\mathbf{x} + \boldsymbol{\zeta} \quad (1)$$

where

\mathbf{B} = m*m coefficient matrix

$\mathbf{\Gamma}$ (Gamma) = m*n coefficient matrix

\mathbf{y} = m*1 vector of endogenous variables

\mathbf{x} = p*1 vector of exogenous variables

$\boldsymbol{\zeta}$ (Zeta) = m*1 vector of errors in the equations.

In these structural models with observed variables, it is assumed that the observed variable resembles exactly the underlying construct without measurement-errors. Due to the recursive nature of the model in matrix B only coefficients below the diagonal are different from zero. Further, it is assumed that errors of the simultaneous equations are independent from each other. Therefore, the matrix of their covariances (Ψ) is diagonal. In contrast, covariances between all exogenous variables (the economic conditions) are estimated and stored in matrix Φ . Estimation is supposed to replicate the correlation-matrix, which is the starting-point of estimation. The correlation-matrix is presented in the appendix (table A2).

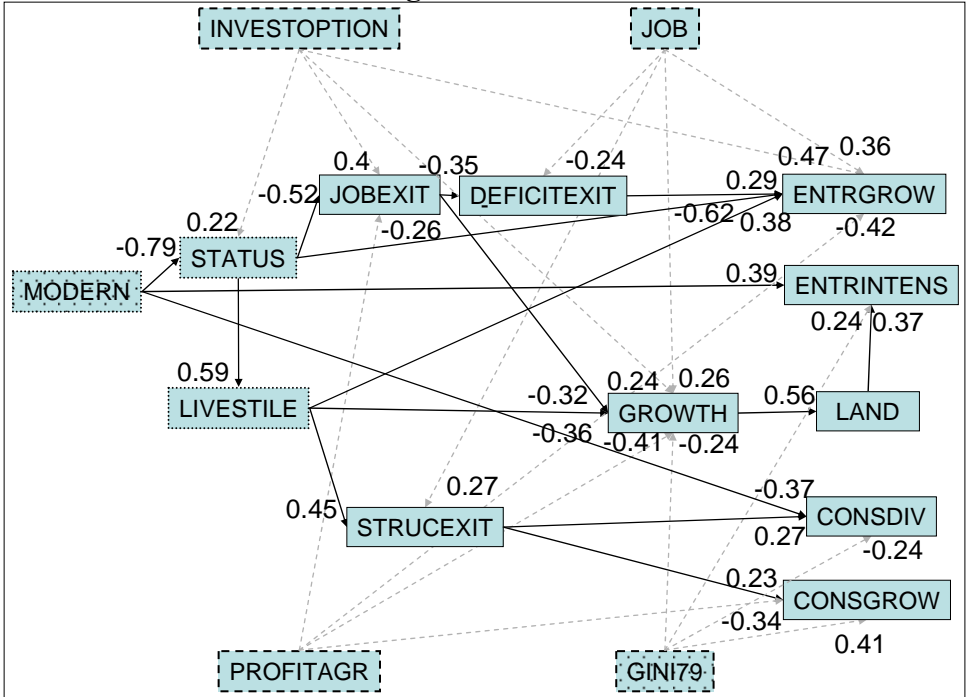
In the estimated model, all variables that are placed further left in the causal chain are allowed to affect all variables that are placed right of them in the causal chain. The resulting model is saturated with zero remaining degrees of freedom, therefore the replication of the initial correlations is perfect but an assessment of model-fit is not possible. As stressed before, an

assessment of the underlying logic is not the aim of the present study either. The strength and significance of estimated coefficients might be assessed, though (Pearl, 1998) by estimated coefficients and standard deviations. All estimated coefficients are presented in the appendix (table A3). The following interpretation of results concentrates on significant estimators, that is, coefficients with a t-value of two or above.

2.3.2 Results of the path-analysis

The results of SEM can be presented in so-called path-diagrams, which facilitate the communication of assumptions and results of the complex models. Figure 6 presents the significant causal relations between variables as they are implied by the experts’ assessments.

Figure 6: Causal relations between economic environment, structural situation, farmers’ attitude and strategic decisions

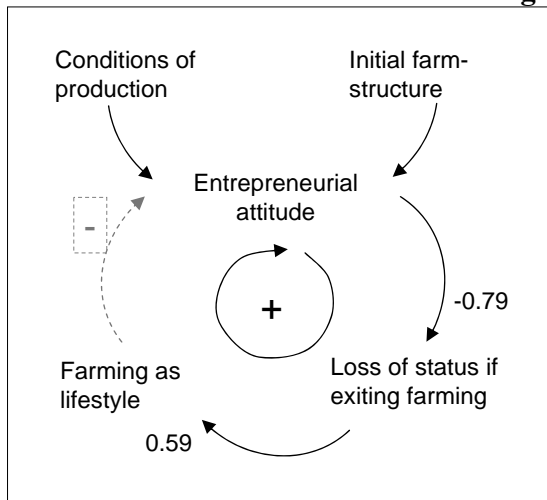


Source: Own figure

Obviously, an insightful direct interpretation is very difficult due to the model’s complexity. Therefore, central relations are analysed in an isolated manner in the following paragraphs.

Whether farmers are growth-oriented or not (MODERN) cannot be explained within this model. Therefore, this general attitude towards farm-development here remains quasi-exogenous. MODERN has been explained, though, within a more detailed model relying on the theoretic foundation of strategic interaction on the land-market (chapter 2.1.1). The lower the potential and desire for extended demand on the land-market is, due to structural restrictions, the lower is the farmers’ growth-orientation or entrepreneurial attitude (MODERN) as perceived by the experts. Further relations between mental constructs are demonstrated by the path-diagram in figure 7. Here, the top-level arrows show that *conditions of production* and the *initial farm-structure* affect the *entrepreneurial attitude* (MODERN) as has been demonstrated in chapter 2.1.1.

Figure 7: Self-reinforcing circle of strategic growth-oriented behaviour, perception of status connected to farming and farming as life-style



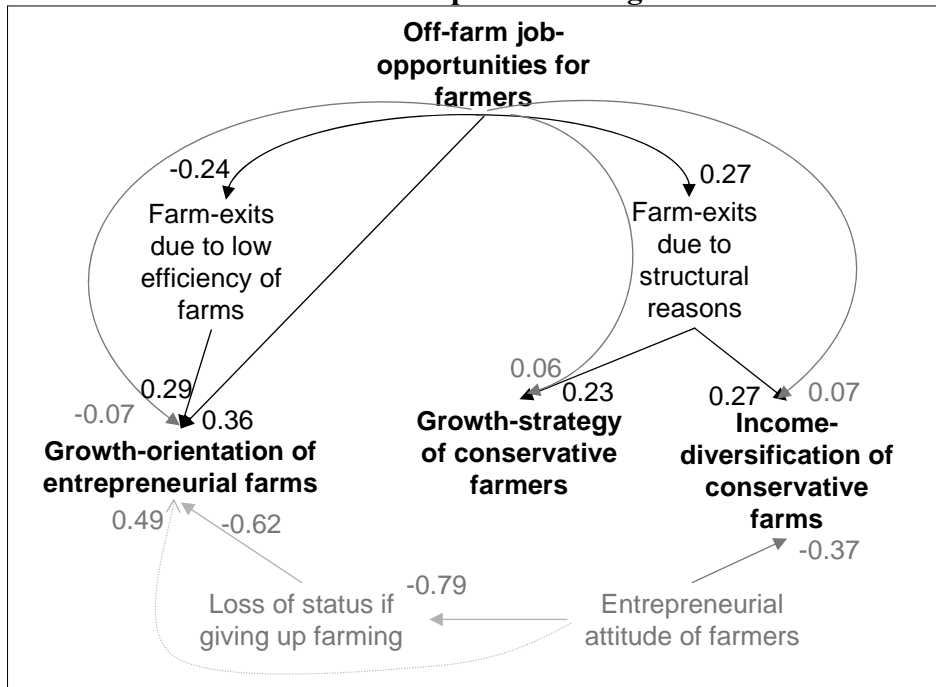
Source: Own figure

A further arrow indicates that the existence of an *entrepreneurial attitude* is strongly negatively related with the farmers' fear from *loss of status if exiting farming*, as the respective high negative coefficient shows. On the contrary, the fear from *loss of status* relates positively to the perception that farmers perceive *farming as a lifestyle*, which is characterised by certain behavioural rules. Since a recursive SEM has been modelled, no empirical support exists for the dotted arrow. It might be hypothesised, though, that the behavioural rules, which are connected with *farming as lifestyle*, pose certain restrictions on *entrepreneurial behaviour* in agriculture. The dotted arrow with the second negative relation then closes the circle, which thereby receives a self-reinforcing character as symbolised by the circular arrow and the plus-sign in the centre of the circle. These relations give an impression of how economic decision-makers might adopt their aims to restrictions that determine their strategic behaviour. In this case, goals and values of farmers would at least be partially endogenous to the economic process.

Another external factor (see figure 5) that influences farm-development-strategies is the availability of adequate job-opportunities for potential part-time farmers or exiting farmers (JOB; see figure 6)). Figure 8 shows the way it influences upon growth-strategies of farms and compares the influence with that of farmers' attitudes. The left side of figure 8 shows that *growth-orientation of entrepreneurial farms* (ENTRGROW) is affected in various ways. Good *off-farm job opportunities* (JOB) reduce *farm-exits due to low efficiency of farms* (DEFICITEXIT). Additional income-sources in the presence of inflexible labour-markets allow farmers to use residual labour on-farm, which results in very low opportunity-costs of farm-labour. *Farm-exits due to low efficiency of farms* support a *growth-orientation of entrepreneurial farms*. Its reduction in the presence of good job-opportunities therefore results in a negative indirect effect of off-farm job-opportunities on the growth-orientation of entrepreneurial farmers (curved greyish arrow). The positive direct effect of job-opportunities on growth-orientation offsets by far this indirect effect, though, resulting in a positive net-effect of 0.29 (calculated from 0.36 minus 0.07). Nevertheless, the arrows at the bottom-part of figure 8 show that a high prevalence of an *entrepreneurial attitude among farmers*

(MODERN) contributes much stronger to the *growth-orientation of farmers* than the off-farm job-opportunities. MODERN is strongly determined by the initial and present farm-structure, though (chapter 2.1.1).

Figure 8: Influence of regional job-opportunities on entrepreneurial and conservative farmers' farm-development-strategies



Source: Own figure

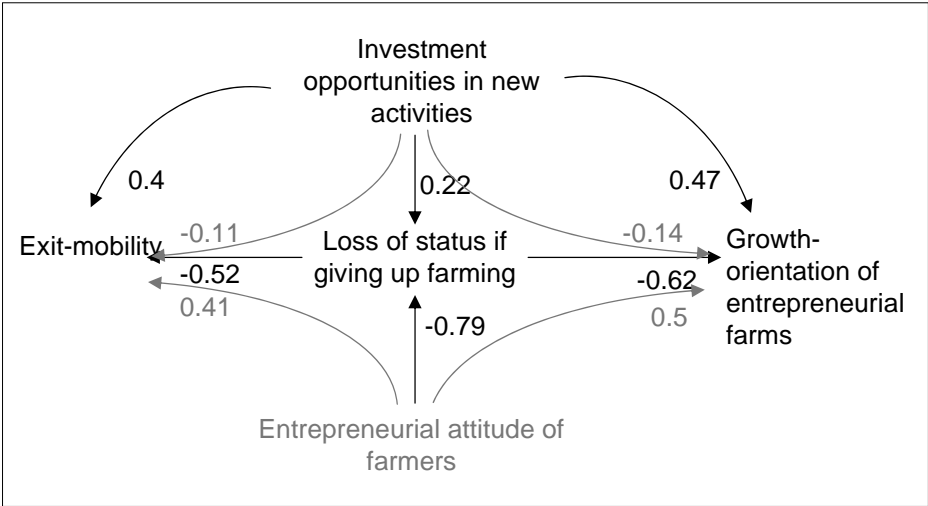
Off-farm job-opportunities affect conservative farms' growth-strategies via their positive impact upon *farm-exits due to structural reasons* (STRUCEXIT). These exits relate positive to *income-diversification of conservative farms* (CONSDIV) on one side and to *growth-strategies of conservative farms* (CONSGROW) on the other side. A growing differentiation among conservative farms in full- and part-time farms should therefore be expected. The greyish arrows show, though, that the off-farm job-opportunities only exert a low effect on conservative farms' growth strategies. This confirms results of other studies on the rather low impact of regional unemployment-rates on structural change in agriculture.⁵ The prevalence of an *entrepreneurial attitude of farmers* in the region and thereby the initial and present farm-structure seems to affect much stronger the *conservative farms' decision for income-diversification*.

The next exogenous factor (see figure 5) to be analysed with respect to its impact upon farmers' strategies is the *farmers' opportunities to invest in new activities* (INVESTOPTION) in- and outside agriculture (figure 9). According to the experts' assessments, the perceived *loss of status in case of giving up farming* (STATUS) positively relates to *investment opportunities*. That might be because in many rural areas farmers are among those inhabitants

⁵ Glauben et al. (2006) conclude for example from their empirical, regression-based analysis of regional factors that influence farm-exit-rates „that the declining number of farms is significantly influenced by characteristics of the farm-sector, whereas characteristics of the non-farm-economy seem to be less important“. In the study of Goetz and Debertin (2001) the regional unemployment-rate remains insignificant in its influence upon farm-exit-rates.

who have the capability to realise investments; therefore, in regions with good business-opportunities their status is rather high. Status therefore in a world of imperfect capital-markets reflects also the economic advantage in access to capital.

Figure 9: The relation between investment-opportunities and growth-orientation of farmers on one side and status-consciousness and structural dynamic on the other



Source: Own figure

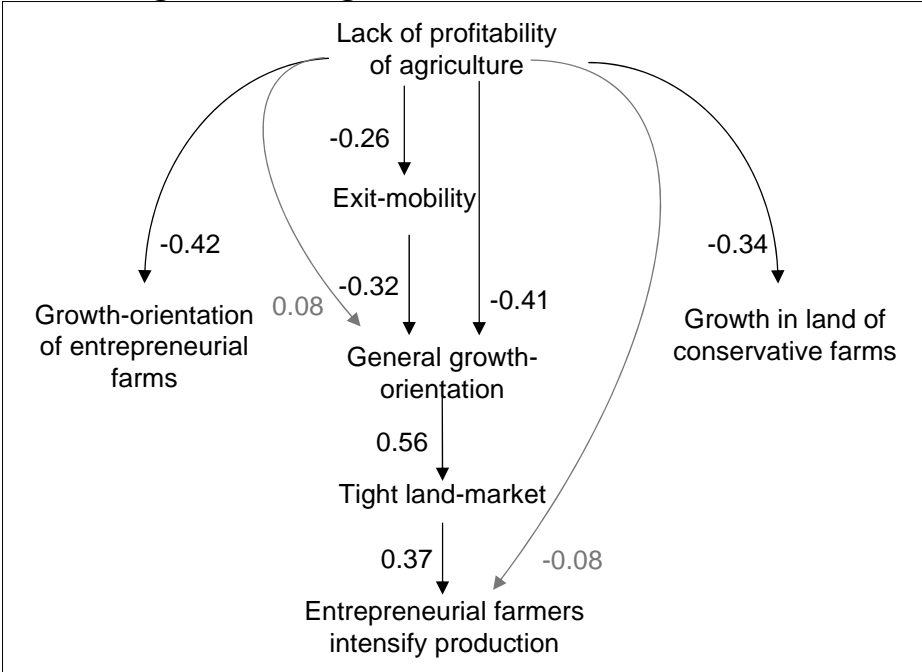
A high relevance of status leads to a reduced *exit-mobility* (JOBEXIT) and to reduced *growth-orientation especially of entrepreneurial farms* (ENTRGROW) within agriculture. Much stronger than these negative indirect effects of investment opportunities on *exit-mobility* and *growth-orientation of entrepreneurial farms* via the status-effect, though, is the direct increasing effect of good investment-opportunities on these factors of structural dynamics.

The indirect strengthening effect of *entrepreneurial attitude of farmers* (MODERN) on structural dynamics (*exit-mobility* and *growth-orientation of entrepreneurial farms*) is higher than the net effect of *investment opportunities* as the greyish arrows in the bottom part of figure 9 show. Obviously, where the *entrepreneurial attitude of farmers* is strong, exiting farming on the other hand has been recognised as a normal entrepreneurial reaction towards tight land-markets and no or little *loss of status* is connected with this decision. The resulting indirect impact upon structural dynamics could possibly explain the ambiguity of results of empirical studies on exogenous factors' influences.

Lack of profitability of agriculture (PROFITAGR) is the first exogenous factor (see figure 5) to be considered that relates directly to agriculture. Its impact on farmers' strategies is summarised in figure 10. Low profitability of agriculture causes a *reduced growth-orientation of entrepreneurial farms* (ENTRGROW), a low desire for *growth in land of conservative farms* (CONSGROW) and consequently a reduced *general growth-orientation* (GROWTH). On the other hand, it is also related to a reduced *exit-mobility* (JOBEXIT). Therefore, a growth-regime of farm-stabilising strategies is expected. This confirms expectations formed based on the theory of strategic interaction with respect to the land-market (Margarian, 2009). Under conditions of low profitability of growth, the low exit-mobility shows that farmers are reluctant to exit from agricultural production due to various kinds of rents of the status-quo.

The low pressure on the land-market if growth-orientation is low allows even more farmers to stabilise their farms and to realise these rents sustainably. Rents of the status-quo, e.g., political rents, therefore might explain why land does not lie fallow as has been predicted for regions of low agricultural competitiveness repeatedly.

Figure 10: The relation between competitiveness of agriculture in the district and growth-strategies of farmers

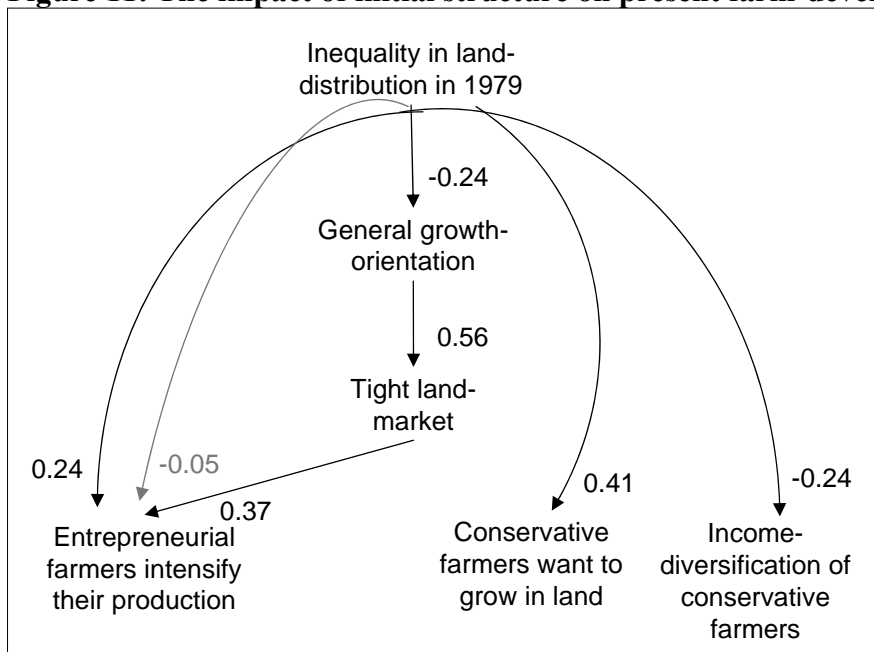


Source: Own figure

The bottom part of figure 10 shows that if *general growth-orientation* is high on the contrary and *land-markets are tight* (LAND) *entrepreneurial farmers intensify production* (ENTRINTENS) and partly refrain from a pure strategy of growth in land. This shows that farmers do adopt their strategies to structural conditions in the course of time resulting in endogenous developments of regional regimes of growth.

The second sectoral exogenous factor (see figure 5) to be considered is the initial *inequality in land-distribution in 1979* (GINI79). It is the only indicator constructed from secondary data-sources, but it does show some significant relations towards experts' assessments (figure 11). Where the inequality of land distribution was high initially, natural quantity-leaders on the land-market existed. These would have grown rapidly, while the smaller farms would have acted as quantity-followers with reduced growth (Margarian, 2009). Accordingly, as figure 11 shows, the *general growth-orientation* (GROWTH), that is, the growth-orientation of the majority of farms is rather low. On the other hand, *entrepreneurial farmers intensify their production* (ENTRINTENS) after the periods of rapid growth in land. This direct effect is only counterbalanced slightly by the indirect effect that a lower growth-orientation of the majority of farms causes a less *tight land market* (LAND) and thereby supports growth in land of competitive farms, i.e., less intensification (greyish arrow).

Figure 11: The impact of initial structure on present farm-development-strategies



Source: Own figure

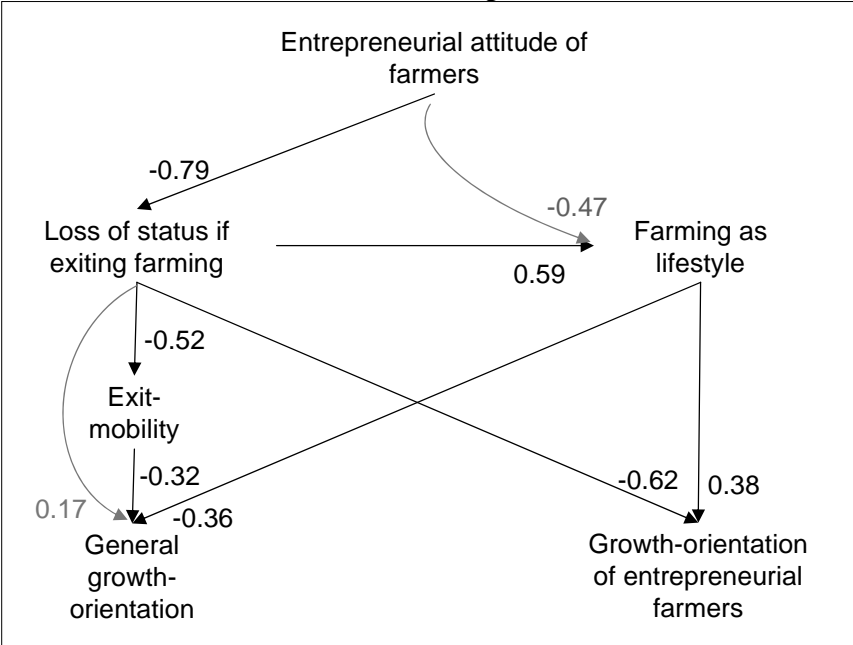
On the other hand, in the entrepreneurial farmer's shadow, many conservative farmers had been able to stabilise their full-time-farm, since none of them could establish as additional quantity-leader. Consequently, *income-diversification of conservative farmers* (CONSDIV) is not a frequent phenomenon in the respective districts. Rather, since they had been forced in a path of restricted growth in the past, *conservative farmers want to grow in land* (CONSGROW) further in order to stabilise their farms. Therefore, the initial farm-structure and the strategic interaction of farms can explain the disturbing observation, that many farms state a strong will for growth in land but at the same time, all of them restrict themselves to a minimum level of growth.

Finally, the impact of the sustainable differences in attitude, which are determined to a high degree by the initial farm-structure (see chapter 2.1.1) on short-term decisions concerning farm-development, will be analysed (figure 12). The *entrepreneurial attitude of farmers* (MODERN) has a direct negative relation with a *perceived loss of status if exiting farming* (STATUS). Via the status-effect, the entrepreneurial attitude of farmers indirectly relates negatively to the perception of *farming as a certain lifestyle* (LIFESTYLE). One could conclude that a lack of entrepreneurial attitude, the fear of losing status and the perception of farming as a lifestyle measure the same concept. A more thorough analysis of the relations depicted in figure 12 shows, though, that the status-effect and the perception of farming as a lifestyle rather allow for a further differentiation of farmers' attitudes.

The *fear from loss of status if exiting farming*, which is strongly related to a low entrepreneurial attitude of farmers, consequently causes a low *exit-mobility* (JOB) of farmers. On the other hand, where exit-mobility is low, the *general growth-orientation* (GROWTH) is rather high, because growth helps a sustainable stabilisation of farms. The fear from loss of status is therefore indirectly positive related to stronger general growth-orientation (the left

greyish arrow in figure 12). The perception of *farming as a lifestyle* relates not as strongly to the entrepreneurial attitude of farmers, and the model explains its value only to a small degree. In contrast to the fear from loss of status, it has a significant direct negative impact upon general growth orientation.

Figure 12: The impact of general growth-orientation of farmers and short-term decisions on farm-development



Source: Own figure

The contrary can be observed with respect to the *growth-orientation of entrepreneurial farmers* (ENTRGROW). Where the status-effect is high, especially the risk-aversion of entrepreneurial farmers seems to be higher and their growth-orientation is reduced. That means that growth-orientation of existing entrepreneurial farms is lower, the lower the predominance of entrepreneurial farms in a region is. In terms of strategic competition, this observation can be explained by the remaining ability to grow sufficiently by the many less competitive farms that act as quantity leaders and the lack of possibility of the few entrepreneurial farms to oust them out of production (Margarian, 2009).

On the other hand, the higher the fear from loss of status is, the higher is also the perception of *farming as a lifestyle*. While lifestyle is negatively related to *general growth-orientation*, it relates positively to the *growth-orientation of entrepreneurial farmers*. These therefore seem to take advantage from the less competitive behaviour of non-entrepreneurial farmers. Due to the opposing influence of the fear from *loss of status* and the perception of *farming as a lifestyle* on *general growth-orientation* and the *growth-orientation of entrepreneurial farmers* the impact of a lack of *entrepreneurial attitude of farmers* upon these strategies remains ambiguous. The question, under what circumstances the perception of farming as a lifestyle might dominate, cannot be answered, since the relevant factors are not in the model obviously. Therefore, the possibility remains open that cultural differences have at least some impact upon farmers’ growth-orientation. The idea of “cultural differences” still has to be reflected critically, though: Obviously, competitive farmers take their advantage of the

reduced competitive behaviour by the majority and are not under the influence of this “culture”. Therefore, the impression remains that it is mainly the combination of restrictions and opportunities in the presence of rents of the status quo, which shape regionally behavioural differences.

3 Results and conclusions

Foregone studies have demonstrated the impact of the initial farm-structure on farmers’ growth-orientation. Consequently, a coincidence of strategic behaviour motivated by the market with “cultural” differences, identified by external observers, is expected. Cultural differences in this case are regional differences in farmers’ behaviour. The empirical validation of this coincidence confirmed the theoretically derived result of endogenously evolving heterogeneity of farmers’ behaviour in the market. Therefore, concrete strategic adoptions of farmers not only relate to economic conditions and the present farm-structure but also to the fundamental growth-strategy that has evolved due to past conditions. The present paper showed that specific adoptions of farmers towards their environment can be explained economically within the framework of endogenously evolving heterogeneity.

The experts’ assessment of the fundamental mental disposition of farmers could be explained with the historically caused distribution of land among farms and the present structure of production. The assumption that behavioural and cultural differences are exogenous to economic development is being questioned by these results. At least in part, mental differences are grounded in *historical* economic conditions. Fundamental mental differences respectively their historical causes can be shown to have a lasting influence on farms’ strategic development and the resulting production structure. Moreover, the results show that in the imperfect land-market, rather subtle mental differences like awareness of status or traditional values impact upon strategic decisions. While these subtle differences in attitude closely relate to the economically founded growth-orientation, their primary source remains open for further analyses. Therefore, conditions influence upon the observed structural change, which present data on observables alone do not reflect adequately.

The consequences of these results might be rather painful in the eyes of “normal” economists and intervening policy. Farmers’ reaction to economic circumstances is mediated by initial conditions and evolving strategic attitudes towards growth and the kind of interaction with other farms. Therefore, a general optimal strategic choice does not exist from the farmer’s point of view. Economists in analysing structural change have to take account of specific regional conditions. Depending on the initial situation, very different dynamic equilibriums might be realised with different implications for social welfare. A non-ambiguous assessment of possible welfare-effects of political interventions might not be possible any more.

On the other hand, it has been demonstrated that this specificity of structural change does not prevent the development of a general theoretic framework of structural development. This framework, which allows for endogenously evolving behavioural heterogeneity, is characterised, though, by more degrees of freedom than the special case of neoclassical theory, which still applies for the case of perfect competition. Somehow counter intuitively, it

might finally be the recognition of the specificity of economic developments that paves the way for a general theory of structural change (in agriculture).

References

- Backhaus, K., B. Erichson, W. Plinke und R. Weiber, 2003: *Multivariate Analysemethoden. Eine anwendungsorientierte Einführung*. Berlin, Heidelberg: Springer.
- Bollen, K. A., 1989: *Structural Equations with Latent Variables*. New York: John Wiley & Sons.
- Brambor T., W.R. Clark und M. Golder (2006): Understanding Interaction Models: Improving Empirical Analysis. *Political Analysis* 14, 63-82.
- Breustedt, G. und Th. Glauben, 2007: Driving Forces behind Exiting from Farming in Western Europe. *Journal of Agricultural Economics*, Vol. 58, No. 1, 2007, 115-127.
- FDZ, 1999: Forschungsdatenzentrum [Centre for scientific use of individual data from official statistics]. Data of the agricultural census 1999. Kiel.
- Gasson, R., 1973: Goals and Values of Farmers. *Journal of Agricultural Economics* 24 (3), S. 521-537.
- Glauben, Th., H. Tietje and Ch. Weiss, 2006: Agriculture on the Move: Exploring Regional Differences in Farm Exit Rates in Western Germany. *Jahrbuch der Regionalwissenschaft* 26: 103-118.
- Goddard, E. W., A. Weersink, K. Chen and C.G. Turvey 1993: Economics of Structural Change in Agriculture. *Canadian Journal of Agricultural Economics* 41, S. 475-489.
- Goetz, S.J. and D.L. Debertin, 2001: Why Farmers Quit: A County-Level Analysis. *American Journal of Agricultural Economics* 83, S. 1010-1023.
- Herrmann, V., 1993: *Handlungsmuster landbewirtschaftender Familien*. Bamberg: WVB-Verlag.
- Hildenbrand, B., K. F. Bohler, W. Jahn, R. Schmitt, 1992: *Bauernfamilien im Modernisierungsprozess*. Frankfurt: Campus Verlag.
- Huettel, S. and A. Margarian, forthcoming. Structural Change in the West German Agricultural Sector. *Agricultural Economics* 40 (Supplementary Issue), 2009.
- Jaccard, J., 2001: Interaction Effects in Logistic Regression. Sage University Papers Series on Quantitative Applications in the Social Sciences, 07-135. Thousand Oaks, CA: Sage.
- Loehlin, J.C., 2004: *Latent Variable Models. An introduction to factor, path, and structural equation analysis*. London: Lawrence Erlbaum Associates.
- Makowski, L. und J. M. Ostroy, 1995: Appropriation and Efficiency: A Revision of the First Theorem of Welfare Economics. *The American Economic Review* 85 (4), S. 808-827.

- Margarian, A., 2009: The regional specificity of structural change in agriculture: An assessment of the role of farmers' strategic behaviour on the land market. DFG-Research-Group 986: SiAg-Working Paper.
<http://www.agrar.hu-berlin.de/struktur/institute/wisola/fowisola/siag/publikationen>
- Ohe, H. von der, 1985: Landwirte im Entscheidungsprozeß – Verhaltenswissenschaftliche Ansätze und Ergebnisse einer empirischen Untersuchung. Frankfurt: Verlag Alfred Strothe.
- Patrick, G. F., B. F. Blake and S. H. Whitaker, 1983. Farmers' goals: Uni- or Multi-Dimensional? *American Journal of Agricultural Economics* 65 (2), S. 315-320.
- Pearl, J., 1998: Graphs, Causality, and Structural Equation Models. *Sociological Methods and Research* 27(2), 226-284.
- Roeder, N., J. Kantelhardt and M. Kapfer, 2006: Impact of the CAP reform on small-scale grassland regions. *Agrarwirtschaft* 55, Heft 5/6, S. 257-267.
- Sinkwitz, P., 2001: Landwirtschaftliche Nebenerwerbsbetriebe im wirtschaftlichen und sozialen Wandel. *Land-Berichte* 7, 6 (2), Special Issue. Ulrich Planck zum 80. Geburtstag. Hrsg.: Franz Kromka und Gerd Vonderach.
- Tietje, H., 2004: Hofnachfolge in Schleswig-Holstein. *Dissertation zur Erlangung des Doktorgrades der Agrar- und Ernährungswissenschaftlichen Fakultät der Christian-Albrechts-Universität zu Kiel*.
- Varian, H.R., 1992: *Microeconomic Analysis*. New York: W. W. Norton & Company.
- Weiss, Ch. R., 1999: Farm Growth and Survival: Econometric Evidence for Individual Farms in Upper Austria. *American Journal for Agricultural Economics* 81, S. 103-116.

Appendix

A1) Factors and related statements that were assessed by the experts

Factor	Associated statements and their relation with the factor
PROFITAGR	+ “Without investment-support profitability of arable farming would be questionable.”
	+ “Without investment-support profitability of pig- and poultry-production would be questionable.”
	+ “Without investment-support profitability of horticulture would be questionable.”
	+ “Without investment-support profitability of milk-production would be questionable.”
INVESTOPTION	+ “Farmers should invest more in new types of production.”
	+ “Full-time-farms have additional sources of income apart from their farm”.
JOB	- “If farmers invest too little it is due to risk-aversion of banks.”
	+ “If a farmer here looks for non-farm-employment he will be successful.”
STATUS	+ “Exiting from farming implies for farmers a loss in status.”
LIVESTILE	+ “If necessary, farmers support each other based on trust.”
	+ “Farmers’ families are willing to sacrifice short-term profits or consumption, in order to secure future stability of the farm.”
	+ “Income from off-farm-labour is also spent for the financial stabilisation of the farm.”
JOBEXIT	+ “If off-farm-earnings per hour exceed income from farming, farmers exit the sector.”
DEFICITEXIT	+ “Exiting farms are characterised by low labour-efficiency.”
	+ “Exiting farms are characterised by low management-ability.”
	+ “Exiting farms are characterised by deficits in investments.”
STRUCEXIT	+ “Exiting farms occupy less land than surrounding farms.”
	+ “Farmers of exiting farms are characterised by good opportunities for non-farm-earnings.”
	+ “Exiting farms are characterised by deficits in investments.”
	+ “Farms exit in the course of farm-succession.”
GROWTH	+ “Demand for land is higher than supply of land.”
	+ “In large arable farms in the district non-family-labour is occupied.”
	+ “Farms in the district cooperate contractually with each other.”
LAND	+ “Demand for land is higher than supply of land.”
	+ “The necessary employment of non-family-labour represents a restriction on growth, because the necessary rapid accompanying growth is not possible.”
	+ “Change to part-time-farming is a reaction towards missing possibilities for growth due to the tight land-market.”
	+ “Profitability of necessary investments in milk-production would be questionable without investment-aid.”
ENTRGROW	+ “Non-exiting entrepreneurial full-time farms follow the strategy of growth in land.”
	+ “Non-exiting entrepreneurial full-time farms follow the strategy of offering services, which are related to agriculture.”
	+ “Non-exiting entrepreneurial full-time farms follow the strategy of cooperation with other farms.”
ENTRINTENS	+ “Non-exiting entrepreneurial full-time farms follow the strategy of growth unrelated to land.”
	+ “Non-exiting entrepreneurial full-time farms follow the strategy of specialisation.”
	- “Non-exiting entrepreneurial full-time farms follow the strategy of offering services, which are related to agriculture.”
CONSGROW	+ “Non-exiting conservative full-time farms follow the strategy of growth in land.”
	- “Non-exiting conservative full-time farms follow the strategy of growth unrelated to land.”
CONSDIV	+ “Non-exiting conservative full-time farms follow agricultural niche-strategies such as ecological production, breeding etc.”,
	+ “Non-exiting conservative full-time farms follow the strategy of non-agricultural diversification of their farm.”
	+ “Non-exiting conservative full-time farms follow the strategy of diversifying income via off-farm-work, for example by spouse or farm-successor.”
	+ “Non-exiting conservative full-time farms follow the strategy of changing their organisation towards part-time-farming.”
	+ “Non-exiting conservative full-time farms follow the strategy of offering services, which are related to agriculture.”

Source: Own table

A2) Correlation-matrix of variables from the structural-equation-model

		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1	CONSDIV	1.00 83															
2	CONSGROW	-0.13 83	1.00 83														
3	ENTRINTENS	-0.19 74	0.14 74	1.00 109													
4	ENTRGROW	0.11 74	0.26 74	-0.09 109	1.00 109												
5	STRUCEXIT	0.16 75	0.26 75	0.00 92	0.15 92	1.00 108											
6	LAND	-0.11 54	0.05 54	0.29 73	0.01 73	-0.05 70	1.00 81										
7	GROWTH	-0.21 56	-0.09 56	0.11 81	-0.05 81	-0.09 72	0.51 68	1.00 86									
8	DEFICITEXIT	-0.04 75	0.00 75	0.06 92	0.09 92	-0.12 108	-0.09 70	-0.04 72	1.00 108								
9	JOBEXIT	0.19 75	0.03 75	-0.11 92	0.04 92	-0.04 108	-0.13 70	-0.11 72	-0.36 108	1.00 108							
10	LIVESTILE	0.04 67	0.17 67	-0.02 90	0.26 90	0.43 88	-0.03 69	-0.20 74	-0.05 88	-0.20 88	1.00 101						
11	STATUS	-0.02 67	0.02 67	-0.02 90	0.03 90	0.25 88	0.08 69	-0.05 74	0.12 88	-0.28 88	0.66 101	1.00 101					
12	MODERN	-0.09 82	0.03 82	0.12 107	-0.06 107	-0.19 108	-0.09 80	0.05 86	-0.02 108	0.20 108	-0.55 101	-0.82 101	1.00 137				
13	GINI79	-0.22 83	0.36 83	0.19 108	-0.02 108	0.03 108	-0.12 81	-0.21 85	-0.07 108	-0.05 108	-0.12 100	-0.07 100	0.12 136	1.00 144			
14	PROFITAGR	0.14 54	-0.10 54	0.00 73	-0.15 73	0.15 70	-0.04 81	-0.36 68	0.05 70	-0.16 70	0.09 69	0.00 69	0.07 80	0.18 81	1.00 81		
15	INVESTOPTION	0.15 54	0.11 54	-0.17 73	0.22 73	0.05 70	0.02 81	-0.08 68	0.01 70	0.14 70	0.29 69	0.30 69	-0.11 80	0.05 81	0.31 81	1.00 81	
16	JOB	-0.11 54	0.12 54	0.13 73	0.21 73	0.33 70	0.12 81	0.18 68	-0.27 70	-0.01 70	0.11 69	0.06 69	-0.14 80	0.07 81	-0.02 81	-0.21 81	1.00 81

Remark: top-line: Pearson's correlation-coefficients; bottom-line: number of observations

Source: Own table

A3) Estimated causal coefficients from the structural-equation-model

influences upon...	CONSDIV		CONSGROW		ENTRINTENS		ENTRGROW		STRUCEXIT		LAND		GROWTH		DEFICITEXIT		JOBEXIT		LIVESTILE		STATUS		MODERN	
	Coeff	t-value	Coeff	t-value	Coeff	t-value	Coeff	t-value	Coeff	t-value	Coeff	t-value	Coeff	t-value	Coeff	t-value	Coeff	t-value	Coeff	t-value	Coeff	t-value	Coeff	t-value
CONSDIV																								
CONSGROW	-0.11	-0.9																						
ENTRINTENS	0.01	0.1	0.03	0.3																				
ENTRGROW	0.13	1.1	0.05	0.5	-0.13	-1.1																		
STRUCEXIT	0.27 *	2.3	0.23 *	2.2	-0.06	-0.5	0.04	0.4																
LAND	-0.02	-0.2	0.21	1.8	0.37 *	3.2	0.13	1.2	-0.06	-0.6														
GROWTH	-0.17	-1.3	-0.17	-1.4	-0.05	-0.4	-0.23	-1.8	0.05	0.4	0.56 *	4.9												
DEFICITEXIT	-0.03	-0.3	0.15	1.3	0.17	1.4	0.29 *	2.8	-0.01	-0.1	-0.12	-1.1	-0.11	-1.0										
JOBEXIT	0.10	0.8	0.02	0.2	0.05	0.4	-0.06	-0.5	0.09	0.8	-0.06	-0.5	-0.32 *	-2.9	-0.35 *	-3.4								
LIVESTILE	-0.17	-1.1	0.24	1.6	0.22	1.4	0.38 *	2.7	0.45 *	3.2	-0.05	-0.4	-0.36 *	-2.8	-0.23	-1.7	-0.07	-0.5						
STATUS	-0.29	-1.3	-0.23	-1.1	0.21	0.9	-0.62 *	-3.2	0.10	0.5	0.08	0.4	0.09	0.4	0.31	1.6	-0.52 *	-2.6	0.59 *	3.9				
MODERN	-0.37 *	-2.0	0.04	0.2	0.39 *	2.2	-0.19	-1.1	0.12	0.7	-0.07	-0.4	0.10	0.6	0.16	0.9	-0.18	-1.0	-0.03	-0.2	-0.79 *	-12.9		
GINI79	-0.24 *	-2.0	0.41 *	4.1	0.24 *	2.3	0.01	0.1	0.04	0.4	-0.04	-0.3	-0.24 *	-2.5	-0.10	-1.0	-0.05	-0.5	-0.10	-1.2	0.01	0.2	0.12	1.1
PROFITAGR	0.10	0.8	-0.34 *	-2.8	-0.04	-0.3	-0.42 *	-3.8	0.16	1.4	0.17	1.5	-0.41 *	-4.0	0.02	0.2	-0.26 *	-2.4	0.08	1.0	-0.02	-0.3	0.10	0.9
INVESTOPTION	0.15	1.1	0.18	1.4	-0.21	-1.5	0.47 *	4.1	-0.10	-0.8	0.00	0.0	0.24 *	2.1	0.00	0.0	0.40 *	3.4	0.11	1.2	0.22 *	3.4	-0.19	-1.6
JOB	-0.15	-1.2	0.07	0.6	0.15	1.2	0.36 *	3.4	0.27 *	2.6	-0.02	-0.2	0.26 *	2.6	-0.24 *	-2.4	0.09	0.8	0.10	1.2	0.00	0.0	-0.18	-1.6

Source: Own table