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Understanding family farmers' decisions
Towards a socio-economic approach

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Habilitation dossier

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Table of Content

Part A: Introduction and overview

Part B: Selection of published papers

1. Darnhofer, I. (2005). Organic farming and rural development: Some evidence from Austria. **Sociologia Ruralis** 45(4): 308-323. (SSCI impact factor 2004: 1,617)
2. Milestad, R. and I. Darnhofer (2003). Building farm resilience: the prospects and challenges of organic farming. **Journal of Sustainable Agriculture** 22(3): 81-97. (SCI impact factor 2003: 0,194)
3. Milestad, R., I. Darnhofer and S. Hadatsch (2002). Can resilience be built through organic farming? *Farming and Rural Systems Research and Extension. Local Identities and Globalisation.* Proceedings of the 5th International Farming Systems Association (IFSA) European Symposium. Florence, Italy, April 8-11, 2002. pp.120-128. (full-paper peer-reviewed)
4. Darnhofer, I. (2006). Understanding farmers as adaptive managers. Paper to be published in the proceedings of the 7th European IFSA Symposium, Workshop 3 "The future of farming", to be held in Wageningen, 7-11 May 2006.
5. Darnhofer, I., W. Schneeberger and B. Freyer (2005). Converting or not converting to organic farming in Austria: Farmer types and their rationale. **Agriculture and Human Values** 22(1): 39-52. (ISI-listed journal, SSCI impact factor: n.d.)
6. Darnhofer, I., R. Gretzmacher and W. Schneeberger (1997). Modelling Farmers' decisions: a comparison between HDM and CART for oats-vetch adoption in the Ethiopian Highlands. **Die Bodenkultur** 48(4), pp. 271-280. (SCI impact factor 1998: 0,204)
7. Schneeberger, W., I. Darnhofer and M. Eder (2002). Barriers to adoption of organic farming by cash crop producers in Austria. **American Journal of Alternative Agriculture** 17(1): 24-31. (SCI impact factor 2003: 0,439)
8. Darnhofer, I., M. Eder und W. Schneeberger (2003). Modellrechnungen zur Umstellung einer Ackerbauregion auf Biolandbau. **Berichte über Landwirtschaft** 81(1): 57-73. (SCI impact factor 2003: 0,114)
9. Darnhofer, I., C. Vogl (2003). *Certification and accreditation of organics in Austria: Implementation, strengths and weaknesses*. In: W. Lockeretz (Ed.). Ecolabels and the Greening of the Food Market. Proceedings of a conference held in Boston, USA, 7-9 November 2002. Gerald J. and Dorothy R. Friedman School of Nutrition Science and Policy, Tufts University, Boston, pp. 11-20. (full-paper peer-reviewed)
10. Darnhofer, I. und W. Schneeberger (2006). Impacts of voluntary agri-environmental measures on Austria's agriculture. **Int. J. of Agricultural Resources, Governance and Ecology**, accepted Nov. 2005. (ISI-listed journal, SCI impact factor: n.d.)

Part C: CV and overview of scientific activities relevant for the habilitation

Overview of activities relevant for the habilitation

following the habilitation guideline of the BOKU, downloadable at: http://www.boku.ac.at/habil.html

Category	Nb.	Activity/Output	Points/Publication	Total		min. required
Publications						
	7	Publication in Journal Cat. I	1,25/Pub.	8,75		7,00
	2	Publication in Journal Cat. III	0,75/Pub.	1,50		
	2	Editor (co-editor)	1,00/Book	2,00		
	2	Editorship (co-editor 2006)	1,00/Book	2,00		
	1	Chapter in book	0,75/Pub.	0,75		
				13,00	(15,00)	10,00
Conference presentations						
	14	Presentations at international scientific conferences				5
Research projects						
	2	Leader in two research projects				
	3	Participation in three research projects as a team member				
Scientific Community Services						
		Coordinator of the cooperation with the Thammasat University in Thailand (Memorandum of Understanding signed in 2005)				
		President of the Austrian Society for Agricultural Economics (ÖGA)				
		Convenor of a working group at a congress of the European Society for Rural Sociology (ESRS)				
		Member of the coordination committee of the European Consortium for Landscape Economics (Consortium Européen pour l'Économie du Paysage - CEEP)				
		Reviewer for journals included in the SSCI and SCI				
Teaching activities						
	14	Classes held	27 weekly hrs			3
	3	Classes held in English				
	1	Teaching activity abroad: Guest professor at the Thammasat University, Thailand				
Co-advisor for theses						
	5	Diploma theses (at Master level)				
	2	Doctoral theses				
Further education						
	5	Courses in didactics (university didactic, facilitation, creative methods in knowledge transfer, team based learning)				
	4	Courses in the application of IT (Hyperwave, Typo3, Moodle)				
	5	fFORTE-Coachings (Women in Science and Technology) and courses in scientific writing				

Curriculum Vitae

Name:	**Ika Darnhofer**
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Languages:	Fluent in German, English and French

Education

Oct. 1993 - April 1997	**Doctoral study** at the University of Natural Resources and Applied Life Sciences, Vienna. Awarded degree: Dr. nat. techn.
Oct. 1985 - Jan. 1993	**Diploma study** in Agriculture, specialisation in agricultural economics; at the University of Natural Resources and Applied Life Sciences, Vienna. Awarded degree: Diplomingenieurin (engineers' diploma)
Sept. 1978 - July 1985	**Lycée** (secondary school) in N'Djaména (Chad), Embrun (France), Niamey (Niger) and Nairobi (Kenya). Completed with the Baccalauréat de l'enseignement du second degré, Académie de Lyon, at the Ecole Française de Nairobi
Sept. 1974 - July 1978	**École Primaire** (primary school) in Kara Macina (Mali), Garoua (Cameroon) and N'Djaména (Chad)

Work experience

July 2004	**Guest professor** at Thammasat University (Thailand), duration: 4 weeks
Since April 2002	**Assistant Professor** at the Institute for Agricultural and Forestry Economics, University of Natural Resources and Applied Life Sciences, Vienna
Nov. 2000 - March 2002	**Research Assistant** at the Institute for Agricultural Economics, University of Natural Resources and Applied Life Sciences, Vienna
April 1999 - Sept. 2000	**Systems Operations Manager** at Romer Labs, Inc. in Union, Missouri (USA)
Sept. 1997 - Nov. 1998	**Consultant** for the Federal Ministry of Foreign Affairs - Dept. for International Cooperation VII/a.2c (Short term missions to Florence, Brussels, Brasilia and Montpellier).
Oct. 1996 - Feb. 1999	**Consultant** with FOCUS Management Consulting, Vienna
Mar. 1994 - March 1996	**Graduate Fellow** at the International Livestock Research Institute (ILRI), in Addis Abeba, Ethiopia (ILRI is a member of the CGIAR)
Oct. 1991 - March 1992	**Research Intern** at the International Center for Research in Agroforestry (ICRAF) in Nairobi, Kenya (ICRAF is a member of the CGIAR)

Understanding family farmers' decisions
Towards a socio-economic approach

Part A of this habilitation[1] dossier presents the conceptual framework spanning the publications included in Part B, which are referred to in curly brackets. The aim of this overview is to weave the individual publications of the author into a larger conceptual development, not to present a comprehensive literature review. The approaches and methods used in the author's research work are described. Reflections on the complementary nature of the approaches used as well as key insights from the results illustrate how they contributed to grounding the conceptual advances. The outlook section presents a framework that can be useful to integrate the different disciplinary methods by building on the strengths of the various economic approaches as well as the strengths of approaches from other social sciences.

1. Farmers' decisions as an object of research

Although farmers represent a small share of the active population in many European countries, their farm management choices can have profound implications, since they are the stewards of a large share of the national territories. To ensure environmental quality and landscape amenity, agriculture and land use are the object of a large number of laws, regulations and policies (Penker 1997). These can serve as an indication of the importance policy makers give to influencing farmer choices. Farmer decision making[2] and the effect of their choices are also a rich object of research, not least to be able to formulate recommendations to policy makers.

Organic farming has been at the centre of attention of both agricultural policy and consumers discourse since it carries the potential to address a number of concerns raised by modernised, industrial farming (e.g., environmental impact, overproduction, food safety). For policy makers, organic farming also carries the promise to contribute to rural development and to support the multifunctional role of farms (e.g., in building

[1] A habilitation is an academic qualification denoting the license to teach and to supervise students working on their theses.

[2] Although in some contexts it is useful to distinguish between a choice and a decision, these will be treated synonymously here. Both are understood as a cognitive process involved in judging the merits of multiple options and selecting one for action. Such a cognitive approach assumes internal mental operations as part of the causation of behaviour. Although philosophers do debate about the extent to which intentional actions are caused (or not) by mental items (see Mele 2003), this position is widely taken for granted by economists and decision theorists. Furthermore, while being sensitive to the theoretical concerns of philosophers of mind and action and the empirical work in psychology that raise issues such as the fact that the internal states mediating behaviour remain unobservable, the perceptual bias involved in decision making or the problem in communicating internal reasoning, these issues will not be pursued further. For the current purpose of attempting to explain intentional actions by farmers, i.e. understand their choices, it will suffice to assume that farmers act on the basis of practical reasoning and that the key reasons for actions can be reasonably well communicated to researchers.

alternative food chains through direct marketing or its positive impact on landscapes). Thus organic farming is the subject of policy support, with explicit goals to increase the share of organic farms included both in policy papers by the European Commission (see the European Action Plan for Organic Food and Farming) as well as by a number of individual Member States (e.g. in the UK, Austria, Denmark).

Researchers are called upon to investigate under which conditions farmers do convert to organic farming and what factors present obstacles to conversion. On the one hand, the goal of research on conversion to organic farming is thus to offer policy makers advice on measures that can contribute to increasing the share of organic farms. On the other hand, organic farming is a well suited object to study decision making by farmers as it has clearly defined legal rules {see Darnhofer and Vogl 2003} that set it apart from other production methods. Organic farming can be seen as a strategic choice, affecting the farm's overall purpose and direction. As such it differs from choices related to the operational management of the farm, which are more targeted towards ensuring efficient and effective farm operations. As a conversion to organic farming usually involves a fundamental restructuring of farm activities, it might be expected that the decision making process by farmers is more comprehensive, i.e. a decision where a wide range of influencing factors can play a role. Organic farming has thus been and continues to be a fertile ground of study for economists (e.g., Nieberg and Offermann 1999, Kirner and Schneeberger 2002, Blank and Thompson 2004), sociologists (e.g., Tovey 1997, Fairweather 1999, Padel 2001), political scientists (e.g., Michelsen 2001) as well as human geographers (e.g., Duram 1999, Morgan and Murdoch 2000, Guthman 2004).

Austria provides a particularly interesting situation for studying conversion to organic farming since it prides itself to be the leading country in the European Union regarding the share of certified organic farms. Indeed, Austria's agricultural policy has long been aware of the multifunctional aspects of farms and their role in rural development and is oriented towards maintenance of family farms even in remote areas {see Darnhofer and Schneeberger 2006}. Supporting the development of organic farms has been an integral part of this strategy and further increasing the share of organic farms remains a declared policy goal. The strategic nature of the decision to convert to organic farming is also underlined by the fact that in Austria the whole farm is required to convert, i.e. converting individual farm enterprises is not permissible if the farm is to receive direct payments for organic farming within the agri-environmental programme.

2. Economic approaches to decision making

2.1. Economic modelling

Economics can be defined as the science of individual choices and their consequences. For many agricultural economists, mathematical models are the tool of choice to understand important aspects of decision making, i.e. derive the optimal allocation of resources to a range of activities a farm might engage in. These are mostly used to

derive operational recommendations but can also be used to help select between strategic options. To compare production methods or farm enterprises, usually gross margin calculations (also called enterprise budgets) are used. If the goal is a whole farm model, linear planning allows to define the combination of crop and livestock activities that will maximise e.g. total gross margin for the farm, given the farm's resources (land, labour, capital, buildings, machinery) and various limitations as seen fit for the case under study (e.g., participation in the agri-environmental programme). Feasible enterprises are identified, their gross income per unit, variable costs and gross margins computed. Income and variable costs per unit are multiplied by the number of units to be produced and then combined with other farm income, fixed costs and any additional variable costs to estimate net farm income (see Kay et al. 2004). Linear programming can thus be used to select the combination of enterprises that maximises gross margin without exceeding the supply of resources available.

To analyse the relative profitability of organic farming vs. conventional farming and to ground farm-level recommendations, agricultural economists have made extensive use of gross margin calculations and linear programming models, among many others also Darnhofer et al. {2003}. The goal of the study by Darnhofer et al. {2003} was to assess the economic implication of the conversion to organic farming in a cash crop area of Austria. The region under study, the Weinviertel, was selected for its low share of organic farms (1% compared to 10% on average in Austria). Since the farms in the region differ in their mix of enterprises (e.g., type of field crops, animal husbandry, vineyard) and farm sizes, characteristic farm types were identified and eleven linear planning models built. Starting from conventional farming methods, three scenarios of conversion to organic farming were calculated: assuming organic prices for organic products, assuming conventional prices for organic products and a scenario with additional ecological constraints to take into account the impact of cropping choices on the landscape. The results show that when assuming organic prices, it is economically profitable for all eleven farm types to convert to organic farming. Assuming the lower, conventional prices for the organically produced products, conversion to organic farming is still economically profitable for six farm types. For two other farm types, farm gross margin is similar to that under conventional farming and for four farm types the gross margin decreases {Darnhofer et al. 2003}.

The linear planning models thus provide important insights into the relative profitability of organic farming as compared to conventional farming under different assumptions (e.g., prices, agri-environmental constraints). They also help understand how the type of farm (with/without sugar beet quota, with/without animal husbandry, with/without vineyards) affects the relative economic attractiveness of conversion to organic farming. Furthermore, these models allow to assess the level of compensation payments or the required price levels for organic farming to be attractive to farmers. If the results are aggregated at the regional level, indications regarding the likely impact of a full conversion of an entire region to organic farming (e.g. types and amounts of products supplied, direct payments required) can be derived. These applications illustrate some of the fundamental capabilities and distinctive advantages offered by quantitative economic models.

The information derived from these normative economic models is helpful to understand a variety of economic aspects; however they cannot be used to predict behaviour of farmers. Indeed, the economic models for the Weinviertel – whose results are in line with other such models as calculated e.g. for Germany (Nieberg and Offermann 1999) or Austria (e.g., Kratochvil 2003, Omelko 2004) – show that conversion to organic farming is economically attractive for the majority of farms. The fact that 'only' about 1% of the farms in the region are certified organic points to systematic reasons for farmers not to convert to organic farming. These may be related to aspects of the conversion process which cannot be captured by a static comparative approach and/or indicate that farmers do not necessarily proceed by making production decisions that equate their marginal costs to the given market price. The fact that farmers do not always act in a strictly economically rational way, particularly regarding strategic choices, has long been recognised by researchers. As farmers often strive to fulfil a variety of goals (Coleman 1994, Kay et al. 2004) their choices cannot be expected to conform to the results of economic models, especially when these primarily take into account economic aspects.

2.2. Theoretical approaches to choice within economics

The limits of neoclassical economic models to understand real-life decisions – e.g. by family farmers – have long been recognised by economists. To appreciate the origin of this restriction, the relevant fundamentals of the neoclassical economic reasoning will be briefly retraced and theoretical developments aiming at overcoming some of these limitations will be outlined.

Neoclassical economics begins with an a priori conception of markets and economies as determinate systems that, by the action of individual agents, tend towards an efficient and market-clearing equilibrium. This requires that individual agents behave in a prescribed manner, i.e. according to economically rational choice (Fullbrook 2005). The economic model of rational choice views people as individuals, and each individual as self-interested, autonomous, rational and free to choose among different actions. As Keiser (2005) notes, this economically rational person is an actor who knows her preferences with respect to all the goods available and can rank them in order of priority without problems of transitivity (i.e. if X is preferred to Y and Y to Z, then X is always preferred to Z). This person has thoroughly reflected on these preferences so that they are now stable. She has complete information and time is not an issue (i.e. out of the set of all possible bundles of goods, given her income, she will consider her preference between every pair of them). Also, her choices are independent (i.e. there are no intersubjective effects: an economically rational person is not influenced by the choices of others). Actors meeting these axioms are called economically rational agents. An economic agent is thus a person without mental bias (which are the issue of psychologists, not economists) or social ties (which are studied by sociologists).

Given the rigorous abstractions required in the neoclassical perspective, the results based on them have limited ability to describe real-world behaviour (Keiser 2005). However, various economic schools of thought have also attempted to describe what people actually do, i.e. taken a positive or descriptive approach. In these approaches

assumptions underlying neoclassical economics are relaxed in various ways. For example, although neoclassical economists assume that people would never do anything to violate their preferences, Herbert Simon[3] has shown that humans tend to be 'boundedly rational', i.e. experience limits in formulating and solving complex problems and in processing (receiving, storing, retrieving, transmitting) information. These bounds of human's cognitive processes are core issues in behavioural economics (Mullainathan and Thaler 2001).

The principle of invariance that underlies the rational theory of choice in economics has also been qualified by the results from experimental economics. Indeed, the results from experimental economics have demonstrated that even under simple experimental setups, decision makers do not always act in utility-maximising ways, as is assumed by neoclassical economic theory (Tversky and Kahnemann[4] 1981, Laibson and Zeckhauser 1998). Research in economic psychology has shown that non-economic considerations, such as fairness or other ethical considerations can play an important role in choice (see Smith[4] 2003).

Neoclassical production theory usually focuses on cost or price induced substitution effects between factors of production and considers knowledge as given, i.e. assumes a decision maker who is fully informed. However, real-life decision makers are not omniscient. Transaction cost economics focuses on the role of information and emphasises that organisation and governance does matter (Williamson 2002). Using Ronald Coase's[5] fundamental insight about the critical role that transaction costs play in determining economic structures and performance, new institutional economics focuses on the embeddedness of economic activity in social and legal institutions. The school of institutionalist political economy goes even further, upholding the fundamental premise that economics cannot be separated from the political and social system within which it is embedded. There is thus an acknowledgement that individual choice tends to be linked with historically and geographically given social worlds (Fullbrook 2005), so that incorporating enabling and restricting institutions and social structures may lead to a more complete picture (Davidsen 2005).

Whereas neoclassical economic theory is based on the assumption of independent actors, another development within economics, using game theory, specifically looks at decisions that are made in an environment where various agents interact. Game theory thus studies choice of optimal behaviour when costs and benefits of each option are not fixed, but depend upon the choices of other individuals. Here the focus is on strategic

[3] Herbert Simon received the Nobel Prize in Economic Sciences in 1978 for his pioneering research into the decision-making process within economic organizations. He rejects the assumption made in the neoclassic theory of the firm of an omniscient, rational, profit-maximizing entrepreneur. He replaces this entrepreneur by a number of cooperating decision-makers, whose capacities for rational action are limited, both by a lack of knowledge about the total consequences of their decisions, and by personal and social ties.

[4] Daniel Kahneman received the Nobel Prize in Economic Sciences in 2002 (which he shares with Vernon Smith) for having integrated insights from psychological research into economic science, especially concerning human judgment and decision-making under uncertainty. In 2005, Robert Aumann and Thomas Schelling received the Nobel Prize for having enhanced our understanding of conflict and cooperation through game-theory analysis.

[5] Ronald Coase received the Nobel Prize in Economic Sciences in 1991 for his discovery and clarification of the significance of transaction costs and property rights for the institutional structure and functioning of the economy.

situations where players choose different actions in an attempt to maximize their returns; including collective and cooperative strategies (see Montet and Serra 2003).

To overcome the static view of the firm which is at the heart of neoclassical economics and of contractual theories, Rathe and Witt (2001) propose to analyse the processes by which firms change and develop. They point out that the changes that firms undergo are subject to exogenously induced adaptations as well as to endogenous sources of development. The theories focusing on the dynamic aspect try to explain how firms generate and adapt to change, and how these processes are intertwined with what happens at both the lower level of individual behaviour and the higher level of markets and the firm's environment in general. Whereas evolutionary economics is primarily concerned with the ongoing change in industries, technologies and the economy as a whole, the developmental approach focuses on internal change of the firm which is seen as a learning system whose survival strongly depends on the successful generation and absorption of new knowledge (Rathe and Witt 2001). This notion of development in firms highlights the impact of bounded rationality, cognition and social learning and emphasises the crucial role of the entrepreneur for the development of the firm (Witt 2000).

These – as well as other – developments in economic thought seek to (partially) overcome the limiting assumptions on which neoclassical economics are based. However, despite their significant theoretical contributions, only few schools have developed methods and tools to implement them in empirical research.

2.3. Implications for understanding family farmers' decisions

Theoretical developments in economic thought have found limited application in agricultural economics, especially in farm-level studies. This may be partly due to the fact that whereas they propose appealing concepts, these can be hard to operationalise and implement. It may also be due to the fact that economic aspects of farming are often understood as being primarily related to production. Agricultural production is indeed largely dependent on technology, the mix of factor inputs, factor prices and marginal productivity. The goals of many studies in agricultural economics were thus well served by the theory of production, i.e. the analysis of the role of production possibilities in the determination of relative prices, and in the efficient allocation of resources.

However, especially given the shift from production to rural development within the agricultural policy of the European Union, the focus of farm-level analysis on production needs to be enlarged so as to capture the wide range of alternative options that are open to farmers and the diversity of influences on their choices. Indeed in Austria on average 54% of the income of the farm family stems from agricultural and forestry activities (including direct payments), 29% stems from other sources of income and 17% from pensions and social transfer payments (BMLFUW 2005:75). Additionally it needs to be kept in mind that in Austria, more than half of all farms are managed by part-time farmers, i.e. where the farmer and her spouse spend less than half of their working hours on farm. For these family farms, economic models focusing on the optimal

allocation of resources for the production of agricultural commodities can only serve as partial information for the organisation of farm activities.

Agricultural economists working at farm-level have thus often complemented the insights derived from (neoclassic) economic models with additional information derived using sociological methods. The sociological approaches are used to highlight the cognitive dimension of farm management and thereby partly integrate the theoretical development in economic thought. Indeed, the insights from cognitive sciences question the economically rational choice model in its abstraction from the interpretive process and its treatment of information as datum, whose meaning is self-evident (Priore 2003). Human rationality has been shown to be mostly interpretative; an agent's understanding of her choices being evaluative (Eymard-Duvernay 2005). In other words, realities are conceptual constructs and thus subject to inevitable and continual re-interpretation and contest.

As agricultural economists have noted, and as has been supported by research results from psychology, farmers' decisions can be influenced by a wide range of non-monetary considerations. Although monetary and material aspects are doubtlessly important, understanding family farmers' choices requires including perspectives on their interdependency with social dimensions, i.e. the appreciation that farmers aim not only at economic goals but also at sociability, approval, status, and power (see Granovetter 1985, Galmiche-Tejeda 2004). It is thus necessary to reach a better understanding of the social factors limiting the farmer's freedom of choice. At the same time, an 'oversocialised' conception (see Granovetter 1985), where farmers are seen as passive recipients of government programmes and/or as so routinised that they simply follow laid-down rules or conventions should be avoided, as has been emphasised by Long and van der Ploeg (1994).

In studying farmers' decisions it is also important to keep in mind that farms are 'polycentric' in the sense that each individual family member is an actor with her or his specific ideological orientation, which to some extent may depart from that of the head of household (Söderbaum 2004). This means that the farmer needs to generate socially-shared, cognitive and motivational commonalities among the members of the farm family, a task that is by no means trivial (Witt 2000). Such tensions may well be a source of learning and reconsideration of the 'core values' or 'business concept' of the farm, which might thus change over time. Indeed, as insights from rural sociology point out, the family farm should not only be understood as a site of production, but also as a life style. It is then important to take into account the links between the farm as an economic unit and the social sphere, including the dynamics within the farm family (Gasson and Errington 1993; for a review see Vogel and Wiesinger 2003).

A core objective of many family farmers is the long-term survival of their farm. As Rosenhead and Mingers (2001) note, making and taking decisions, solving problems, designing and re-designing systems all take place in conditions of complexity and uncertainty. From an evolutionary viewpoint, continual development and change is needed to maintain a farm's 'fitness' relative to the systems it is coevolving with. As Rammel (2003) emphasises, this imperative to change implies that there cannot be any

best state, nor a stable equilibrium, nor an optimal path of development. Evolutionary systems do not relate to stability in a static sense as they are faced with moving equilibria and the dynamics of coevolutionary interactions which cannot be foreseen ex ante. Under such turbulent conditions, diversity can be a key element of long-term stability and even survival. Maintained diversity represents a repertoire of alternative options and increases the possibility that altered conditions or new socio-economical objectives can be successfully met through pre-adaptations and further changes. There thus seems to be a trade-off between economic efficiency on the one hand, and diversity or adaptability on the other (Rammel and van den Bergh 2003).

To better understand family farmers' choices, it thus seems helpful to account for the cognitive processes at play when family farmers analyse and select alternatives, how they are subject to influences originating from the social context, as well as the extent to which farmers take into account complexity and uncertainty in a world characterised by rapid and unforeseeable change.

The shift in perspective from family farm decisions being centred around production issues, to an understanding of the farm as seeking to balance economic and social goals, accommodating multiple sources of income, e.g. from rural development activities and off-farm work, and securing the long-term survival of their farm, emphasises the importance of analysing the farm in its complexity. As Galmiche-Tejeda (2004) has pointed out, family farmers address farming problems by looking at them as a whole, by seeking solutions based on an integrated analysis of all parts of their system, e.g. the technological, social and economic components. To support such an integrative approach, combining the insights from economic analyses with the results derived using methods from other social sciences has proved fruitful.

3. Integrating methods from other social sciences

3.1. Including subjective perceptions: Asking farmers

Surveys are an appropriate tool to attempt to grasp factors that influence family farmers' choices. Both written questionnaires and oral interviews have been used attempting to find out what actually happens at farm level, by asking farmers why they do what they do. Questionnaires are useful in describing the characteristics of a large population, as they allow to include a large sample size, making the results statistically significant even when analysing multiple variables.

Questionnaires have been used both to ask conventional farmers about their perceived barriers to conversion as well as to ask organic farmers for the reasons that underlie their decision to convert. The analysis of the farmers' responses shows that non-economic factors can indeed play an important role in farmer decision making. For example, the results of Schneeberger et al. {2002} indicate that one of the main obstacles to conversion for conventional farmers is the fear of additional labour. This

leads to the question whether and how this may be linked to the fear of a high weed and pest incidence on their field. Another potential interrelation might be between the fear of a yield decrease and the fear of a lower net income. Subjectively, these two items might be linked in the farmer's mind, even if objectively it is a matter of price per unit. A similar question arises regarding whether the dislike of a yield decrease, which is likely to happen after conversion to organic farming, is linked to the values in the farming community, i.e. that a 'good' farmer is one achieving a high yield. Although questionnaires offer additional insights into the factors influencing farmer decision making as well as the farmers' relative ranking of the various obstacles to conversion, these are still insufficient for identifying the interplay of various factors. Since often several interrelated factors are at play, rather than there being one single decisive barrier (Kirner 2001), the limited insight into the structure and the relationship of various barriers to conversion offered by questionnaires does not allow for a thorough understanding of farmers' decision making process.

Thus although questionnaire-based surveys tend to be strong on reliability, the artificiality of the format puts a strain on validity (Dudley 2005). Since people's real feelings are hard to grasp through dichotomies such as 'agree/disagree,' 'like/dislike,' these are only approximate indicators of what the researchers have in mind when creating the questions. Furthermore, a method relying on standardization forces the researcher to develop general questions, possibly missing what is most appropriate to many respondents.

Oral interviews are a more flexible form of research than written questionnaires, with the particular advantage that the interviewer has the opportunity to probe or ask follow-up questions. The interview approach is personal, providing a large amount of detail. In-depth interviews on reasons for conversion have been reported by a number of authors {see Darnhofer et al. 2005}. They show that the choice between conventional and organic farming is multidimensional, resulting from complex interactions between various factors. Personal determinants, such as subjective perception and future expectations of farmers seem to play an important role in farming decisions as fundamental as the conversion to organic agriculture {Schneeberger et al. 2002}.

The analysis of interviews suggests that although a number of factors influencing the decision to convert or not to convert may be translated into economic terms, farmers themselves do not necessarily reduce them to their economic dimension. They seem to perceive them in a more complex way, i.e. see them as embedded, as intrinsically linked with sociological and technological aspects. For example, interviews reveal that farmers' dislike of weeds in their fields is linked not only to the economic aspect (lower yields), but also to technical aspects (e.g., weeds entangling the harvester) and to social status (i.e. fear to be perceived as a 'lazy' or 'incompetent' farmer by the community). This reinforces the presumption that the conversion to organic farming involves economic aspects (is it economically feasible for the farm?), technological questions (e.g., a shift from curative biocide application to preventive measures) as well as sociological aspects (acceptance by family members, acceptance by the farming community). Although the acceptance by the farming community has been shown to decrease in importance as

organic farming has become an accepted method of production, acceptance by family members (e.g., a father or father-in-law from whom some land was inherited) is still mentioned as a decisive issue by some family farmers {Schneeberger et al. 2002, Darnhofer 2004).

The drawback of oral interviews is that they are resource intensive and can be very time consuming, so that the sample size is usually rather small. It is thus often difficult to draw definitive conclusions from the findings or to generalise them to larger groups. However, using a case-study approach, this method allows for much deeper insights into farmers' perceived causal chains and the interdependencies of the influencing factors.

3.2. Compiling qualitative decision models and cognitive maps

Qualitative studies explicitly oriented towards understanding farmers' decision making processes can offer additional insights and help interpret the findings based on economic models and on questionnaires. In tools such as hierarchical decision modelling {e.g., Darnhofer et al. 1997, Darnhofer et al. 2005} or cognitive mapping {e.g., Darnhofer 2005} in-depth interviews serve as the basis for constructing a model depicting farmer perception of his choices and the logic of his argumentation. This allows for a systemic, integrated view of farmer decisions, understanding under which configuration a particular decision factor becomes salient.

Decision trees, built following the method developed by Christina Gladwin (1989) are useful for assembling information on farmers' opinions and perceptions in a systematic way so as to show the logic behind farmers' decisions. The tree building process is tightly integrated with data collection, thus offering a high level of flexibility. The method has been shown to be as effective as computer programmes building classification and regression trees {Darnhofer et al. 1997}. The strength of decision trees is that they make transparent the links between various influencing factors, while at the same time identifying groups of farmers that have distinct rationales for their choices. Thus a decision tree allows insights into the values and beliefs underlying farmers' choices and shows that there are different groups of farmers who base their decision on different sets of criteria.

This heterogeneity among farmers has important implications. As research on farming styles (see van der Ploeg 2000, Commandeur 2003) has revealed, there are important differences in the logic guiding the strategic decisions of a farmer and thus the organisation of farm resources. The variety of farming styles has persevered, although competition and the logic of the market may seem to favour one specific type of farms and farm organisation (van der Ploeg 1997). As Rathe and Witt (2001) have pointed out, for a firm as a constrained productive unit, it is the way in which the resources are utilised that matters, not the resources themselves. The productive opportunities of the firm are then not objectively given, but subject to the possibly differing conceptions of individual actors, i.e. what a farm can produce with given resources hinges critically on

the conceptions and capabilities of the farmer. This may help explain why similar exogenous influences can have dramatically differing consequences for farms.

Nonetheless, decision trees, as any method, also have weaknesses. One is that a decision tree depicts a snapshot in time. With its unidirectional arrows, the decision tree can give the impression that a deterministic, static and linear decision process exists. This is, of course, not the case. Since the interrelation between decision factors are not modelled, the decision tree does not allow predictions as to future development of farmer's choices. When structural conditions (e.g., agricultural policy, prices, marketing channels) change, farmers' perceptions are likely to change too. As Rigby et al. (2001) point out, explanatory variables may change not only from one farmer to another, but also over time. Thus, change and learning processes, while certainly present, cannot be appropriately captured in decision trees.

To capture the interconnections between various factors, it might be more fruitful to represent the concepts and logic of farmers in the form of a network. One such approach to render graphically the interconnected issues, problems, strategies and options considered by decision makers are cognitive maps, developed by Colin Eden (Eden and Ackermann 2001) which are guided by the theory of personal constructs by George Kelly (1955). The essence of Kelly's theory argues that people are continually striving to "make sense" of their world so as to be able to manage and influence that world. This cognitive approach implicitly sees the individual as a problem solver. The farmer is thus taken to be involved in the psychological construction of the world rather than the perception of an objective world. It is her interpretation or 'construction' of an event that is reality, rather than its perception. Action thus arises out of the meaning of situations, and the meaning will vary from one individual to another, even if the characteristics of the event are agreed by both individuals to be similar (Eden and Ackermann 2001).

The aim of a cognitive map is to build a model that is emphatic with the view of the farmer. The string of arrows linking concepts depicts the line of argument as presented by the farmer during the interview. A cognitive map is thus a model designed to represent the way in which a person defines an issue. It is not a general model of someone's thinking, neither is it intended to be a simulation model of decision making. The model seeks to portray the way in which farmers are making sense of their situation. It aims to set out their explanations for why the situation is as they construe it and why it matters to them (Eden 1994).

The cognitive maps drawn for a sample of twelve farmers (Darnhofer 2004) show the importance farmers put on balancing the needs and preferences of various family members as well as the importance they put on their roles within the local community (e.g., off-farm work, social engagement) as a means to keep up the social ties as well as maintain information flows. Farmers thus seek a fine balance between the labour time on-farm and their involvement in off-farm (agricultural and non-agricultural) activities. The cognitive maps allow to make transparent farmers' multiple realities and strategies, thus shifting attention to how farming approaches are mediated by farmers, how they transform and reconstruct meaning to fit their farming rationale.

In particular the analysis of the cognitive maps show that conversion to organic farming is valued by some farmers as it allows to restructure production factors, to reorient the farm to follow a different economic logic, moving from economies of scale towards economies of scope. Farmers simultaneously take into account the alternative sources of income on-farm and off-farm (in both cases, whether related to agriculture or not). Some farmers see a conversion to organic farming as facilitating their engagement in the local economy, e.g. in the local food sector or as a producer of energy {see Darnhofer 2005}. This implies a wide set of alternatives, reemphasising Marsden's (1999: 504) call "for a more integrated, holistic and spatial rather than sectoral approach" to understanding farm dynamics, taking into account all activities of the farm family.

3.3. Integrating evolutionary concepts

In Austria, where farms are typically inherited from previous generations, there is a strong link to the land and a deeply felt responsibility to keep the farm going. Thus many farmers emphasise the importance to maintain the flexibility needed to adapt to dynamic and uncertain environments {Darnhofer 2005}. Farmers seem to take an integrative look at their farm and examine how their management choices may impact the long-term survival of their farm. When considering temporal dynamics, a farm's sustainability implies the ability to create, test and maintain its adaptive capacity so as to be able to cope with unexpected events and juggle shifting objectives (Holling 2001). Systems do not remain stable and farmers have always lived in changing environments – politically, socially, economically and ecologically – where surprise and structural change are inevitable. A diversification of on-farm and off-farm activities might thus be an opportunity to increase the resilience of the farm {Milestad and Darnhofer 2003}.

There is then a need to balance the optimisation strategy which are the strength of many recommendations based on neoclassical economics with the family farmers' long-term farm maintenance strategy. Indeed, a farmer's goal may not only be to maximise current income, or the profit in the short-term, but also to secure the farm as a viable entity, so as to be able to pass it on to the next generation. This restriction has profound implications for the farm management strategy. The optimum-and-equilibrium orientation underlying a number of neoclassical economic models may not sufficiently account for the pivotal role diversity can play (Rammel and van den Bergh 2003). However, long-term sustainability calls for adaptive flexibility and evolutionary potential, which enables a continuous process of adaptive learning and the possibility to initiate new development trajectories (Rammel 2003, Rammel and van den Bergh 2003). Farmers may thus seek to foster a sound balance between short-term efficiency goals and long-term stability based on maintained evolutionary potential and adaptive flexibility (Rammel and van den Bergh 2003). This balance implies that farmers may be willing to incur the cost of maintaining variety and diversity, even if it may mean a loss of efficiency or a lower profitability on the short term. Farmers are aware of the fact that the one-sided focus on increasing economic efficiency is often linked to an increase specialisation, as embodied by modernisation {Darnhofer 2005}. A decrease in the number of activities and thus a

lower level of adaptive flexibility, however, tends to create inflexible lock-ins. Once a farm becomes locked into a narrow development trajectory, the lack of alternative options goes hand in hand with increased vulnerability (Rammel 2003). Maintaining diversity to foster adaptive flexibility and evolutionary potential can thus be seen as a risk-minimising strategy, much in line with the precautionary principle.

4. Outlook: A socio-economic approach

Increasingly, economists come to recognize that the tools and techniques based on neoclassical economics, strong as they are, may be unsatisfactory by themselves to address issues related to decision making by family farmers. If the goal is to explain family farmers' concrete behaviour in society, taking a disciplinary approach provides only partial answers which may not be adequate in a complex and fast-evolving world. Indeed, choices are the result of the simultaneous working of the economic and social forces. These forces are intertwined and cannot be observed separately (Keizer 2005).

To better understand family farmers' decisions while taking into account the concerns raised by various schools of economic thought, the integration of a range of social disciplines seems judicious (see Abell 2003), the goal being to find "a way of getting them to trade and breed ideas, concepts, evidence and experiments" (Harvey 2004:335). As Kanbur (2001) has suggested, we should focus on the strengths of sociology, anthropology and political analysis and see how these can complement economic approaches. As far as understanding decision making, there are obvious complementarities e.g. with anthropology, which is centrally concerned with people's understanding of the world in which they live, and the ethnographic approach which aims at understanding action and the ideas and beliefs that shape it (Harriss 2002). Although there are concerns that an interdisciplinary approach might lose the strength of each approach through disciplinary and methodological confusion, there are also authors pointing out that 'hybrid vigour' can result from interdisciplinary research (e.g. Jackson 2002). As ecological economics, which fosters an understanding between economists and ecologists and the integration of their thinking has shown, such an interdisciplinary approach can indeed lead to important advances in understanding.

Socio-economics[6] is another such developing movement, seeking to integrate aspects of various social sciences. As Etzioni (2003) emphasises, the term 'socio' in socio-economics does not only stand for sociology. It includes major segments of psychology and anthropology, history and political sciences – the whole complex of disciplines that examine the relationships between society and the economy. Socio-economics

[6] Socio-economics should be distinguished from both social economics (an approach within economics) and economic sociology (an approach within sociology). Whereas some definitions might overlap, these two disciplinary schools can be characterised as follows. On the one hand the social economists attempt to embed the social influences in a testable, analytic framework, e.g. by including the social environment along with standard goods and services in their utility functions (see Becker and Murphy 2000). On the other hand, economic sociology focuses on the social consequences of economic exchanges, the social meanings they involve and the social interactions they facilitate or obstruct (see Granovetter 2002).

recognizes that each disciplinary tradition highlights different aspects and different modes of coordination which can hardly be assimilated into the other disciplinary frame in its present state. There is thus a need to construct a framework of analysis devoted to issues common to several traditions, one that can be used to identify the matrix underlying a plurality of modes of coordination to which the different heritages of the disciplines bear witness. The idea is not to ignore the original contributions of each discipline, nor to confuse them (Eymard-Duvernay et al. 2005). Socio-economics is rather an 'interstitial' or 'bridging' discipline, comparable to the recognized subfields of social psychology and biochemistry, rather than sociology or psychology, biology or chemistry (Etzioni 2003).

Socio-economics begins with the assumption that social reality is complex and dynamic, i.e. that economics is not a self-contained system, but is embedded in society, polity, culture as well as being dependent on the natural world. If the market is not separate from society (and its polity), it is thus unproductive to think about the market or the economy as self-sustaining, free-standing systems (Etzioni 2003). Socio-economics regards competition as a subsystem encapsulated within a societal context that contains values, power relations, and social networks. As in several schools of economic thought, there is no a priori assumption that people act following economic rationality or that they only pursue self-interest or pleasure. The thesis of socio-economics is not that values drive behaviour, but that there is a continual conflict and tension between self-interest on the one hand and powerful moral commitments on the other (Etzioni 2003). Thus socio-economics tries to understand people's inconsistencies and tendencies to zig-zag as resulting from their being subject to this internal conflict. At the same time the values influencing human choices are not given: they are themselves subject to social processes that lead to them being constantly reconsidered and reformulated, sometimes to break down and be replaced by others. Among the varied factors that promote reconsideration of values, economic factors may well play an important role.

Socio-economics advances an encompassing interdisciplinary understanding of economic behaviour that views individual choices as being shaped not only by notions of economic rationality but also by institutions, emotions, social bonds, values, and a sense of morality {as shown e.g. in Darnhofer et al. 2005, Darnhofer 2006}. Here a number of theoretical developments in economic thought can be fruitfully combined with methods from social sciences. Rather than a pluri- or multidisciplinary approach that would simply combine the contributions of different disciplines, the goal is to transcend disciplinary limitations, to cross the boundaries to uncover their common foundations and to re-examine them. Accepting this challenge of disciplinary integration can provide a promising foundation for new insights into decision making in general and farmers' strategic decision making in particular.

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