

PROPOSAL FOR A RESEARCH GRANT FROM THE DEUTSCHE FORSCHUNGSGEMEINSCHAFT (DFG)

1 General information

Proposal for a research grant, Renewal proposal

Subproject 2 within the DFG Research Unit: "Structural Change in Agriculture (SIAG)"

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1.2 Title

Structural Change and Dynamic Efficiency of German Dairy Farms

Keywords: Dynamic efficiency # real options, farm exit

1.3 Research Area and field of work

Agricultural Economics, Farm Management

1.4 Anticipated total duration

3 years, within the second phase of the Research Unit (first phase started at: 01.08.2007)

1.5 Application period

Date of the previous grant: 06.07.2007

Current funding for personnel will probably last until: 31.07.2010

Current funding for direct project costs is anticipated to last until: 31.07.2010

Application period: 01.08.2010 - 31.07.2013

1.6 Summary

The objective of the research is to investigate the relation between efficiency and structural change in German agriculture. Only efficient farms can be competitive in the long run. Thus it can be conjectured that structural change takes place faster in the presence of inefficient farms. However, in reality differences in economic performance and efficiency are persistent and solid empirical work is necessary for explaining this observed heterogeneity. From a methodological viewpoint this project contributes to the development of dynamic efficiency models. Based on a dual model of inter temporal decision making a shadow cost approach is used that allows for an econometric estimation of dynamic efficiency under uncertainty.

2 Starting point of the project

2.1 State of the art

The dairy sector is one of Europe's most important farming sectors. The European Union is the largest milk producer in the world. The dairy sector reflects both the complexity of agricultural production in highly regulated markets, as well as a complex system of livestock production. Since 1984 the CAP dairy policy has been characterized by a milk quota system and its associated intervention prices. Under the milk quota, classical economic principles such as growth and scale do not necessarily hold (Burell 1989; Colman 2000). # 2003 CAP reform ## 2008 health check # pressure, competitive farms, role of small farms ##

With such a policy scheme, reduced price support, expected falling milk prices and the decoupling of direct payments adaptations are likely to occur in the dairy sector. Such changes in the dairy farm structure, for instance specialization, farm growth, decline or farm closure, are observed by a declining number of farms over time while the average farm size increases. Under the milk quota scheme these farm individual adaptations are inter-linked # because farm growth is only possible along with the farm closure of others their 'free' quota. The particular direction of adjustment is affected by the system of milk quota transfer, the availability of milk quota, and the level and specification of direct payments and technical progress. Moreover, with the milk quota to be abolished in the future, the dairy sector is going to face a significant policy regime shift.

It is widely acknowledged in the literature that structural change is closely related to the efficiency of the firms within a sector (e.g. Goodard et al. 1993). However, there is a controversial discussion about the direction of causality. The classical structure-conduct-performance (SCP) paradigm states that there is a direct relationship between the market structure (degree of concentration) and the degree of competition among firms. (Bain 1951) A higher degree in competition drives monopoly profits towards zero and leads to lower higher (social) efficiency. The SCP has been criticized for the assumption of an exogenous market structure. In reality, market structure is itself affected by firms' conduct and performance. This criticism has led to the efficiency-structure (ES) hypothesis (Demsetz 1973). According to the ES hypothesis performance causes structure. Firms showing superior performance and higher efficiency increase their market share at the expense of less efficient firms, thereby increasing concentration. From this viewpoint it is essential to understand and empirically analyze the efficiency as it is a major driver of structural change.

In what follows, the description of the state of the art in this research area is divided into two topics:

- a) Structural change in the German dairy sector
- b) Efficiency analyses and structural change

ad a) Analyses of structural change in the dairy sector

Structural change in the dairy sectors, especially in the EU, in the U.S. or Canada has been a subject of interest for a long time. Early studies focus on farm growth with respect to the optimal herd size choice like Chavas and Magand (1988). Factors affecting this structural evolution like technical progress are analyzed in Zepeda (1995a) and Zepeda (1995b). General policy effects are analysed Rahelizatovo and Gillespie (1999), Flaten (2002), Foltz (2004) and Stokes (2006). Thereby is structural change measured in terms of the evolution of the farm size distribution, dairy farm growth or farming exit.

However, milk quota schemes like in the European Union or Canada are very likely to have a direct impact on structural adjustments. Based on the general theory of growth show Rasmussen and Nielsen (1985) theoretically the impact of a production quota on farm level adjustments. Hennessy (1995) provides a theoretical analysis of relationship between technical change and welfare under a production quota in general. Richards (1995) as well as Richards and Jeffrey (1997) focus on farm growth under milk quota in Alberta dairy farms. However, these findings are not directly applicable to the European dairy sector as the Canadian and the European milk quota scheme differ.¹

Impact on the farm structures in the European Union are for instance analysed by Helming et al. (1993). The authors show for Dutch dairy farms a considerable increase in the shadow value of milk after the introduction of the milk quota scheme. Colman (2000) and Colman et

¹ The Canadian milk quota scheme fixes milk prices and the amount of milk is related to the milk consumption whereas the European milk quota scheme provides intervention prices for milk powder and butter only and the amount of quota is fixed.

al. (2002) focus on inefficiencies in the UK dairy sector even though compared to other European countries the trade-scheme seems rather efficient. These studies are based on the production cost structure of dairy farms.

Descriptive studies focussing on structural change in the German dairy sector can be found in Doll (1999) where the regional concentration processes and the changing size distribution are emphasised. More recently show Lassen et al. (2008) a possible evolvement of the regional redistribution of milk production after the removal of the regional milk quota transfer restrictions in Germany. In more detail focuses Tietjen (2004) on the cost structure and efficiency of dairy farms in the North of Germany. Also Wieck and Heckelei (2007) provide a detailed analysis for the cost structure in comparison to other EU member states. The specific milk quota impact on farm level adjustments in Germany is analysed in Hanf (1989) ##

Entry of new farms seems limited under binding milk quota which is the general case among German dairy farms. Further, under binding milk quota it is particularly important to analyse farm growth in combination with farm closure. Dairy farms cannot grow unless others decline or close and allow to take over the 'free' milk quota. This emphasises further the important role of quota transfer possibilities as emphasized by Guyomard and Mahé (1994) or Naylor (1990). Studies taking into account this interrelation between all farms under binding milk quota are rare, for instance Tonini and Jongeneel (2008) or Peerlings and Ooms (2008) analyse the Dutch dairy sector. However, it is also of particular importance to take price uncertainty into consideration – becomes even more important in the nearer future. Quota did not introduce a price stabilizing effect for milk prices #

The expected future dairy policy will include the abolition of the milk quota scheme in 2014/15. This gives the decision to abandon dairying the character of a real option to disinvest with a declining value of waiting the closer to 2014/15. In addition to that, the recent dairy policy reform reduces further the intervention prices and export subsidies. Thus, price volatility and thus uncertainty is expected to further increase. Further, the decision to exit the dairy sector is only to a minor share reversible. Once the milk production is abandoned the probability to re-enter the milk production is low. The reversibility is rather costly as the milking equipment is very specific. The key issues sunk costs and uncertainty affecting the entry/exit decisions are considered by Foltz (2004). Based on the model of Dixit (1989) ## However, the specific role of the milk quota scheme that cannot be ignored is not examined.

A further strand of the structural change literature focuses on the farm succession decision and the specificity of family farms as for instance Kimhi and Bollmann (1999) or Glauben et al. (2009). However, the milk quota aspect is not taken into consideration and further, neither sunk cost nor uncertainty are taken into account.

Breustedt and Glauben (2007) – basic idea, comparison the net exit rates of different EU member states and the impact of macro-economic conditions, basic occupational model, but the farm individual decision is not taken into account, highly aggregated over the specialists

it is necessary to understand the impact of the milk quota or a supply management instrument in general to draw conclusions # are dairy farms really hindered to close under the milk quota scheme?

Studies that analyse the expected impact of the dairy policy reform of the EU (health check, expected abolishment of the milk quota) for instance Baudry et al. (2008) – earlier study Bai-

ley (2002) – several EU MS, main milk producing countries (Germany, France, the Netherlands, Italy, UK and Spain – effect of possible quota removal # (with cost-savings focus), also impacts on structural change but ## it is assumed a priori that the milk quota scheme hindered structural change even though milk quotas could have been traded (not in all countries!!) # basic definition of structural change

ad b) Efficiency analyses and structural change

A vast literature attempts explaining differences in technical and economic efficiency by structural characteristics of farms as, for example, size, specialization, organization, or financial structure (e.g. Curtiss 2002, Mosheim and Lovell 2006, Lambert and Bayda 2005). The existing literature on the relation between farm size and efficiency offers mixed results. Hadley (2006) reports that farm or herd size has a significantly positive effect on the technical efficiency of UK farms. Alvarez and Arias (2004) come to a similar conclusion for Spanish dairy farms. In contrast, Latruffe et al. (2005) find a U-shaped relationship between technical efficiency and size of Polish farms. Recently, Sauer and Mendoza-Escalate (2008) revisit the “small-but-efficient” hypothesis. They suggest a revision of this hypothesis in the sense that small-scale farmers are allocative efficient but at the same time scale inefficient. Alvarez et al. (2006) relate efficiency scores to milk quota prices in Spain. They find that economic efficiency is far more important than size in explaining quota values. In fact, farm size is negatively correlated with quota values in this study.

Unfortunately, standard efficiency analyses treat the time dimension of structural change in an unsatisfactory way. In the simplest case productivity and efficiency indicators are based on cross-sectional data and thus ignore time at all. If panel data are available, time varying inefficiency can be estimated in a stochastic production frontier model. Examples are Kumbakhar (1990) or Battese and Coelli 1992). Ahn et al. (2006) present a flexible specification of the time varying efficiency term leading to a so called “dynamic frontier”. Panel data also allow for a calculation of changes in the total factor productivity of farms over time, for example by using the Malmqvist TPF index. Moreover, productivity changes can be decomposed into technical changes, changes of the technical and allocative inefficiency as well as scale effects (e.g. Brümmer et al. 2002). Though this kind of decomposition paves the way for a subtle analysis of the economic development of farms it is still not a fully dynamic analysis. The crucial point is whether the analysis of efficiency is based on a theory of intertemporal decision making or not. With a few exceptions to be mentioned below, efficiency analyses depart from a static cost minimization or profit maximization problem. Thereby intertemporal dependencies of factor allocations are ignored. In particular, no special attention is given to adjustments of the capital stock. That means no difference is made between investments and adjustments of variable production factors. In fact, standard efficiency analyses assume that capital can be adjusted to an optimal level instantaneously and without other costs than interest. This view, however, ignores the quasi-fixed character of capital. Disregarding adjustment costs and dynamic constraints may result in biased estimates of frontiers in the sense that firms, which actually behave optimally, may appear inefficient. In what follows we call this phenomenon “seemingly inefficient”. For example, it may be optimal for a particular farm to stick to an outdated technology and sacrifice a gain of productivity if investments costs are irreversible and future returns are random. Similarly, it could be optimal not to re-

duce the capital stock in response to a decline in marginal capital productivity, because of lacking secondary markets for specific assets.

Only the very recent literature on efficiency and productivity analysis takes these well known insights of the new investment theory into account. A rather new research area, which is labelled "dynamic efficiency analysis", strives for a cross-fertilization of dynamic models of decision making and traditional efficiency analysis. Nemoto and Goto (1999, 2003) develop a dynamic DEA model that takes into account adjustment costs. Oullette and Yan (2008) take up this model and generalize it. Their model distinguishes between variable inputs that can be varied in the short run and quasi-fixed (nondiscretionary) inputs that can be varied only in the long run. Intertemporal adjustment restrictions are incorporated into a static cost-minimizing DEA model. These restrictions reflect an optimization over several periods where a DMU balances the cost of an investment (acquisition costs plus adjustment costs) and the expected reduction of variable costs due to this investment. The resulting dynamic DEA allows for a decomposition of overall economic efficiency into static and dynamic efficiency.

Stefanou and Silva (2003, 2007) also develop non-parametric dynamic measures of technical, allocative and economic efficiency in the short run and in the long run. Short run measures indicate whether variable inputs are employed efficiently in the production process, whereas long run efficiency captures both, variable and quasi-fixed factors. The starting point of their model is an intertemporal cost minimization problem in which capital is treated as a quasi-fixed factor. The dynamics are addressed in the production technology specification via a convex adjustment cost function for a change in quasi-fixed factors. The authors derive lower and upper bounds for each efficiency measure and illustrate the model for a panel data set of US dairy farmers. Using the theoretical framework of Stefanou and Silva (2003), Oude Lansink and Silva (2006) measure dynamic efficiency in short and long run by means of a directional distance function approach. In this model, the properties of dynamic input directional distance function are inherited from the properties of the technology as in the static framework.

Rungsuriyawiboon and Stefanou (2007, 2008) pursue a similar approach. They establish a dynamic efficiency model by integrating the static shadow cost approach and the dynamic duality model of intertemporal decision making. Their model accounts for technical and allocative inefficiencies of variable inputs and net investments. Based on a dynamic programming equation for a cost minimizing firm, optimal dynamic demand functions for the variable inputs and net investments are derived. Decomposition of economic efficiency is achieved by a shadow cost approach. In essence this means to distinguish between actual dynamic cost and behavioral (or shadow) cost for a firm. The actual cost function refers to the perfect minimization of cost, whereas behavioral costs are associated with the observed input levels of the firm. In the presence of inefficiencies shadow costs for production factors will deviate from actual (market) prices. In order to attain estimable factor demand functions Rungsuriyawiboon and Stefanou suggest using a quadratic functional form for the firm's value function.

The aforementioned contributions to dynamic efficiency measurement share one important feature, namely the assumption of static expectations of future prices and returns. This basically means that current prices and outputs contain all relevant information and will persist in the future. Decision makers are not allowed to anticipate revisions in their expectations and

uncertainty does not play a role at all. This is, of course, a highly unrealistic assumption which has been relaxed in the new investment theory. Actually uncertainty turned out to be an important determinant for investment demand and production decisions. Kumbakar (2002) accounts for production risk and risk aversion, however, his model is developed in a static context. Bokusheva and Hockmann (2006) apply this concept to Russian Farms in the post-socialistic period.

Summarizing the state of the art we conclude that adjustment processes in the German and European dairy sector have been analyzed in great detail in the existing literature. However, several important research questions remain unsolved. In particular the following aspects deserve further attention:

- How will the abolishment of the milk quota scheme affect structural change in the dairy sector?
- What is the interplay between structural change and efficiency under the milk quota?
- Is there a difference between short term and long term efficiency?
- How can risk and non-static expectations be incorporated in dynamic efficiency analyses?

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2.2 Preliminary work by this research group (including project development report)

During the last decade the applying research group has gained profound experiences in the fields of farm based structural change, investment analysis, and efficiency analysis. Past work on these issues comprises theoretical as well as empirical contributions. The current project intends to continue research along these lines and to integrate several aspects.

First of all, several studies on the investment behaviour in agriculture have been conducted by the research group. The importance of investment decisions for structural change is obvious as farm growth and shrinkage, entry and exist as well as the adoption of new technologies are in fact (dis)investments. In this context, Odening and Mußhoff (2001) and Odening et al. (2001) highlight the relevance of the real options approach (new investment theory) which allows for a simultaneous consideration of sunk cost, flexibility, and uncertainty when analyzing investment decisions. Odening and Balmann (2002) conjecture that the existence of real options will have an impact on the dynamics of structural change in agriculture. Odening et al. (2005) take this idea up and apply the real options approach to investments in the hog industry. They show that uncertainty can increase (decrease) investment (disinvestment) triggers considerably. However, the results heavily depend on the presumed stochastic process of the random investment returns. While such normative calculations demonstrate the potential of real options for explaining inertia and economic hysteresis they cannot provide empirical evidence for this concept. The latter is the objective of the work of Odening et al. (2004) and Mußhoff and Odening (2005). The authors attempt explaining deviations from arbitrage-free price equilibria by means of options effects. Formally, their econometric model resembles a stochastic frontier model. This model is used for an analysis of the switching behaviour from conventional to organic farming. A drawback of this approach is the use of aggregated market data that prevent the incorporation of farm specific information. In contrast, Hinrichs (2005), Hinrichs et al. (2006a and b) and Hinrichs et al. (2008) resort to farm panel data when explaining capacity adjustments in hog finishing by means of the new investment theory. Investment and disinvestment triggers are modelled and estimated in the framework of a generalized ordered Probit model. A main contribution of this work was to disentangle the impact of uncertainty on investment decisions. This is challenging, because uncertainty may effect investment decisions simultaneously via options effects and the risks

aversion of decisions makers. The empirical results indicate the presence of options effects and confirm their meaning for the understanding of economic hysteresis.

The aforementioned work laid the foundations for the research activities which have been carried out during the first phase of the current SIAG research group. In this project the focus has been shifted towards the role of the financial environment in the context of investment decisions. Though the presence of capital market imperfections is quite obvious, real options models usually assume perfect capital markets. On the other hand, models that take these capital market imperfections into account are usually static and deterministic. Based on simulated data Hüttel et al. (2008) demonstrate that simple static q models of investment lead to erroneous results when irreversibility and uncertainty prevail. Particularly, it may happen that such models indicate “seemingly” capital market imperfections. This finding led to the idea of bridging the new investment theory and the theory of neo-institutional finance. For that purpose Hüttel et al. (2007) develop a dynamic investment model that accounts for sunk costs, uncertainty and capital market imperfections. Basically, this is achieved by an augmented specification of the farms’ adjustment cost functions. The econometric implementation has the structure of a generalized Tobit model. The authors apply this modelling approach to panel data from West and East Germany and show that capital market imperfections as well as sunk costs are responsible for low investment rates in agriculture. Zinych (2009), Zinych and Odening (2007) and Zinych et al. (2007) pursue a similar objective when analyzing investment rates of Ukrainian farms. The challenge here is to distinguish between different types of capital market imperfections, namely credit rationing and soft budget constraints. An Euler equation approach is utilized in order to estimate the impact of the financial environment on the demand for capital.

A second research focus that constitutes a preparatory effort for the intended research project are efficiency analyses. Balmann et al. (2001) investigate the relation of employment and efficiency in East German farms and reveal pronounced hidden unemployment in former co-operatives. Comparing differentials of efficiency scores at different points in time they show that a catching up process of inefficient farms takes place whose speed depends on the farm type. In contrast, Lissitsa (2002) and Lissitsa and Odening (2005) find that differences in technical efficiency of Ukrainian farms increase in the course of time. An interesting finding is the diversity of strategies which have been adopted by efficient enterprises. Hanisch et al. (2008) apply Data envelopment analysis (DEA) when carrying out a SWOT analysis for trading cooperatives in Germany. Filler et al. (2007) also use DEA for an efficiency analysis of biogas plants. Apart from that, the analysis of environmental efficiency of biogas producing farms is subject of an ongoing research project financed by the DBU.

Finally, research on the German and European Dairy Sector has been conducted by the applicants, which will facilitate the planned research project. #Hüttel#

Analysis of milk quota trade effects, structural adjustments using the farm group model FARMIS, 2003 CAP reform, analysis carried out for the main milk producing countries in the EU

Kleinhanß and Hüttel 2004 impacts of 2003 CAP reform and expected price declines for German dairy farms

Kleinhanß et al. 2004 impacts of CAP reform

Hüttel et al. 2005 comparison Germany and France to focus on the impact of the decoupled payments on dairy farms' structural adjustments, farm incomes

Buschendorf et al. 2006 – further conduct a cluster analysis to identify competitive dairy regions and assess the impacts of national milk quota trade as well as price declines on structural adjustments by using the farm group model FARMIS and a cluster analysis based on structural data of dairies

Hüttel et al. 2006 – final EDIM report – comparison of the main milk producing countries with respect to their impacts of the CAP reform, price declines, milk quota trade

Küpker et al. 2006 expanded analysis

Jongeneel et al. 2005 as well as Hüttel and Jongeneel 2008 analyse the specific farm size distribution, comparison Germany and the Netherlands

List of relevant publications²

a) in scientific journals (peer-reviewed)

Hanisch, M., Filler, G., Odening, M. (2008): Zur Ableitung von Entwicklungsstrategien für Warengenossenschaften. Zeitschrift für das gesamte Genossenschaftswesen 58 (1): 24-39.

Hinrichs, J., Mußhoff, O., Odening, M. (2008): Economic Hysteresis in Hog Production. Applied Economics 40 (3): 333-340.

Küpker, B., Hüttel, S., Kleinhanß, W., Offermann, F. (2006): Assessing impacts of the reform of the CAP in France and Germany. Sonderheft, Agrarwirtschaft 55 (5): 227-237.

Lissitsa, A., Odening, M. (2005): Efficiency and total factor productivity in the Ukrainian agriculture in transition. In: Agricultural Economics 32 (3): 311-325.

Odening, M., Musshoff, O. (2001): Reale Optionen und landwirtschaftliche Betriebslehre oder: Kann man mit der Optionspreistheorie arbitrieren? Agrarwirtschaft 50 (8): 480-489.

Odening, M., Mußhoff, O., Balmann, A. (2005): Investment Decision in Hog Finishing - An Application of the Real Options Approach. Agricultural Economics 32 (1): 47-60.

Odening, M., Mußhoff, O., Hirschauer, N., Balmann, A. (2007): Investment under Uncertainty - Does Competition matter? Journal of Economic Dynamics and Control 31 (3): 994-1014.

Odening, M., Mußhoff, O., Utesch, V. (2004): Der Wechsel vom konventionellen zum ökologischen Landbau: Eine investitionstheoretische Betrachtung. Adoption of organic farming – the impact of uncertainty and sunk costs. Agrarwirtschaft 53 (6): 222-231.

b) at major scientific conferences

Balmann, A., Czasch, B., Odening, M. (2001): Employment and Efficiency of Farms in Transition: An Empirical Analysis for Brandenburg. In: Peters, G.H., Pingali, P. (eds.): Tomorrow's agriculture: Incentives, institutions, infrastructure and innovations, Proceedings of the XXIVth International Conference of Agricultural Economists 2000. Ashgate, Hants, England, Chapter 4: 553-564.

² Publications resulting from the previous funding period of the research group are indicated by *

- Hinrichs, J., Mußhoff, O., Odening, M. (2006): Capacity Adjustments in German Hog Production. In: Mann, S. (ed.): Causes and Impacts of Agricultural Structures. Proceedings of the 96th European Association of Agricultural Economists (EAAE) Seminar. Nova Science Publishers, New York: 59-75.
- Hinrichs, J., Mußhoff, O., Odening, M. (2006): Ökonomische Hysterese in der deutschen Veredelungsproduktion. In: Bahrs, E., Cramon-Taubadel, S. von, Spiller, A., Theuvsen, L., Zeller, M. (Hrsg.): Unternehmen im Agrarbereich vor neuen Herausforderungen. 45. Jahrestagung. Schriften der Gesellschaft für Wirtschafts- und Sozialwissenschaften des Landbaues. Landwirtschaftsverlag, Münster-Hiltrup, Bd. 41: 45-56.
- Hüttel, S., Jongeneel, R. (2008): Structural Change in the Dairy Sectors of Germany and the Netherlands - A Markov Chain Analysis. 12th Congress of the European Association of Agricultural Economists - EAAE 2008, August 26-29, Gent, Belgium.
- Hüttel, S., Kleinhanss, W., Offermann, F. Impacts of decoupling and milk quota trade on the French and German dairy sectors. Paper presented at the 11th Congress of the European Association of Agricultural Economists - EAAE , August, 24-27 2005 Copenhagen, Denmark.
- *Hüttel, S., Mußhoff, O., Odening, M. (2007): Investment Reluctance: Irreversibility or Imperfect Capital Markets? Evidence from German Farm Panel Data. Selected Paper at the 2007 Annual Meeting of the AAEA. Available at AgEcon Search.
- Jongeneel, R, Longworth, N and Hüttel, S (2005): Dairy farm size distribution in East and West: evolution and sensitivity to structural and policy variables. Paper presented at 11th Congress European Association of Agricultural Economics - EAAE, August, 24-27 2005 Copenhagen, Denmark
- Mußhoff, O., Odening, M. (2005): Switching from Conventional to Organic Farming - a Real Options Perspective. In: Arfini, F. (2005) (ed.): Modelling Agricultural Policies: State of the Art and New Challenges. Proceedings of the 89th European Association of Agricultural Economists (EAAE) Seminar, Parma, Italy, Monte Università Parma Editore: 400-412.
- Odening, M., Balmann, A. (2003): Die Bedeutung realer Optionen für das Tempo agrarstrukturellen Wandels. In: Penker, M., Pfusterschmid, S. (Hrsg.): Wie steuerbar ist die Landwirtschaft? Erfordernisse, Potentiale und Instrumente zur Ökologisierung der Landwirtschaft. 27.-28. September 2001, Graz, Tagungsband zur 11. Tagung der Österreichischen Gesellschaft für Agrarökonomie, Facultas, Wien #####:49-57.
- *Odening, M., Hüttel, S. (2008): Investment Behaviour and Capital Markets under the 2003 CAP Reform - Some General Considerations. In: Crisoiu, A., Curtis, J. (eds.): Income and Factor Markets under the 2003 CAP Reform - Workshop Proceedings. European Commission (JRC), Available at EC (JRC), IPTS EUR 23422 EN: 65-70.
- Odening, M., Wesseler, J., Weikard, H.-P. (2001): New Investment Theory in Agricultural Economics: Its Implication for Farm Management, Environmental Policy and Development. International Association of Agricultural Economists: Tomorrow's agriculture: incentives, institutions, infrastructure and innovations. Proceedings of the XXIVth International Conference of Agricultural Economists 13-18 August 2000, Berlin, Germany: 656-657.
- *Zinych, N., Odening, M. (2007): Financial Constraints and Investment in Ukrainian Agriculture. In: Nagel, U. J., Knierim, A. (eds.): Proceedings of the Green Week Scientific Conference "Managing Economic, Social and Biological Transformations", 17.-18.01. 2007, Berlin: 155-162.

- *Zinych, N., Odening, M., Hüttel, S. (2007): Financial Constraints in Economic Transition: Empirical Evidence from Ukrainian Large Farms. Paper prepared for the 104th EAAE seminar „Economics and Transition“, Budapest, Hungary, September 6-8 2007. Available at [AgEcon Search](#).

c) Monographs

- Hinrichs, J. (2005): Hysterese im Agrarstrukturwandel. Berliner Schriften zur Agrar- und Umweltökonomik, Shaker Verlag, Aachen, Bd. 10.
- Lissitsa, A. (2002): Der Transformationsprozess in der Landwirtschaft der Ukraine - eine Analyse der Effizienz und Produktivität von Großbetrieben. Shaker Verlag, Aachen.
- *Zinych, N. (2009): Ukrainian Agriculture in Transition: The Role of Financing and Capital Access for Investment. Berliner Schriften zur Agrar- und Umweltökonomik, Shaker Verlag, Aachen, Bd. 15.

d) other publications

- *Hüttel, S., Mußhoff, O., Odening, M., Zinych, N. (2008): Estimating Investment Equations in Imperfect Capital Markets. SFB 649 Discussion Paper 2008-016.
- Filler, G., Odening, M., Seeger, S., Hahn, J. (2007): Zur Effizienz von Biogasanlagen. Berichte über Landwirtschaft 85 (2): 178-194
- Kirschke, D., Odening, M., Mußhoff, O., Häger, A. (2007): Strukturwandel im Agrarsektor. HU-Spektrum 14 (1): 24-31.
- Buschendorf, H., Weindlmaier, H., Hüttel, S., Kleinhanß, W. (2006): Prognose zur regionalen Milcherzeugung in Deutschland bis 2013. Deutsche Milchwirtschaft 57 (7): 319-321, 326
- Hüttel, S., Kleinhanß, W., Offermann, F. (2005): Impacts of decoupling and milk quota trade on the French and German dairy sectors. EDIM Working Paper WP05.
- Kleinhanß, W., Hüttel, S. (2004): Auswirkungen der MTR-Beschlüsse im Milchbereich. Berichte über Landwirtschaft 82 (4): 529-550.
- Kleinhanß, W., Hüttel, S., Offermann, F. (2004): Auswirkungen der MTR-Beschlüsse und ihrer nationalen Umsetzung. Arbeitsbericht 05/2004 am Institut für Betriebswirtschaft an der Bundesforschungsanstalt für Landwirtschaft. Studie im Auftrag des Bundesministeriums für Verbraucherschutz, Ernährung und Landwirtschaft.
- Lissitsa, A., Odening, M. (2001): Effizienz und totale Faktorproduktivität in der ukrainischen Landwirtschaft im Transformationsprozess. Humboldt-Universität zu Berlin, Landwirtschaftlich-Gärtnerische Fakultät, Institut für Wirtschafts- und Sozialwissenschaften des Landbaus, Berlin, Working Paper 58.
- ## EU final report EDIM??

e) submitted manuscripts

- *Hüttel, S., Jongeneel, R. (2009): Does the EU milk quota affect structural change? European Review of Agricultural Economics (under review)
- *Hüttel, S., Mußhoff, O., Odening, M. (2009): Investment Reluctance: Irreversibility or Capital market Imperfections. European Review of Agricultural Economics (under review).
- *Zinych, N., Odening, M. (2009): Capital Market Imperfections in Economic Transition: Empirical Evidence from Ukrainian Agriculture. Agricultural Economics (under review).

3 Project Description (objectives, methods, work schedule)

3.1 Objectives

Objectives with regard to content

The overall objective of this subproject is to improve the understanding of structural changes in the German dairy sector. The relevance of this topic emanates from the dynamics, which has characterized dairy production in the past, in conjunction with the value that the dairy sector adds to farm income in Germany and the EU. We want to identify and the main drivers of the adjustment process and thereby pave the way for predictions of developments in this sector. Moreover, we target at the identification of farm strategies that turned out to be successful and thus could serve as a benchmark for other dairy farms.

The following questions will be addressed:

- *What are the determinants of exists from milk production?*
Price levels, price volatility main drivers – but also possibilities to grow, the degree of specialization (sunk costs) and the possibility of other production branches for expansion, farm successor and efficiency
- *How did the EU milk quota system affect the dynamics of structural change?*
It is conjectured in the literature that the introduction of quota limits the growth of profitable firms and thereby slows down structural change in an industry. The European milk market offers a natural experiment for a test of this hypothesis. The history of the German milk market includes different quota regimes: no quota, non-tradable quotas, and tradable quotas. Moreover, the quota volume has been changed several times. These variations give the opportunity to quantify the responses of dairy farmers on this central policy instrument. An assessment of the quota effect is important for predictions of the development of the German dairy sector before after the intended phase-out of the quota system in 2015.
- *What is the role of efficiency in the development process of the dairy sector?*
In the proposed research project we take up the efficient-structure-hypothesis and target at quantifying the relationship between efficiency and farms' decisions that shape the adjustment process in the dairy sector, particularly, exits from milk production and expansions of this production activity. An important sub-goal in this context is the measurement of efficiency and productivity of dairy farms. As the role of efficiency is considered in a long-term perspective a dynamic efficiency measurement is required allowing for a distinction between short term and long term efficiency. This kind of quantification takes into account that farms' decisions on the use of variable inputs are conditional on the endowment with quasi-fixed assets and farms incur adjustment costs when changing the quasi-fixed production factors.
- *What is the farm size / production structure that is required for competitive milk production in Germany in the next decade?*
An outcome of the efficiency and productivity analysis is the identification of farms showing a superior economic performance. In a subsequent step we intend to analyze the characteristics and development paths of these farms in greater detail. It will be interesting to investigate if high efficiency actually translates into higher profitability and competitiveness or if the "poor but efficient" hypothesis holds, particularly for small dairy farms. Moreover, we want to understand why certain farms turn out to be efficient and

competitive. What are the factors behind this development and can farmers control them?

Methodological objectives

The aforementioned objectives require sophisticated methods that are not fully available yet. Thus an important contribution of this subproject is the refinement of existing models that allow for a quantitative analysis of adjustment processes in dairy farming. The focus lies first on econometric models that explain entry and exit decisions in dairy production and second on models for dynamic efficiency analyses. With regard to econometric models of structural change we face the following challenges: # Hüttel #

The second methodological contribution targets at the refinement of dynamic efficiency measurement. This concept has to take into account that the farms' decisions are made in the short run with a view to the long run. As mentioned in section 2.1 the sparse literature on dynamic efficiency analysis invariably assumes static expectations on future costs and returns. However, it is well known that uncertainty affects the optimal adjustment path of quasi-fixed inputs over time such that increasing risk widens the optimal range of inaction for capital and other quasi-fixed factors. Thus the incorporation of risk into dynamic efficiency will close an important gap in the existing literature. The basic idea, which we will pursue for this purpose, is to bridge models of investment under uncertainty and (deterministic) dynamic efficiency analysis.

3.2 Methods

Econometric modelling of farm exits

Based on the theoretical real option model for abandonment from Dixit (1989) – an intertemporal decision making is assumed, profit maximizing farm

Probit/Logit analysis, classical binary choice model

Difficulty – identify dairy farms in the FADN – identify farms that abandoned milk production

Sample selection bias?

panel data approaches that allow to take heterogeneity effects into account. Further allow panels for a dynamic analysis and thus have a direct advantage compared to pure cross section analyses. But complicates the estimation procedure

Maximum likelihood estimation

Could also be an option to go to the Bayesian analysis – allowing to introduce prior information coming from theory or other data sources

Dynamic Efficiency Analysis

The efficiency measurement will be conducted in a shadow cost framework. The basic idea is to link the static shadow cost approach with the dynamic model of intertemporal decision making. We consider an intertemporal model where farms minimize their expected discounted sum of production costs over an infinite horizon subject to a capital accumulation equation and a sequence of production targets. A distinction between variable inputs and

quasi-fixed inputs is essential for this approach. As usual, changes of the stock of quasi-fixed inputs (capital in particular) generates additional adjustment costs. In contrast to existing models uncertainty in future input prices is explicitly considered via a stochastic differential equation, e.g. a mean-reverting process. Applying stochastic dynamic programming techniques leads to a Hamilton-Jacobi-Bellman equation, from which dynamic factor demand functions for capital and variable inputs can be derived. In order to identify technical and allocative inefficiencies a behavioural dynamic cost function has to be defined which, in general, differs from the actual dynamic cost function. The behavioural cost function (or shadow cost function) expresses the cost minimum of the farm in terms of shadow input prices. The latter force the technical efficient input of a firm to be the cost minimizing solution for the production of a given output. By introducing technical and allocative inefficiency parameters a relationship between actual and shadow cost functions can be established. As a result the optimized actual investment demand and the variable input demand can be expressed in terms of the shadow cost function. With panel data at hand, technical and allocative efficiencies can be estimated as producer specific parameters. The system of factor demand equations is recursive as the net investment demand enters the variable input demand equation as an explanatory variable. This suggests a two stage estimation where the investment demand is estimated by Maximum Likelihood and the system of variable input demands is estimated using the Generalized Method of Moments. The resulting farm specific efficiency estimates will be used for the explanation of exist decisions from milk production.

Data

For both parts we intend to use the German national FADN (farm accountancy data network) data base (Testbetriebsnetz). In order to have a comparison between other member states of the EU we might refer to the EU FADN that has the disadvantage of being less detailed. The data are available at the Johann Heinrich von Thünen-Institut, Federal Research Institute for Rural Areas, Forestry and Fisheries, Institute of Farm Economics.³ The data are available for the years 1996-2008, at the beginning of the subproject year 2009 will also be available. This rich panel data set allows to estimate such sophisticated models, also dynamically. #####

3.3 Work Schedule

The work schedule of subproject 2 results from the objectives and the methodological approach which have been outlined in the previous sections. The activities break down into two main strands, namely the development and the estimation of a dynamic efficiency model and a model explaining exits from milk production. Both strands will be pursued concurrently by two research assistants. As these models are rather sophisticated the first project phase will be devoted to the development of the theoretical foundations. Apart from literature studies the two research assistants will attend appropriate courses in the PhD program "Agricultural Economics" such as Microeconometrics, Efficiency Analysis, and Risk Management. The data retrieval and streamlining will take place at the vTI in Braunschweig, where the FADN

³ The applicant Silke Hüttel is a guest researcher there.

data are recorded. The most challenging parts are the development of the theoretical models and the specification of the according econometric models. We plan to test the reliability of the econometric models with simulated data before we apply them to empirical data. The duration and the sequence of the aforementioned work packages are depicted in the following figure:

Draft

estimation of the econometric model that targets at explaining exits from dairy production. The second scientific assistant will be in charge of the implementation of the dynamic efficiency analysis of milk producers. The student assistant will support the scientific assistants through literature analysis, data collection, the specification and validation of the exit model and the efficiency model.

4.2 Scientific instrumentation

- not applicable -

4.3 Consumables

Consumables will provided by Humboldt-Universität zu Berlin.

4.4 Travel

2010	Johann Heinrich von Thünen Institute (vTi) Braunschweig (Data acquisition, 1 week, 2 persons)	440 €
	vTI Braunschweig and IAMO Halle (Periodic research seminar meetings)	200 €
	Wageningen University (discussion of methodical aspects of the econometric model)	1.000 €
	Liebenberg Workshop	500 €
2011	vTI Braunschweig (Data acquisition and analysis, 2 weeks, 2 persons)	720 €
	vTI Braunschweig and IAMO Halle (Periodic research seminar meetings)	400 €
	Contributions to national and international conferences:	
	- German Association of Agricultural Economists (GeWiSoLa) Annual meeting	
	- American Agricultural Economics Association (AAEA) Annual meeting	
	- European Association of Agricultural Economists (EAAE) XIII th Congress (Zurich, Switzerland)	5.000 €
2012	vTI Braunschweig (Data analysis, 2 weeks , 2 persons)	720 €
	vTI Braunschweig and IAMO Halle (Periodic research seminar meetings)	400 €
	Contributions to national and international conferences:	
	- GeWiSoLa Annual meeting	
	- IAAE 2012 Triennial Conference	
	- AAEA Annual Meeting	5.600 €
2013	vTI Braunschweig (Data analysis and discussion of results, 1 week, 2 persons)	440 €
	vTI Braunschweig and IAMO Halle (Periodic research seminar meetings)	200 €

Wageningen University (discussion of results)	1.000 €
Contributions to national and international conferences:	
- GeWiSoLa Annual meeting, - IAMO Forum Halle	
- AAEA Annual meeting	<u>4.000 €</u>
Total 4.4 (for 2 scientists)	20.620 €

4.5 Publication expenses

Overall 750 € per year	<u>2.250 €</u>
Total 4.5 (for 2 scientists)	2.250 €

4.6 Other costs

2010	Purchase of special literature (#Hüttel#)	250 €
	Purchase of special software (#Hüttel #)	1.000 €
2011	Purchase of special literature (#Hüttel #)	250 €
	Service contracts (editing of publications)	500 €
2012	Service contracts (editing of publications)	<u>500 €</u>
	Total 4.6 (for 2 scientists)	2.250 €

Sum of costs - 4 -

Cost category	2010	2011	2012	2013	Sum
Staff costs (4.1)	25.250	60.600	60.600	35.350	181.800
Scientific instrumentation (4.2)	0	0	0	0	0
Consumables (4.3)	0	0	0	0	0
Travel (4.4)	2.140	6.120	6.720	5.640	20.620
Publication expenses (4.5)		750	750	750	2.250
Other costs (4.6)	1.250	750	500		2.500
Sum	28.640	68.220	68.570	41.740	207.170

4.A Funds for joint activities of the research unit

The following funds are requested for joint activities of the research group. They are listed here due to the applicant's role as the spokesman of the research group.

4.A1 Staff costs (joint activities of the research unit)

- not applicable -

4.A2 Scientific instrumentation (joint activities of the research unit)

- not applicable -

4.A3 Consumables (joint activities of the research unit)

- not applicable -

4.A4 Travel costs (joint activities of the research unit)

Research-Group Workshop 2010 in Liebenberg

In the first funding period two workshops have been successfully carried out. It is intended to organize a further workshop in the upcoming funding period in order to discuss crosscutting themes and elaborate on concrete co-operations between distinct subprojects. Information will be exchanged about ongoing model development aspects, the coordination of data acquisition, as well as the joint dissemination of research outcomes.

2010	Workshop travel- and accommodation expenses	5.000 €
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Research seminars (2010 till 2013)

The discussion of modeling aspects and preliminary results within framework of regular research seminars has proven to be effective and hence will be continued. As in the previous funding period external discussants shall be invited.

2010	Research seminar travel- and accommodation expenses	1.000 €
2011	Research seminar travel- and accommodation expenses	2.000 €
2012	Research seminar travel- and accommodation expenses	2.000 €
2013	Research seminar travel- and accommodation expenses	1.000 €

International Seminar on Structural Change in Agriculture in 2013

In view of the success and the large interest of the scientific community in the EAAE-Seminar on „Structural Change in Agriculture“ we plan to organize a similar event at the end of the second funding period. The cost for the organization of the EAAE seminar will be mainly covered through the conference fees paid by participants. However, DFG funds are requested for the reimbursement of travel expenses for plenary lectures by invited keynote speakers and the publication of conference proceedings.

2013	International Seminar travel- and accommodation expenses	<u>10.000 €</u>
	Total 4.A4	21.000 €

4.A5 Publication expenses (joint activities of the research unit)

2011	overall	3.000 €
2012	overall	3.000 €
2013	overall	<u>4.000 €</u>
	Total 4.A5	10.000 €

4.A6 Other costs (joint activities of the research unit)

Management, coordination (assistants, secretary support, public relations, workshop, research seminars, EAAE - seminar, internet portal)

2010	overall	2.000 €
2011	overall	5.000 €

2012	overall	5.000 €
2013	overall	<u>3.000 €</u>
Total 4.A6		15.000 €

Sum of costs for joint activities of the research unit - 4.A -

Cost category	2010	2011	2012	2013	Sum
Staff costs (4.1A)	0	0	0	0	0
Scientific instrumentation (4.2A)	0	0	0	0	0
Consumables (4.3A)	0	0	0	0	0
Travel (4.4A)	6.000	2.000	2.000	11.000	21.000
Publication expenses (4.5A)		3.000	3.000	4.000	10.000
Other costs (4.6A)	2.000	5.000	5.000	3.000	15.000
Sum	8.000	10.000	10.000	18.000	46.000

5 Prerequisites for carrying out the project

5.1 Composition of the group

The research group working in this subproject includes the following persons

- a) financed by means of the applicant's institution:
 - Prof. Dr. Martin Odening, Head of the subproject
 - Dr. Silke Hüttel, Head of the subproject
 - Dr. Günther Filler, Scientific assistant
 - Reinhold Wilhelm, Technical Assistant
- b) financed by third parties – non DFG:
 - Anna Struve, PhD Student, funded by DBU

5.2 Cooperation with other scientists

Cooperation within the Research Unit

#to be developed#

Cooperation outside the DFG Research Unit

Prof. Dr. J. Sauer, ##, United Kingdom

###

Dr. R. Jongeneel, Universität Wageningen, Niederlande

###

5.3 Scientific equipment

The implementation of the subprojects basically requires two workplaces endowed with a PC for the two research assistants in charge and an appropriate working environment for the student assistant. The provision of these basic facilities is ensured by the Farm Management Group at Humboldt-Universität zu Berlin.

5.4 Running costs

The estimated expenses for the project (phone/fax, postage, fees, material consumption) amount to approximately 1.100 €/year. These expenses will be covered by the budget of Humboldt-Universität zu Berlin.

5.5 Conflicts of interest with commercial activities

- not applicable -

5.6 Other requirements

Library, computer and media center, Internet access and other infrastructure of the university may be used by the members of the subproject without any restriction.

6 Declarations

- 6.1 We have not requested funding for this project from any other sources. In the event that we submit such a request, we will inform the Deutsche Forschungsgemeinschaft immediately.
- 6.2 The trustee of the Deutschen Forschungsgemeinschaft, at Humboldt-Universität zu Berlin, Prof. Dr. Bärbel Friedrich, has been informed about this application.

7 Signatures

Berlin, 01.03.2010

(Prof. Dr. Martin Odening)

(## Silke Hüttel)

8 List of attachments

CV of applicant Martin Odening
 List of publications of applicant Martin Odening
 CV of applicant Silke Hüttel
 List of publications of applicant Silke Hüttel

9 Attachments to subproject 2

9.1 Curriculum Vitae of the applicant

Personal Information

Name	Odening, Martin, Prof. Dr. sc. agr.
Date of birth:	28 April 1959
Place of birth	Hannover, Germany
Affiliation	Farm Management Group Department of Agricultural Economics and Center for Applied Statistics and Economics (C.A.S.E) Humboldt-Universität zu Berlin
Language proficiency	English: fluent, German: mother tongue

Education

1993	Post Doctoral thesis (Habilitation) in Agricultural Economics, University Göttingen, Germany. Thesis on Complexity Reduction in Decision Models
1988	Doctorate (Dr.sc.agr.), in Agricultural Economics, University Göttingen, Germany. Thesis on Kalman filtering.
1984	Diploma in Agricultural Sciences, University Göttingen, Germany

Academic and employment history

1994	- to date	Professor for Farm Management (C4/W3), Humboldt-Universität zu Berlin
05/2002	- 7/2002	Visiting Professor, Department of Applied Economics, University of Minnesota
12/1996	- 3/1997	Visiting Professor Department Agricultural Economics, University of New England
1993	- 1994	Interim chair for Farm Management, Martin-Luther Universität Halle-Wittenberg
1992	- 1993	Interim chair for Farm Management, Humboldt-Universität zu Berlin, Germany
1988	- 1993	Assistant professor, Department of Agricultural Economics, University Göttingen
1987	- 1988	Head of Department of Agricultural Statistics, Federal Statistical Office Rheinland-Pfalz, Germany

Research Interests

Risk Management in Agriculture
Investment and Finance
Efficiency and Productivity Analysis

Memberships, Functions, and Awards

Membership: Agricultural & Applied Economics Association (AAEA), European Association of Agricultural Economists (EAAE), International Association of Agricultural Economists (IAAE), Gesellschaft für Wirtschafts- und Sozialwissenschaften des Landbaus (GeWiSoLa)

Referee for: American Journal of Agricultural Economics, European Review of Agricultural Economics, Agricultural Economics, Agricultural Finance Review, Journal of Economic Dynamics and Control, Applied Economics, Journal of Business Venturing

Editorial Board: Agricultural Finance Review, Berliner Schriften zur Agrar- und Umweltökonomik

Awards: Co-author of Best Papers at the annual conference of the German Association of Agricultural Economists 2006 and 2007

Member of the DFG (German Research Foundation) Review Board 207 (Agricultural and Forestry Sciences, Horticulture and Veterinary Medicine)

Examiner for Environmental Experts at the Federal Ministry for the Environment, Nature Conservation and Nuclear Safety

9.2 List of publications of applicant Martin Odening (since 2005)

Reviewed publications in scientific journals

Mußhoff, O., Odening, M., Xu, W. (2009): Management of Climate Risks in Agriculture - Will Weather Derivatives Permeate? Applied Economics (in print).

Hanisch, M., Filler, G., Odening, M. (2008): Zur Ableitung von Entwicklungsstrategien für Warengenossenschaften. Zeitschrift für das gesamte Genossenschaftswesen 58: 24-39.

Hinrichs, J., Mußhoff, O., Odening, M. (2008): Economic Hysteresis in Hog Production. Applied Economics 40 (3): 333-340.

Mußhoff, O., Hirschauer, N., Odening, M. (2008): Portfolio Effects and the Willingness-to-pay for Weather Insurances. Agricultural Finance Review 68 (1): 83-97.

Xu, W., Odening, M., Mußhoff, O. (2008): Indifference Pricing of Weather Derivatives. American Journal of Agricultural Economics 90 (4): 979-993.

Filler, G., Odening, M., Seeger, S., Hahn, J. (2007): Zur Effizienz von Biogasanlagen. Berichte über Landwirtschaft. Bd. 85 (2): 178-194.

Mußhoff, O., Odening, M., Xu, W. (2007): Management klimabedingter Risiken in der Landwirtschaft - Zum Anwendungspotenzial von Wetterderivaten. Agrarwirtschaft und Agrarsoziologie 7 (1): 27-48.

Odening, M., Mußhoff, O., Hirschauer, N., Balmann, A. (2007): Investment under uncertainty – Does competition matter? Journal of Economic Dynamics and Control 31 (3): 994-1014.

Odening, M., Mußhoff, O., Xu, W. (2007): Analysis of Rainfall Derivatives Using Daily Precipitation Models: Opportunities and Pitfalls. Agricultural Finance Review 67 (1): 135-156.

Shahwan, T., Odening, M. (2007): Forecasting Agricultural Commodity Prices using Hybrid Neural Networks. In: Chen, S., Wang, P., Kuo, T. (eds.): Computational Intelligence in Economics and Finance. Springer, Berlin, Heidelberg, Vol. II: 63-74.

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9.3 CV of applicant Silke Hüttel

Personal Information

Name	Hüttel, Silke
Date of birth:	6 April 1978
Place of birth	Mühlacker (Baden-Wuerttemberg), Germany
Affiliation	Farm Management Group Department of Agricultural Economics Humboldt-Universität zu Berlin
Language proficiency	English: fluent, German: mother tongue, French: basic

Education

2005 – 2009	Promotion an der Fakultät # der Humboldt-Universität zu Berlin Thema: „Structural Change in Agriculture – An Empirical Analysis Doktor der Agrarwissenschaften (Dr. sc. agr.)
1997 – 2003	Studium der Agrarwissenschaften an der Universität Hohenheim und der Humboldt-Universität zu Berlin Schwerpunkt: Wirtschafts- und Sozialwissenschaften des Landbaus (Dipl.-Ing. agr., M.Sc)
1997	Abitur #####

Academic and employment history

2005 –	Research Associate at the Department of Agricultural Economics at Humboldt-Universität zu Berlin
2003 - 2005	Research Associate at the Federal Agricultural Research Institute, Farm Management Group (FAL, today VTI).

Research Interests

Risk Management in Agriculture
Investment and Finance
Efficiency and Productivity Analysis
Applied Econometrics

Memberships, Functions, and Awards

Membership: Agricultural & Applied Economics Association (AAEA), European Association of Agricultural Economists (EAAE), International Association of Agricultural Economists (IAAE), Gesellschaft für Wirtschafts- und Sozialwissenschaften des Landbaus (GeWiSoLa)

Referee for: Agricultural Economics, Agricultural Finance Review, Agrarwirtschaft

Awards: Best Poster at the annual conference of the German Association of Agricultural Economists 2005; Humboldt-Price for outstanding Masterthesis

9.4 List of publications of applicant Silke Hüttel (last 5 years)

Publications in reviewed scientific journals

- Buschendorf, H., Weindlmaier, H., Hüttel, S., Kleinhanß, W. (2006): Prognose zur regionalen Milcherzeugung in Deutschland bis 2013. *Deutsche Milchwirtschaft*, 57. Jg., Nr. 7, S. 319-321, 326.
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- Hüttel, S., Kleinhanß, W., Offermann, F. (2005): Impacts of decoupling and milk quota trade on the French and German dairy sectors. EDIM working paper WP05.

- Hüttel, S., Kleinhanß, W. (2004): Review of MTR Impacts on the European Dairy Sector. EDIM working paper WP02
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Monographien und Herausgeberschaften

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Other Publications

- Hüttel, S., Mußhoff, O., Odening, M., Zinych, N. (2008): Estimating Investment Equations in Imperfect Capital Markets. SFB 649 Discussion Paper 2008-016.
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