Improving weather index-based insurance: better consideration of crop physiology

**Ziel:**
The aim of this master thesis is to test approaches to estimate growth stages to be used for weather index-based insurance design. More specifically growing degree days (Conradt et al., 2015), Biometeorological Time (BMT) and physiological days (Pdays), where the latter two are alternatives to the classical GDD based approach (Saiyed et al., 2009).

**Forschungsfragen:**
- Do BMT and Pdays adjusted weather index-based insurances outperform GDD based products in terms of expected utility (EU) maximization.

**Methoden:**
- Flexible Insurance period adjustment using above mentioned approaches (Conradt et al., 2015a)
- Determination of Index parameters focusing on downside risk aversion by using quantile regression (QR) (Conradt et al. 2015b)
- Insurance performance assessment using expected utility and a power utility function (Leblois et al., 2014)

**Literatur:**

**Anmerkung:**
Bei Interesse sind Fragen zu richten an: Tobias Dalhaus tdalhaus@ethz.ch in collaboration with Annelie Holzkämper

Agricultural production is exposed to a variety of climate related risks. In this context, crop insurance schemes are designed to help farmers by providing payout in times of low outcomes. However, traditional insurance schemes come with asymmetric information problems hampering the development of private, unsubsidized insurance markets. With regard to this background, weather index based insurance solutions offer potential benefits for creating private marked based risk management tools. The drawback of these index-based solutions is that if the weather index is not well suited to on farm losses, a discrepancy between insurance payout and on farm damages (Basis Risk) can occur. One reason for such mismatch is the consideration of time windows to measure the index that do not reflect the critical crop growing phases (temporal basis risk). This thesis should contribute to reduce these temporal basis risks by better representation of crop growing phases in these insurance solutions.
**Titel**

Political network analysis of the agricultural policy reform 2014-17 in Switzerland

**Kontext:**

Agricultural policies are usually the outcome from a political compromise i.e., from bargaining processes between influential political interests. In addition to these dynamics of the policy process, the scope of possible policy interventions is oftentimes dynamic itself, and, thus, is a "moving target". To understand the changes between different reform packages of the Swiss agricultural policy (e.g., AP11, AP14-17 etc.), political network analysis is a valuable tool to understand preferences and goals within the agricultural bargaining processes (Hirschi and Huber, 2012; Hirschi et al., 2013; Hirschi et al., 2012).

**Ziel:**

The goal of this thesis is to perform a political network analysis of the latest agricultural policy reform (AP14-17) in Switzerland and to compare it to existing network analysis on the reform AP11 (see Hirschi and Huber 2012).

**Forschungsfragen:**

- How does the agricultural policy network of the AP14-17 look like?
- What changes can be observed with respect to the AP11 i.e., in Network size (number of actors), Network density (number of linkages among actors) and the degree of centralization (the dependence of the network on one or a small number of actors)?
- What consequences could emerge from these changes for future agricultural policy reforms?

**Methoden:**

To analyze the current agricultural policy network in Switzerland, the student will apply the Actor-Process-Event Scheme. According to this conceptualization, every policy process can be understood as a sequence of linked political events in which political actors participate to various degrees. The student will first collect all available information (from official documents and media reports) on the AP14-17 and develop a detailed chronology of all related and observed political events. Then the participating actors and their form of interaction have to be assigned to the identified political events. The resulting data with the specified forms of interactions that link pairs of actors is then aggregated to a policy network using the software UCINET 6.4 (Borgatti et al., 2002).

**Literatur:**


**Anmerkung:**

Bei Interesse sind Fragen zu richten an: Robert Huber

rhuber@ethz.ch
**Vorschläge für Masterarbeiten**

**Titel**  
**Neighborhood effects in agricultural land-use change in Switzerland**

**Kontext:** Agricultural land-use change is often influenced by so called neighborhood effects. For example, if grassland in a mountain region is abandoned, the probability of abandonment increases for adjacent parcels (Gellrich et al., 2007). Neighborhood effects are very common in spatially explicit models of land-use change (van Vliet et al., 2013; Verburg et al., 2004). Current neighborhood indices, however, depend strongly on the spatial extent set for calculating them. So far most of land-use change analyses or models using neighborhood variables assumed some predefined neighborhood extents without proving whether the selected extents are optimal for driving land use change. The results of this thesis are of crucial importance for understanding land-use changes in Switzerland, e.g. the “extensification-incentives” of the current agricultural policy (AP14-17).

**Ziel:** The goal of this thesis is to calculate optimal neighborhood extents for different agricultural land-use changes in Switzerland and to provide insights into the effect of policy induced land-use changes.

**Forschungsfragen:**
- How does the neighborhood effect differ between different types of land-use change (i.e., from intensive to extensive land-uses and vice versa) in selected Swiss regions?
- What conclusions can be drawn for the evaluation of agricultural policies?

**Methoden:** Land-use change modeling based on the data from the Arealstatistik and calculating neighborhood effects using NetLogo (model application). Visualization of the effects in ArcGIS. Regression analysis to calculate optimal neighborhood effects.

**Literatur:**

**Anmerkung:**

Bei Interesse sind Fragen zu richten an: Robert Huber  
rhuber@ethz.ch  
Quang Bao Le  
Q.Le@cgiar.org
A rapid income calculation tool for agricultural land-use meliorations

Ziel:  
The goal of this thesis is to build a spatially explicit land-use model that calculates agricultural income based on a spatially explicit land-use map in the Linth-Ebene (Canton of Glarus).

Forschungsfragen:
- How can the agricultural income on farm level be estimated based on a spatially explicit land-use map?
- What is the effect of different land-use allocations on farm income in the Linth-Ebene? What would be the effect of a coordination of crop rotation standards?
- What consequences can be expected for the ongoing LP Glarus?

Methoden:  
Based on the spatially explicit land-use data of the Linth-Ebene (AGIS provided by the canton of Glarus), the student develops an algorithm (e.g. a Bayesian-Network, @Risk, ArcGIS or a mathematical programming model) that upscales the spatially explicit information to the farm and the regional level. The parameter for calculating the income is based on gross margins (Deckungsbeitragskatalog) and/or FADN data (Hauptbericht Agroscope).

Literatur:  
BLW, Swissmelio, geosuisse. Wegleitung Landwirtschaftliche Planung. Position und Entwicklung der Landwirtschaft im Zusammenhang mit raumrelevanten Vorhaben. BLW online

Anmerkung:  
This thesis would be part of ongoing LP in Glarus which will start early 2016. Thus, the thesis should also start in Spring 2016

Bei Interesse sind Fragen zu richten an:  
Robert Huber  
rhuber@ethz.ch

Christian Flury  
christian.flury@flury-giuliani.ch
Titel: **Model based uncertainty analysis of farmland abandonment in the Valais, Switzerland**

**Kontext:**
Land abandonment and the subsequent re-forestation are important drivers behind the loss of ecosystem services in mountain regions. Agent-based models can help to identify global change impacts on farmland abandonment and can test policy and management options to counteract this development (Brändle et al., 2015). There are, however, two sources of uncertainty in such modelling approaches. On the one hand, there is uncertainty with respect to the future development which is usually captured by doing scenario analysis (Seppelt et al., 2013). On the other hand, there is uncertainty from the model and the underlying parameter itself (Troost and Berger, 2014). Knowing the source of uncertainty helps to assess direct payment schemes (Kulturlandschaftsbeiträge, Steillagenbeiträge) that are designed to maintain open space in mountain regions.

**Ziel:**
The goal of this thesis is to assess the spatial explicit uncertainty in farmland abandonment in the case study area of Visp (Valais). Thereby, the different sources of uncertainty should be disentangled by using a combination of sensitivity analysis with scenario analysis in the existing agent-based land-use model ALUAM. Results should support the evaluation of direct payment schemes in mountain regions.

**Forschungsfragen:**
- Where are spatially explicit hot-spots of farmland abandonment in the Visp- and Saas-valley in Switzerland?
- Which sources of uncertainty affects the probability of farmland abandonment most?
- What are the implications of these uncertainties on the evaluation of agricultural direct payment schemes?

**Methoden:**
Application of the agent-based land-use model ALUAM. Visualization of the spatially explicit land-use changes in ArcGIS maps.

**Literatur:**

**Anmerkung:**

**Bei Interesse sind Fragen zu richten an:** Robert Huber
rhuber@ethz.ch
Profitability of Firms in European food retailing

**Context:** The European food retailing sector is characterized by a high degree of concentration and bargaining power towards the upstream sector. In many European countries the five largest food retail firms contribute more than 75% to total sector turnover. The resulting market power is reinforced by a high and still increasing share of private labels. The question remains to which degree those and other factors influence the profitability of firms in this sector.

**Goal:** Aim of this thesis is to illustrate the structural characteristics of the European food retailing sector and based on those insights to determine the drivers of firm profitability

**Research Questions:**

a) How sustainable is profitability in the retailing sector?

b) What are drivers of profitability (in particular size) in the food retailing sector?

c) Do differences between European countries prevail?

**Methods:**

a) Derivation of theoretical concepts of firm profitability

b) GMM estimation and quantile regressions to analyse the sustainability as well as the drivers of profitability

**Literature:**


**Remark:** Robert Hirsch is starting from 01.04.2016 at ETH

**For questions:** Stefan Hirsch

stehirsch@ethz.ch
**A comparison of the decision making process within the farm family.**

**Kontext:**
Many agricultural economists and sociologists have understood the huge importance of the concept of path dependency for the comprehension of agricultural structures. This holds especially for Swiss agriculture that is organized mostly (97%) in family farm structures. More often than not, the existence of a family farm is not so much the result of a choice between different organizational forms, but a given fact. Leading to a unique decision making process of the family farm members. To analyze this process is of large importance with respect to agricultural risk management decisions and the underlying risk preferences.

**Ziel:**
This study aims towards analyzing the differences and similarities in the decision making structures of different family farm members. Especially focusing on the inheritability of risk preference structures and subjective believes about risks.

**Forschungsfragen:**
1) How are decisions concerning risk management strategies made within a farm family?
2) Are risk preferences within a farming family inheritable?

**Methoden:**
Literature review, collecting and analyzing empirical data (face to face interview with farm families or online questionnaire)

**Literatur:**

**Anmerkung:**
Bei Interesse sind Fragen zu richten an: Manuela Meraner
mmeraner@ethz.ch
Title: Institutional risks and investment decisions

Context: Due to frequent agricultural policy reform steps in Switzerland farmer potentially face a high degree of uncertainty with respect to future market and support conditions as well as environmental obligations. Real option theory suggests that due to such uncertainty, investment decisions might be postponed and technological progress thus is hampered. Moreover, such uncertainty can reduce the degree and speed of dis-investment (e.g. leaving unprofitable activities). Thus, also desired levels of structural change cannot be reached. Due to these mechanisms, a too high frequency of agricultural policy reforms might thus reduce its effectiveness and efficiency.

Goal: This thesis should use concepts of real option theory to derive testable hypotheses how the subjective uncertainty with respect to the current design of agricultural policy reform steps affects investment and disinvestment decisions taken in Swiss agriculture. Based on this background, different lines of research could be followed. First, interviews or a survey can be conducted with farmers. The goal of this analysis should be to match subjective perception of these risks, risk aversion and the information whether investment decision taken or postponed. Second, a normative farm-level modeling perspective could be used to study optimal investment decisions under different levels of institutional risks.

Research questions:
- Does the current design of agricultural policy reform steps affects investment decision taken in Swiss agriculture?
- Can real option theory help to explain farm-level investment decisions?
- How does farmers risk preferences affect investment decisions?

Methods: Microeconomic modeling of an investment problem under uncertainty, surveys or interviews, econometric analysis, or: normative modeling of an investment problem.

Literature:


Remark:

Be interested in questions to contact: Robert Finger
rofinger@ethz.ch
Risk and risk management in the dairy market

Kontext: The dairy market faces uncertainties from various sources. The focus in this thesis should be on production and price risks. The presence of these risks is expected to influence farm-level behavior. More specifically, both short-term decisions (e.g. marketing) and long-term decisions to be taken by the farmer (e.g. investment decisions) are potentially affected. As a response, various risk management or stabilization strategies have been established on farm-, regional or national levels. In addition, insurance solutions that are tailor made for the dairy sector, such as the Dairy Margin Protection Program in the US, have been established recently (Mark and Burdine). Using such instruments that cover different risk sources jointly in contrast to management of individual risks separately allows more efficient management of highly correlated risk sources (El Benni et al.).

Ziel: This thesis aims to analysis the role of different risk sources for the Swiss dairy sector. In an econometric analysis, the effect of various risk sources and their development over time are tested. Quantitative analysis (e.g. simulation or optimization) is conducted to show the potential effects of tools and instruments that are currently applied in other countries. The focal point of this analysis is laid on impacts and decisions at the farm-level.

Forschungsfragen: -What are the most important risks in the Swiss dairy sector?-What is the potential of new risk management instruments in the Swiss dairy sector?-What is the potential role of agricultural policy in that field?

Methoden: Microeconomic modeling, econometric analysis data at different aggregation levels, simulation and policy analysis


Anmerkung:

Bei Interesse sind Fragen zu richten an: Robert Finger
rofinger@ethz.ch
Vorschläge für Masterarbeiten

Agricultural Economics (AECP)

**Titel**  
**Economic assessment of species diversity in grassland production**

**Kontext:**  
Species diversity has been found to increase yield stability in managed grasslands. This also implies potential benefits for farmers. More specifically, species diversity has insurance values for risk averse farmers and species diversity may serve as valuable ex-ante risk management strategy, e.g. to avoid low tail income situations due to climatic extreme events. Understanding the interplay of risk preference and species diversity also offers a high potential to develop more efficient policies. Combining ecological and economic frameworks allows to develop an unique interface between plant science and economics. Moreover, data from various field trials offers a high potential for empirical analysis.

**Ziel:**  
The thesis is supposed to build upon existing ecological economic framework (e.g. Finger and Buchmann) and extend this framework to also capture downside risks components. Next, an econometric application is conducted based on large scale field trial data. Finally, the developed economic framework and the results from the econometric analysis are used to conduct simulations and policy analysis. The latter might also comprise the interplay between insurance availability and optimal levels of intensity and species diversity (e.g. Quaas and Baumgärtner).

**Forschungsfragen:**  
- What is the effect of species diversity on downside risks in grassland production?
- How do farmers’ risk preferences, their management decision and the availability of insurance solutions affect species diversity?
- What are optimal policies to reach the social optimal provision of production and external effects of species diversity?

**Methoden:**  
Microeconomic modeling, econometric analysis of field trial data, policy analysis

**Literatur:**  

**Anmerkung:**

**Bei Interesse sind Fragen zu richten an:**  
Robert Finger  
rofinger@ethz.ch
**Vorschläge für Masterarbeiten**

**Titel**  
Risk aversion and the use of pesticides of Swiss fruit farmers – the example of fire blight

**Kontext:**  
Fireblight (Erwinia amylovora) is a highly contagious pest affecting apple and pear production, among others. To target fireblight a system of warnings with different alert stages is used in Switzerland. This system is intended to be used by farmers as an indicator for precautious treatment with plant protection products (PPP). Treatment strategies taken by farmers might differ with regard to personal characteristics such as risk preferences.

**Ziel:**  
The goal of the thesis is an assessment of pesticide use under risk in the context of Swiss fruit farming and the occurrence of fireblight.

**Forschungsfragen:**
1.) What are the effects of fire blight on Swiss fruit production, and most important PPP used?
2.) How does risk aversion of farmers affect pesticide use?
3.) Description of the warning system for fireblight in Switzerland and analysis for different cantons over time.
4.) Comparing the actual use of PPP against fireblight with actual warnings in the given time periods using a unique data set on pesticide use of Swiss fruit producers (SOA).
5.) Econometric analysis of the effect of a farmers risk aversion on the precautious use of PPP fighting fireblight.

**Methoden:**
1.) Literature research.
2.) Descriptive statistical analysis of a unique data set on pesticide use of Swiss fruit producers and fireblight occurrence.
3.) Econometric analysis of production decisions under risk.

**Literatur:**

**Anmerkung:**

Bei Interesse sind Fragen zu richten an: Niklas Moehring  
nmoehring@ethz.ch
**Titel**

The prohibition of neonicotinoids in Switzerland – economic effects on rapeseed cultivation and a temporal-spatial approach to pest reduction

**Kontext:**

Seed treatments of rapeseed with neonicotinoids were banned in Europe and Switzerland by the end of 2014. This lead to problems fighting the pollen beetle (Meligethes aeneus) and other pests, as substitutes were scarce, and therefore had large economic impacts on rapeseed cultivation in Switzerland and the EU. A solution to this problem is the use of chemical substitutes, but could also be a new innovative system of temporal-spatial management in rapeseed cultivation combined with biological control with ichneumon wasps.

**Ziel:**

Goal of the thesis is an economic assessment of effects of the neonicotinoids ban on Swiss rapeseed production and the elaboration of an alternative temporal-spatial approach.

**Forschungsfragen:**

1.) How are neonicotinoids used in European rapeseed cultivation and what are possible substitutes?
2.) Outlining the ban of neonicotinoids in EU and Switzerland and economic impacts on rapeseed cultivation in Switzerland.
3.) Building a microeconomic (agent based) model using temporal-spatial management in rapeseed cultivation combined with biological control.
4.) Can such an approach be an economically viable substitute for conventional plant protection measures against the Meligethes aeneus, and how should incentives be designed for a successful implementation of such an alternative?

**Methoden:**

1.) Literature research.
2.) Design of a small (agent based) microeconomic model of temporal-spatial management in rapeseed cultivation.
3.) Analysis of private and social welfare outcomes based on the model.

**Literatur:**


**Anmerkung:**

Bei Interesse sind Fragen zu richten an: Niklas Möhring
nmoehring@ethz.ch
Weather index based insurances in Agriculture: A case study for Swiss farmers

Kontext: Agricultural production is exposed to a variety of climate related risks. In this context, crop insurance schemes are designed to help farmers by providing payout in times of low outcomes. However, traditional insurance schemes come with asymmetric information problems hampering the development of private insurance markets. With regard to this background, index based insurance solutions offer potential benefits for creating private marked based risk management tools. Here several studies suggest strategies for designing and optimizing index based products.

Ziel: The aim of this master thesis is to develop a weather index insurance product for Swiss crop producers. The student can further specify a specific example for application.

Forschungsfragen: The Literature gives several examples and starting points for developing further research questions

Methoden: Case study including analysis of weather and yield data


Anmerkung:

Bei Interesse sind Fragen zu richten an: Tobias Dalhaus
tdalhaus@ethz.ch
**Titel**  
Income related climate risks and risk management strategies in Swiss apple production: An empirical Analysis

**Kontext:**  
Apple production is a major component of the Swiss horticultural production landscape. However, apple production is exposed to a variety of climate risks. In this context, apple producers utilize a number of different risk management strategies to cope for weather induced yield as well as quality losses to protect their income.

**Ziel:**  
The aim of this master thesis is to identify relevant downside climate risks and management strategies in Swiss apple production empirically.

**Forschungsfragen:**  
- What kind of cultivar specific production risks can be identified in Swiss apple cultivation?
- What are the consequences of these adverse weather events for the farms income and apple yield?
- What are efficient risk management strategies in Swiss apple cultivation?

**Methoden:**  
- Identification of climate related risks in apple cultivation within a literature review, experts interviews

**Literatur:**  
z.B.:  

**Anmerkung:**

**Bei Interesse sind Fragen zu richten an:**  
Tobias Dalhaus  
tdalhaus@ethz.ch
Titel: Eigenes Thema

Kontext: Sie sind herzlich eingeladen, auch eigene Ideen für ein Thema mit uns zu besprechen.

Ziel: Formulieren Sie die Fragestellungen, die Sie gerne untersuchen wollen und Sie interessieren würden.

Methoden: Besuchen Sie uns im SOL an der Sonneggstrasse 33 und suchen Sie die Mitarbeiter, die sich mit dem entsprechenden Thema befassen. Wir helfen Ihnen gerne weiter.

Literatur:

Anmerkung: Bei Interesse sind Fragen zu richten an: Mailadressen der Mitarbeiter auf www.aecp.ethz.ch