NEW INVESTMENT THEORY IN AGRICULTURAL ECONOMICS: ITS IMPLICATIONS FOR FARM MANAGEMENT, ENVIRONMENTAL POLICY AND DEVELOPMENT

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The motivation for this mini-symposium was the impression that 'new investment theory' – also named 'real option theory' – seems to be a research area within agricultural economics which offers numerous potential applications. Real option theory exploits the analogy between a financial option and a physical investment, facilitating the transfer of methodology and the main findings of option pricing to generic investments. Three preconditions have to be fulfilled to make the approach meaningful and non-trivial: firstly, the decision maker has the flexibility to defer the investment decision, secondly, the initial investment outlay is at least partially sunk; and thirdly, the investment returns are uncertain. Under these (realistic) assumptions it can be demonstrated that 'waiting' has a positive value. An immediate investment kills the option and hence the expected investment returns should cover the direct investment costs as well as the opportunity cost of the alternative 'wait and see' decision. Accordingly, real option theory yields investment triggers which are significantly higher than traditional investment criteria suggest.

On this basis a broad class of investment problems appears in another light. The objective of the meetings was to highlight the main ideas and the implications of real options, explore potential applications and identify problems and needs for further research. The discussion was structured around eight papers focusing on farm management, environmental issues and policy making.

Farm management

Oude Lansink and R. Huirne (Wageningen University, Netherlands) provided an overview of modelling investments in agriculture. They distinguished between positive (empirical) and normative approaches and showed how the concept of real options can be incorporated in traditional models. With a focus on adjustment cost models and stochastic dynamic programming, M. Odening and O. Mußhoff (Humboldt University, Germany) calculated critical values for the returns on investments in hog feeding under German market conditions. Option prices and investment triggers were determined using stochastic simulation. It turns out that the results depend heavily on the stochastic processes assumed for the investment cash flows. The investment trigger largely exceeds

the investment costs for a geometric Brownian motion, but is close to it when a moving average model is used. T. Richards and G. Green (Arizona State University and Western Washington University, USA) investigated the investment behaviour of California wine grape producers. An econometric model was used to test whether option values for adopting a new variety cause economic hysteresis. The empirical results show a significant effect, its extent depending on the variability of crop revenues. It is concluded that the speed of adoption of new varieties can be increased by means of revenue insurance or contract production arrangements.

Environment and natural resources

Two papers dealt with natural resources. Ellen Burnes (Oregon State University, USA) analysed the value of a contract for harvesting a natural resource. To get prices right resource managers must consider an arbitrage free contract price. The speaker showed how such prices are constructed when harvest costs are included. The second presentation, by Hans-Peter Weikard (Wageningen University, Netherlands), dealt with the option value of biodiversity and conservation. Limited information about the value of ecosystems and species leads to a positive option value. The design of a conservation policy 'today' must take into account the possibility that more information about the attributes of ecosystems and species might be revealed 'in the future'. It was suggested that the possibility of learning leads to higher initial conservation efforts, even if that is at the expense of long-term measures.

Policy

Discussion of the relevance of new investment theory for efficient economic policies began with Gerald Shively (Purdue University, USA) considering the impact of product price uncertainty on the hurdle rate, and its implication for investments in soil conservation and policies promoting conservation. The main conclusion was that price uncertainty, in itself, can discourage farmers from adopting soil conservation methods. It provides an additional explanation of why their adoption rate is low despite the fact that traditional cost–benefit analysis shows a positive rate of return.

Gerd Nicodemus (FERI GmbH, Germany) presented a discussion of optimal resource allocation applied to climate change policies, under irreversibility and uncertainty in a decentralized economy. The paper showed that policies can improve the efficiency of the market outcome in the case of forest carbon sequestration. Justus Wesseler (Wageningen University, Netherlands) spoke on the application of new investment theory to the assessment of benefits and costs of biotechnology and discussed the optimal timing of releasing transgenic crops into the environment against the background of highly uncertain risks. One major empirical problem is the identification of the stochastic processes underlying the net benefit stream. All three speakers argued that economic policies will result in inefficient resource allocation if irreversibility and uncertainty are not incorporated.