A RICARDIAN ANALYSIS OF THE IMPACT OF CLIMATE CHANGE ON EUROPEAN AGRICULTURE

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Using and protecting natural resources in combination with continued high quality food production is a daunting but necessary task. The European Common Agricultural Policy (CAP) is designed to meet different objectives such as production efficiency, income support and food quality. Since the 1992 reform, the CAP is also marked by a gradual shift towards decoupled direct aid, by the strengthening of rural development policy, and progress in the integration of environmental considerations including climate change. In fact, the CAP has a role to play in facilitating adaptation to the changing conditions by helping farmers to adapt to the changing climatic situation and to provide wider ecosystem services dependent on land management [1]. However, a first important step is to estimate the long term impacts of climate change on agricultural production.

Olesen, Trnka [2] found a high proportion of negative expectations concerning the impacts of climate change on crops and crop production in Europe. White, Hoogenboom [3] reviewed 221 peer-reviewed papers that used crop simulation models to examine diverse aspects of how climate change might affect agricultural systems. They found that no single paper could be judged as "complete". The uncertainties and sources of variation in estimated impacts of climate change on agriculture depend on the emission scenarios, climate and impact models used, the local soil and climatic conditions of the ecosystems under study [4]. We disagree with the conclusion of White, Hoogenboom [3] that the diversity weakens the comparisons that stakeholders require and likely has introduced unintended biases. In fact, we believe that the diverse use of methods is a major advantage as climate change impact and adaptation studies draws much of its power and creativity from its ambiguity. However, it should be noted that the underlying assumptions and paradigms must be clear to the reader, otherwise, a sound discussion is made impossible.

The objective of this research is to measure the impact of climate on European agriculture using a Ricardian analysis. The Ricardian approach has already been used in many applications, for example for US and Canadian farmland [5]. In Europe, there only exist Ricardian studies on agriculture in Germany [6] [7] and in England and Wales [8]. An analysis covering several European countries will contribute to the existing literature on the Ricardian analysis and to the existing literature of climate change impact on European agriculture. Moreover, an European analysis can translate European climate scenarios to agricultural production and support the CAP.

To determine the farmland value, the European Farm Accountancy Data Network (FADN) is used. The FADN is the only source of microeconomic data that is harmonized with the same bookkeeping principles in all European member countries.

Estimating the impact of climate change on European agriculture using the Ricardian approach complements existing research. Moreover, the advantage is that the method includes the direct effect of climate on productivity and the adaptation response by farmers to local climate. A limitation of the Ricardian approach is the assumption of long-run equilibrium in land markets and the possible failure to control for general equilibrium price effects. Our approach links current CAP policies (such as stimulating

organic farming) with the estimated long term impact of different farming practices. In a following step, a structural Ricardian model should be developed to reveal the precise adaptations that farms are making to climate change.

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