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Challenges in Modelling and Evaluating Effects of Agricultural Policy Reforms and Trade Agreements

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About 10 years ago, Meilke et al. (1996) defined what should be "the ideal economic analysis" to promote progress in the Doha Round of agricultural multilateral negotiations within the World Trade Organisation (WTO). They considered that a top priority was to improve "the structural representation of each agricultural sector" in world trade models used for policy-scenario assessment and enumerated various technical aspects that should be addressed. They emphasised in particular the need to explicitly model policy variables, better represent cross-commodity effects and resource constraints linked to primary production factors, base technical and behavioural parameter choice on sound econometric analysis, take into account growth effects and better capture what happens at the stage of processed products instead of basic agricultural commodities only. They also underlined that economists should enlarge the policy issue coverage as new issues were likely to be added to the agenda of the Doha Round relative to the Uruguay Round. Trade and the environment was one such area.

Last year, Westhoff et al. (2004) reviewed the main challenges encountered in modelling and analysing reforms to domestic agricultural policy as well as those concerning trade agreements. As no single model can fully capture all the technical aspects and all the possible effects, economists are required to make choices, including the choice of model type and scope, the definition of a reference (baseline) scenario, the representation of policy experiments and the choice of metrics for measuring the effects of policy experiments. Two emerging issues, the quantification and representation of non-tariff barriers and the inclusion of processed or value-added products, were also emphasised.

We fully agree with Meilke et al. when they note that "the sound assessment of market structures and key policy parameters will continue to be the basic building blocks of all economic analysis". We also fully agree with Westhoff et al. when they point out that "no single modelling approach dominates the others on all fronts". We argue, however, that one of the main weaknesses of models currently used for assessing agricultural policy reform is that they focus quasi-exclusively on market effects. To a large extent, structural effects are not captured within partial equilibrium models and they are not the focus of impact assessments based on general equilibrium models. And non-market effects are generally, purely and simply ignored.

The WTO does not make judgements about countries' policy objectives under the condition that the measures used to achieve these objectives have no, or at most minimal, trade distortion effects. From that perspective, one easily understands why agricultural trade modellers and models focus and will continue to focus on the market and private welfare effects of policy reforms. But agriculture provides (more precisely, can provide) food and non-food benefits. These non-food benefits include food security, environmental protection and the viability of rural areas. In other words, agriculture is multifunctional. At this stage, it is worth remembering that agriculture can affect the environment positively, for example by providing open and diversified landscapes as well as habitat preservation, and negatively, in terms of pollution and natural resource degradation.

Three main normative lessons can be drawn from economic theory. First, when there are public goods/bads along with positive and negative externalities, then the efficient level of agricultural output can conceptually be larger or smaller than the competitive one. Second, non-trade concerns associated with agricultural production should ideally be addressed through targeted instruments even if this targeting policy results in trade distortion effects relative to free trade. Third, transaction costs associated with this ideal targeted policy should not be disregarded by simply assuming that they can be minimised. These normative recommendations suffer

from the problem of an ambiguous recognition of public goods/bads and externalities associated with agricultural production and the three related issues of identification, measurement and valuation. Valuation is particularly problematic, although it is necessary to define social welfare functions (see Guyomard & Le Bris, 2004). Normative analyses should then be complemented by positive approaches, more specifically impact analyses including market, non-market and structural effects of policy experiments.

This can be done by defining an integrated framework that links different models, for example, focusing on the environment, a world-trade agricultural model, a (spatial) equilibrium model for the agricultural sector of the country under scrutiny and a (spatial) environmental-simulation model based on agricultural production technologies used in that country. The world-trade model essentially gives changes in world prices. The country model ideally gives changes in production practices, land allocation, input use and output levels while the environmental model provides changes in the physical measures of environmental impacts. A complementary or alternative solution likely to be less exigent in terms of data collection and modelling efforts is to use an indicator-based approach. Multifunctionality essentially covers food security, the environment, the viability of rural areas and the contribution of agriculture to (rural) employment, agricultural landscapes, cultural heritage values and animal welfare. Available statistics do not provide direct and unambiguous measures of all these multifunctional characteristics. In many cases, however, they can used to provide proxy indicators of the influence agricultural activities and agricultural policy reforms can have on the economic, physical and social environment (Andersen et al., 2004). From both a scientific and political point of view, a top priority is to complete the descriptive studies aiming at assessing agricultural multifunctionality on the basis of indicators calculated on observed data by modelling exercises that seek to evaluate changes in these indicators induced by domestic policy reforms or trade agreements (or both).

Available statistics clearly do not equally cover all aspects of multifunctionality. Those aspects related to the environment are probably the best covered, even if available indicators mainly relate to the pressure on the environment and landscapes and thus are not direct measures of environmental goods or bads. But to our knowledge, no indicators related to characteristics such as heritage values can be identified on the sole basis of available official statistics. One practical and potentially promising way to overcome this lack of indicators in official statistics would be to construct indicator proxies, for example by regressing, on the basis of specific surveys, a given indicator on its main determinants and then using regressions to construct indicator proxies.

A final remark is that there is a real risk that a partial coverage of multifunctionality leads to misleading policy conclusions under the form of abusive generalisation of simulation results focused on some multifunctionality aspects only. As Westhoff et al. (2004) rightfully pointed out, "even the best models are dangerous tools in inexperienced hands", that is in the hands of novice modellers. We would add that models and model results can also be dangerous tools in the hands of economists and analysts who are not modellers as well as in the hands of under-informed policy-makers. Modellers should talk to each other in scientific seminars where modelling strategies (especially in terms of data, behaviour parameters and policy representation as well as scenario definition and implementation) and simulation results should be discussed and confronted. Modellers should also talk to non-modeller economists, analysts and policy-makers in a non-technical and transparent way in order to minimise the risks of false interpretations of simulation results and erroneous policy conclusions.

In that context, it is particularly important to clearly identify the time horizon of simulation results. The long-term effects of reforms on multifunctionality, when all the variables can adjust (notably the number of farms, agricultural practices and production techniques) are likely to differ from short-term effects when primary factors of production and technologies are given. Agricultural policy reforms are likely to affect the provision of multifunctional agricultural goods in a variety of ways – some positive, some negative. They will produce an impact on multifunctionality as a result of composition, scale and technique effects. Accordingly, a clear description of the channels that are (or not) taken into account in analyses should be provided together with simulation results in order to enhance the usefulness of models and model results for agricultural policy.

References

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