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**The contribution of modeling tools to deal with the challenges  
of CAP policy evaluation**

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## The contribution of modeling tools to deal with the challenges of CAP policy evaluation

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### *Abstract*

*A very positive development in the last decade has been the increased interest of agricultural economists in ex post modeling.*

*So far however this has not resulted in a strong increase of the use of modeling for ex post CAP evaluation purposes.*

*It can be expected that the need for evidence based evaluation of the CAP, based on specific modeling tools for that purpose, will increase in the coming years. The more important role of the EU budget authority, the European Parliament, following the Lisbon Treaty is one of the driving factors of this increasing need.*

*The EU 2020 strategy shows a political shift from the market liberalization processes of the past decades aiming at efficiency, such as the Internal Market, towards policies promoting stability and equity. The recent economic crisis and climate change adds to this. The effect of this will be that CAP policies will have to be evaluated more from a holistic and European added value perspective.*

*In order to increase for the sake of good governance the role of ex post evaluation modeling, agricultural economists will succeed in providing and using excellent modeling tools if they are capable to formulate an agenda how to match their modeling tools in time with the substantially changing CAP and EU policies and their objectives.*

*Keywords: Modelling CAP evaluation*

*JEL classification:*

### **1. INTRODUCTION**

Regular evaluation of CAP policy measures involving spending is obligatory and this is clearly laid down in the EU Financial Regulation. Policy evaluation is a necessary part of good governance, an expression coined by the United Nations.

Good governance requires that taxpayers and their political representatives must be informed whether the spending that was authorized has been effective, efficient and relevant. This suggests that evaluation must be evidence-based.

But does this evidence-based requirement suggest a larger role for using modeling in ex post evaluations than it has today? And if yes: how has this increased role to be brought about as the type of modeling work for the evaluations<sup>1</sup> is different from the conventional use of modeling tools for forecasts and scenario analysis?

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<sup>1</sup> This is often referred to as ex post modeling. Ex post modeling in the case of the CAP is not meant to assess impacts of future policies as in the case of individual instruments of any Common Market Organization with respect to CAP and EU objectives. A model can assess the ex post impact of a CMO or CAP instrument or a group of instruments on the target variable or variables, by comparing alternative, counterfactual policy scenarios to the actual reference scenario. Thus we can e.g. find out that an instrument

The question how the evaluation evidence should look like is a very difficult one to answer. It depends on political values, political tools and methodological possibilities. Related to the latter EU regulation on evaluation includes sometimes precise amounts to be spend on the evaluation of measures to assure that the methodological effort of providing the evidence is corresponding with the spending involved.

Increasingly impact assessments are carried out in the EU as part of good governance, in particular to have better regulation and better measures. Evaluation can be regarded as ex post impact assessment. The increased need for evidence-based evaluations will raise the expectations on the quality of the methodologies used to generate the evidence which could require a larger role of ex post modeling.

Although several documents and supporting bodies inside and outside the EU provide guidance through rules, brochures, codes and frameworks on methodological possibilities to carry out evaluations the instruction whether or not to use modeling in ex post evaluations are not precise or binding. Modeling is mentioned as just one of the possible methodological tools in carrying out an evaluation.

How can policy evaluations of the CAP become more fruit bearing and light bearing with the help of modeling in the coming years? Which kind of modeling is needed and how can it be used in European Union evaluations. These are the questions that will be addressed in this short paper.

## **2. THE CHALLENGE OF EVIDENCE-BASED EVALUATIONS AND THE USE OF MODELS**

A straightforward way to point out the many difficulties to explain the challenges involved in the use of models to generate evidence for evaluation is an early evaluation in British India on the Cobra premium<sup>2</sup>. Given the perceived danger of cobras a special premium was introduced by the Governor of British India to be paid for every dead cobra. In terms of dead cobras this premium was a success. However, it turned out that citizens had started rearing cobras to receive the premium.

The point we want to make here is not the one of premium hunting and the occurrence of adverse effects. If modeling was to help the evaluation we should have a model capable of supporting the ex post analysis. If we would have such a model the question would be e.g.:

1. Can we use the model in the standard way or does it need particular adaptations and can these be available within a reasonable time?
2. Can the model, apart from the effectiveness of the policy, judge its relevance? How much is too much cobra's? Could the need of reducing the number of dangerous cobras have been addressed in another effective and efficient way without side effects?

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was indeed effective, or was less effective than others, or even was counter-effective in the actual, historical setting. We can also calculate what would have happened if the policies would have been different from what they actually were, would have been more intensive, less intensive or absent.

<sup>2</sup> H. Siebert, The Cobra-Effect, How to avoid mistakes in economic policy? (in German), Stuttgart-Munich, 2001, 11.

3. Are the evaluators themselves able to understand the technicalities of the model and able to run it? Do they, *ceteris paribus*, want to invest the extra methodological effort of using modeling if the precise use of modeling has not been specified precisely in the contract tender?
4. If we have a choice of models to be used: how can the evaluators evaluate the most suitable one? Is the choice of the model also part of the evidence that the evaluation has to provide?
5. Are we capable with the chosen model to deduct quantitatively negative policy effects from positive effects?
6. Are we really capable to generate the counterfactual situation<sup>3</sup> without premium? Or with half of the premium?
7. How do we deal with the uncertainty that we do not know what would have happened without premium? Given the danger: must not we assume that another measure would have been taken like moving households from dangerous places etc. [The fallacy of misplaced concreteness pointed out by Whitehead<sup>4</sup>]. Do we have the alternative policy measures in the model?
8. If there had not been ever a similar cobra plague before what is then the evidence on the value of the model parameters?
9. Are we capable to include all the impacts on objective variables of the premium? If the policy turned out to be lifting incomes and (partly) limiting the danger of cobras: can the model show the effects outside the directly intended effect of limiting the existence of cobras in the wild close to villages.
10. Are we capable of simulating alternative policies to solve the same problem?

These questions on the use of modeling in evaluations must be asked to maintain the quality of an evaluation as good governance requires. However, they clearly show the challenges and potential pitfalls in using modeling for ex post evaluations.

### **3. THE EFFORT TO STRENGTHEN MODELING IN EX POST EU EVALUATIONS OF THE CAP**

The large expert meeting on *Modeling for ex post CAP evaluations*, organized by DG AGRI of the European Commission on 1 July 2002 concluded that little use was made so far of modeling in ex post evaluations.

The expert meeting was based on a broad invitation to the community of agricultural economists and evaluators using models in Europe. It involved 24 specialized institutes from 12 countries and 20 relevant modeling efforts. Additional expertise was provided by a US

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<sup>3</sup> Counterfactual analysis is comparing a policy-on situation with a policy-off situation, or comparing alternative variants of the policy instruments to the actual ones.

<sup>4</sup> A.N. Whitehead, *Science and the Modern World*, New York, 1964.

economist (Pat Westhoff) involved in ex post evaluation work using the FAPRI modeling project.

Furthermore the conclusion of the experts was that in the rare cases that modeling was applied in ex post evaluations the added value in terms of a better analysis and more useful conclusions has certainly become clear. The same applied to experience outside the EU, in particular evaluations organized by USDA of Farm Bill measures<sup>5</sup>.

The experts also reached six other important conclusions:

1. The added value of using modeling in ex post evaluations applies to all components of the CAP: the first pillar (the meeting dealt in particular with market and income policies in the cereals, oilseeds and protein product sector as well as the beef sector), the second pillar (rural development) and the third pillar (as it was called at that time), environment.
2. The main reason why modeling had in fact been rarely used in EU ex post CAP evaluations was lying not only partly in the availability of suitable available models. However, the experts concluded that modeling tools regarding rural development and the environment were in shorter supply than agricultural market modeling tools. In fact one of the main objectives of the expert meeting was to produce a matrix of CAP policy measures to be evaluated ex post on the one hand and suitable models to analyze such measures on the other hand. An important other reason was that fitting in the modeling exercise in an evaluation contract of less than one year had turned to be prohibitive in practice apart from a single exception.
3. The experts recommended in their discussions to overcome the lack of suitable models by generating those by work in the EU Framework Programme of RTD and national research funding schemes. Alternatively and in addition it was recommend that the European Commission would, in addition to contracting evaluation studies on the CAP, would contract specific ex post modeling projects for main CAP Common Market Organizations (beef and COP) with a distinction to macro modeling (markets) and micro modeling (farm modeling).
4. In terms of missing pieces of modeling the need for modeling the agricultural sector in the total economy (multi-sector modeling) was pointed out, the need to include explicitly farmer's behavior (representative agent models), the need to integrate rural development and environment issues in first pillar models, and finally, given the frequent policy changes and the so-called Lucas Critique, the need for non-structural modeling (VAR, ARIMA).
5. The experts realized the political limitations of ex post modeling in view of the expected upcoming large reforms and the preference of policy makers for confronting CAP measures ex post with the counterfactual situation of the previous regime of measures

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<sup>5</sup> See e.g. W.Lin, Paul C.Westcott, R.Skinner, S.Sanford and D. De La Torre Ungarte, Supply Responses Under the 1996 Farm Act and Implications for the U.S. Field Crops Sector, *USDA Technical Bulletin 1888*.

rather than with the counterfactual situation of complete absence of the regime. However, for methodological reasons, the latter counterfactual would probably be easier to derive.

6. The agricultural economists being present and consulted as experts expressed their strong will to support a larger role for modeling in ex post evaluations.

All in all the large expert meeting of agricultural economists in 2002 raised expectations for a beneficial and larger role for modeling in ex post evaluations. In the next paragraph we will look at whether these expectations were met.

#### **4. EX POST MODELING FOR CAP EVALUATION: WHERE DO WE STAND?**

It is important to evaluate from the perspective of today the progress on the agenda on ex post modeling that was laid down in the conclusions of the 2002 expert meeting.

##### ***4.1. Use of modeling in CAP evaluations***

From 2002 until now the awareness of agricultural economists regarding the importance of modeling in ex post evaluations has increased. This conference is an excellent example of that phenomenon.

However, the use of ex post modeling in CAP evaluations in general seems not have increased. The use of modeling in evaluations, when it happens, is often related to forward analysis. Within the OECD the work using the purpose built evaluation modeling tool PEM can be regarded as one of the few exceptions, the same applies to the work of LEI on AGMEMOD, Face-it and FEM. The latter two modeling tools were used in the recent DG AGRI Evaluation of the measures related to the hops sector. A modeling tool focused on the division of feed demand was contracted by DG AGRI but it not yet clear whether the tool can definitely be used for ex post policy evaluation as e.g. the number of animals is not endogenous in this model.

However, the present ex post modeling work is rather partial and can be used for some of the evaluation questions, not as a tool to deal with the set of evaluation questions. This is not a criticism on the mentioned modeling efforts but highlights the challenges of using modeling tools in evaluation that we pointed out in the paragraph on the cobra killing measures.

##### ***4.2. Added value of ex post modeling***

As indicated above the support of the community of agricultural economists and contractors in pointing out the added value of modeling has remained strong. Economist and contractors have taken up the recommendation of the European Commission of the 2002 expert meeting to engage in evaluation modeling tools. In 2003 a large number of offers was received by DG AGRI answering calls for tender regarding ex post modeling tools for the beef and cereals sectors.

With the EU DG RTD research framework programme there has since 2002 been a clear increase of valuable projects on CAP policy evaluation tools including the extension with more countries of modeling efforts such as AGMEMOD and the development of policy evaluation



data. In practice, some of the modeling projects running under FP 6 and FP 7 are in fact frameworks of new indicators and data. These are very useful for a quantitative policy evaluation but not models in the strict sense of the words. Therefore their weakness seems to be the predefined mono-dimensional evaluation that comes with an indicator by indicator approach. The theoretical pitfalls of an indicator driven approach are well known and have been formalized in e.g. Goodheart's Law. The latter explains how indicators lose their information value once these are announced to be used for monitoring and policy decisions. Regarding the relative availability of modeling tools for evaluations in the first pillar compared to similar tools for evaluation ex post the impact on rural development and environmental parameters the situation is not easy to assess. However, the available information seems to indicate that the lower availability for these compared to the first pillar seems broadly unchanged with respect to 2002. In view of modulation and climate changes policies this fact seems inadequate.

#### ***4.3. Availability of suitable models***

Concerning the availability of suitable ex post modeling tools it is important to stress that the CAP reform of 2003, the accessions of 2004/2007, agflation and the economic crisis starting 2007, the Health Check and the EU 2020 Strategy have in fact changed substantially the suitability requirements of existing and future modeling efforts. When looking at European modeling efforts than on national ones the impression is that the modeling landscape has not changed that much in the last decade. This suggest that the match between the ongoing modeling efforts and the ex post evaluation could have become more challenging. The table below points out major new requirements and challenges for modeling for CAP evaluations:

Change of policy framework and objectives	Policy evaluation requirement
2003 Reform	Approach by sector rather than by farm etc. seems redundant as measures are less and less sector specific Policy impact of decoupled payment without re-coupling these Policy impact on competitiveness, innovation and environment (both positive and negative) Art.68,69 measures Structural analysis Modeling of market power and rents
Accessions	More regions to be covered, lack of data, existing model structures no longer valid, CNDP
Agflation and economic crisis	How do measures contribute to limiting volatility and financial and income stability
Exceptional market support measures	High frequent modeling and date needed Modeling of market chain
Health Check	Broadly in line with those of 2003 reform Relative impact and relation of pillar I and II measures
EU 2020 strategy	Modeling of rural poverty and smart growth Ex post impact on productivity Linking agricultural to other sectors, partial equilibrium models become rather obsolete Integrating regional, agricultural and social policies Ex post impact on efficiency, stability and equity

#### **4.4. Organizational barriers to ex post modeling**

The reform of the Financial Regulation in 2003 did not stimulate or bring about a substantial change of the duration of evaluation contracts with external contractors. The duration of most evaluation project of still about 9 months makes it difficult in practice to integrate enough time for ex post modeling development or adaptation and simulations. As increasingly the evaluations have to deal with 27 countries the lack of data in particular countries makes it often difficult to use a modeling approach as this can only be applied in most cases in a limited set of regions. Another organizational barrier is that ideally the ex post evaluation would be performed with the same modeling tool(s) used for the ex ante evaluation or impact assessment. As the latter are often produced without use of a modeling approach that can be used to answer ex post evaluations questions this issue forms in practice a barrier for applying ex post modeling.

#### **4.5. The missing modeling pieces for CAP evaluation**

As was pointed out before there were four missing modeling pieces for CAP evaluation in 2002. What happened on these missing pieces since?

It seems that the planned progress on multi-sector modeling for evaluations was in fact not realized or only partly. Analysis with partial equilibrium models prevail. This makes it difficult to evaluate e.g. agricultural income with other sectors. It also makes it difficult to show the transmission on e.g. environmental sector between sectors. However the cross-sector effects have become more important due to e.g. climate change and the economic crisis. It would also be very important to have a tool to demonstrate the impact of agflation on the rest of the income e.g. on CPI and on the short term and long term interest rate.

The general uses of representative agent modeling for agricultural evaluation purpose got an impulse by a specific call for tender by DG AGRI that was answered adequately by CIRAD. This strand of models has the advantage that it is able to simulate in a transparent way behavior, production choices and investment decisions of farmers. This is one of the shortcomings of the OECD Evaluation model PEM.

Regarding the integration of environmental and rural development in first pillar policy evaluation modeling tools e.g. the CAPRI model achieved clear progress. However, on the whole, for a number of reasons it seems as the integration of rural development and environmental impact in pillar one models has been limited to meet the requirements of the increasingly holistic approach to markets, rural development and the environment.

As for the recommended switch to greater use of non-structural models due to the frequent policy framework breaks and therefore limited number of observations to estimate or calibrate a structural model the situation is not completely clear. As for the European Commission this brand of modeling tools for ex post evaluation has very rarely been used in recent years and this seems in line with what can be derived from agricultural economic literature.

#### **4.6. Limitations of ex post modeling**

In view of the frequent and substantial reforms agricultural modelers and evaluators have generally not been keen to use the policy-off approach in their counterfactual ex post analysis of the CAP. This means that they have generally looked through marginal analysis at the ex post effect of decoupling rather than comparing the remaining coupled payment with a policy-off situation or comparing the decoupled payments with a situation without decoupled payments. It is questionable whether, in view of the large impact delays and expectation effects a marginal approach is able to assess properly ex post the impact of measures. The same applies to the approaches in which decoupled payments are made coupled in the model in order not to leave out the overall support to income and profits. This is related to the fact that, when marginal effects e.g. of decoupling take place in different sectors and different paces at the same time the effect of a measure in one sector cannot be separated easily from the indirect effect of other measures in related sector. The assumed own and cross elasticity's can become little informative.

### **5. OUTLOOK**

A very positive development in the last decade has been the increased interest of agricultural economists in ex post modeling.

So far however this has not resulted in a strongly increase of the use of modeling for ex post CAP evaluation purposes.

It can be expected that the need for evidence based evaluation of the CAP based on specific modeling tools for that purpose will increase in the coming years. The more important role of the EU budget authority, the European Parliament, following the Lisbon Treaty is one of the driving factors of this increasing need.

The EU 2020 strategy shows a political shift from the market liberalization processes of the past decades aiming at efficiency, such as the Internal Market, towards policies promoting stability and equity. The recent economic crisis and climate change adds to this. The effect of this will be that CAP policies will have to be evaluated more from a holistic and European added value perspective.

In order to increase as required for good governance reasons the role of ex post evaluation modeling agricultural economists will succeed in providing and using excellent modeling tools if they are capable to formulate an agenda how to match their modeling tools in time with the substantially changing CAP and EU policies and objectives.