

# The challenges of model based policy advice

## Herausforderungen bei der modellgestützten Politikberatung

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### Abstract

In policy consultation, communicating model results to administration and policy makers has always proven to be a challenge for scientists. Many of the relevant preconditions for effective and successful policy advice are aggravated when results are based on the simultaneous use of a multitude of different models. This paper identifies key issues – e.g., relations to administration; correct identification of prevailing objectives of all agents involved; ability to run scenarios ‘in time’ - and discusses strategies for successful communication based on the experiences of the vTI model network. Specific attention is paid to the issue of communicating ‘conflicting’ results of different models: while often seen as a source for scientific insight, such ‘inconsistencies’ have proven to be a major obstacle for acceptance in a non-academic institutional setting. The experiences, as well as the literature, point specifically to the importance of tight linkages between modellers and policy makers, and the need to abandon decisionist or technocratic approaches of policy advice in favour of pragmatic approaches stressing the bilateral nature of communication.

### Key words

model network; policy advice

### Zusammenfassung

In der Politikberatung stellt die Kommunikation von Modellergebnissen seit jeher eine besondere Herausforderung für Wissenschaftler dar. Dies gilt umso mehr, wenn die wissenschaftliche Ergebnisse auf dem simultanen Einsatz mehrerer Modelle beruhen. Aufbauend auf den Erfahrungen des vTI-Modellverbunds thematisiert dieser Artikel verschiedene Aspekte und Strategien für eine erfolgreiche Politikberatung. Besondere Aufmerksamkeit wird der Kommunikation divergierender Modellergebnisse gewidmet: Während solche Differenzen in der wissenschaftlichen Gemeinde oft als Quelle von Erkenntnisgewinn gesehen werden, führen derartige ‚Inkonsistenzen‘ oft zu einer erheblichen Akzeptanzminderung bei nicht-wissenschaftlichen Zielgruppen. Sowohl die eigenen als auch die Erfahrungen anderer Modellgruppen und Autoren zeigen die große Bedeutung auf, die der Gestaltung der Beziehungen zwischen den Modellierern und der zu beratenden Zielgruppe zukommt. Der Umsetzung und Weiterentwicklung pragmatistischer Modelle der Politikberatung, die die bilateralen und iterativen Eigenschaften des Kommunikationsprozesses betonen, sollte in der modellbasierter Politikberatung noch stärkere Aufmerksamkeit gewidmet werden.

### Schlüsselwörter

Modellverbund; Politikberatung

## 1. Introduction

In policy consultation<sup>1</sup>, communicating model results to administration and policy makers has always proven to be a

<sup>1</sup> ‘Policy advice’ is a widely-used but only loosely defined term, and exists in many different settings. In the literature, some authors distinguish ‘policy advice’ (referring to advice given by scientific experts) and ‘policy consultation’ (referring to strategic-communicative advice given during the policy process, e.g. election campaigns), though the boundaries between the two terms are often blurred in practice (FALK et al., 2006). We use the two terms interchangeably in this paper.

challenge for scientists. Many of the relevant preconditions for effective and successful policy advice are aggravated when results are based on the simultaneous use of a multitude of different models. This paper identifies key issues and discusses strategies for successful communication based on the experiences of the vTI (Johann Heinrich von Thünen-Institut, formerly known as FAL) model network in agricultural policy consultation.

Chapter 2 presents a short overview of prominent examples for model-based policy assessments in agriculture, as well as the institutional setting and models of the vTI modelling network. It provides the background for a subsequent discussion of the different aspects and challenges of model-based policy advice in chapter 3. Specific attention is paid to the availability of results, relations to administration and scientific community, and the issue of communicating ‘conflicting’ results of different models. Chapter 4 concludes with a reflection of the transferability of the lessons learned from the experiences of the vTI modelling network to other settings.

## 2. Model based policy advice in agriculture

Model supported policy consultations have a long tradition in the area of economic policy. They go back to the work of Tinbergen who in 1936 developed and used a general equilibrium model to work out projections for the economic development in The Netherlands, on the basis of which multi-annual business plans were prepared by the government.

### 2.1 Examples of model based policy advice in agriculture

In the area of the agricultural sector, model supported policy assessments were introduced in the U.S. in the Eighties and since then play an increasingly important role in many countries and especially within international organisations:

- FAPRI (Food and Agricultural Policy Research Institute) was built up in 1984 based on financial resources from the U.S. Congress. It uses comprehensive data and computer modelling systems to analyze the complex economic interrelationships of the food and agriculture industry (WAILES, 2005). It prepares baseline projections each year for the U.S. agricultural sector and international commodity markets (Outlooks), which provide a starting point for evaluating and comparing scenarios (FAPRI, 2008). These projections are intended for use by farmers, government agencies and officials, agribusinesses, and others who do medium-range and long-term planning.
- While FAPRI work is oriented to policy consultation of the legislative branch (Congress), the USDA is mainly directed to the executive side. It works out agricultural baseline projections for the farm sector for the next 10 years (USDA, 2008). Supply and demand projections de-

veloped during the interagency process play a key role in developing farm income and food price forecasts, and are used as a starting point for analysis supporting short and long term policy decisions. The baseline is also used to develop cost estimates for the President's budget and to analyze impacts of alternative policy scenarios.

- Independent economic research analysis and forecasting is also undertaken by ABARE<sup>2</sup> (The Australian Bureau of Agricultural and Resource Economics). It uses econometric models derived from the OECD model AgLink and GTAP based CGE models. Analysis focuses on medium term baseline projections of Australia, quantitative support for analysis of domestic policies in the U.S. and the EU, global trade policies of economic shocks on commodity markets and trade and impacts of changes on supply or demand on commodity markets and trade.
- The OECD, together with the FAO works out annual "Outlooks," which are carried out with model analyses by the OECD model AgLink and the FAO model Cosimo, together with expert opinions from the member countries (OECD-FAO, 2007). Although not formally involved in policy decision-making processes, this work is frequently used as a reference for political decisions at the level of the member countries. Additionally, the GTAP model is employed at the OECD to analyse economy-wide impacts.
- The EU-Commission undertakes in-house model analysis with regard to policy impacts and periodically publishes them as 'Prospects for agricultural markets and income' (EUROPEAN COMMISSION, 2008). The market projections are essentially based on the models ESIM (vegetable products) and AgLink (animal products), while since last year the model CAPRI is used for complementary regional differentiated analyses. Price trends are lacking in the projections such that the results cannot be used directly for further modelling work. External model analyses are frequently commissioned for specific policies, e.g., with regard to the Agenda 2000 (Institute for Food and Resource Policy, University of Bonn, Centre for World Food Studies, Amsterdam), the Mid-Term Review (Institute for Food and Resource Policy, University of Bonn; Institute National de la Recherche Agronomique (INRA); Wageningen Agricultural University) and the Health Check (Industrial Economic Institute, Toulouse). In future, this work will be partly realised by the inter-service group, IPTS (Institute for Prospective Technological Studies, Seville), which has been establishing modelling capacities and tools for a few years.

Modelling groups were also established in research centres of ministries or other institutions in some EU member states, e.g., vTI, LEI (the Agricultural Economics Research Institute in The Netherlands), FOI (the Institute of Food and Resource Economics in Denmark) and TEAGASC (the Irish Agriculture and Food Development Authority). TEAGASC, for example, works out baseline projections together with FAPRI (BINFIELD et al., 2008). The vTI, LEI and FOI participate in the projections realised by the AGMEMOD consortium (Salamon et al., in this issue), which in turn are also related to the FAPRI projections. Furthermore, vTI, LEI, FOI and ABARE are, together with

the OECD, the EU Commission and other national and international organisations, involved in the GTAP consortium to support global economic analysis.

The above mentioned modelling activities can be summarised as follows:

- They are either involved in policy formulation for the executive branches of government or sometimes for the legislative branches, and extend beyond to the public.
- Models focus on specific questions (e.g., commodity markets, policies, ...), but are also complementarily used for baseline projections, embedded in international networks of experts providing special knowledge and local experiences.

## 2.2 The vTI model network

The vTI modelling group arose from the need of the German Ministry of Food, Agriculture and Consumer Protection for differentiated policy assessments as a basis for the political decision making on the one hand, and from the interest of the economic institutes of the vTI in methodical development of quantitative models, and their use for model-based policy advice, on the other (BERTELSMEIER et al., 2003). The work is based on the principles of a) selection of models to be appropriate for the underlying subject, b) combining models of different scope and scale, c) the interactive use of models for the calibration of models and consistency check of scenarios, and d) the use of synergies between models and experts as far as possible.

At present, the following models are available and being used (figure 1):

- GTAP is a global general equilibrium model which provides an elaborate representation of the economies including the linkages between farming, agribusiness, industrial and service sectors of the economy.
- The partial equilibrium model AGMEMOD consists of a system of econometrically estimated partial equilibrium models of the member states of the EU. Both models are operated under the leadership of the Institute of Market Analysis and Agricultural Trade Policy.
- The regional agricultural and environmental information system RAUMIS covers the whole agricultural sector of Germany on the basis of so-called 'regional farms'; the model is operated by the Institute of Rural Studies.
- FARMIS, a comparative-static farm group model, represents agricultural sectors by homogeneous farm groups. It provides detailed differentiation of activities and farm characteristics, taking into consideration the competition between farms for important agricultural factor markets such as land and quota, and with regard to questions of structural change. The model can be operated on the data basis of the German national FADN, as well as for selected EU member states based on EU-FADN.

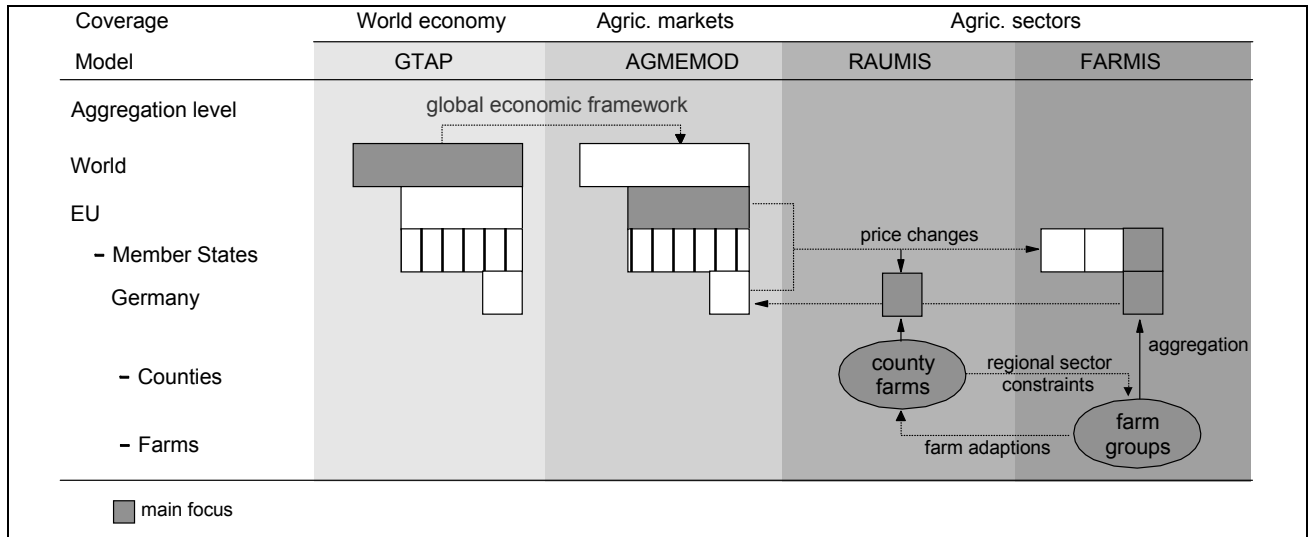
Until now, the models were not formally coupled with each other; rather, their run is coordinated within an iterative process.

## 3. Challenges of policy advice

Generally, model based policy advice involves three main actors, namely the modeler's institution, the client and academia or the general public (compare figure 2). The

<sup>2</sup> For details see [http://www.abareconomics.com/publications\\_html/models/models/models.html](http://www.abareconomics.com/publications_html/models/models/models.html).

**Figure 1. vTI network of complementary models**



Source: own presentation

modeler's institution (e.g., private or public) is most often represented by a research institute based outside or inside an university, but could also be an in-house branch of the client's institution. The clients comprise politicians (e.g., political administration or actual policy makers) as well as stakeholders, whereas academia and the general public stand for all other research outside the modeler's institution. The relationship between these actors might be a one time project, but could also be established on a continuous institutional basis. Within the phases of the policy cycle (problem recognition, agenda setting, policy formulation, decision making, policy implementation, policy evaluation) different combinations of these institutions are possible that influence the interaction and the role models can play within the process.

The interaction between the modeler's institution and the general public is marked by an exchange of scientific information. On the one hand, scientific progress developed by the modeler's institution for the prevailing project diffuses into academia. While the scientific progress of academics is, on the other hand, a rich source of knowledge needed for the successful completion of projects. Additionally, academic criticism in the form of scientific committees attached to the modeler's institution, peer reviews of journal

articles related to the project or discussion of project's work at conferences are valuable inputs to the project. Based on these activities a successful modeler's institution is able to build an academic reputation that is forwarded to the clients and essential to stay in the policy advice business. The most important relationship for the model based policy advice is, however, the interaction between the client and the modeler's institution, which will be described in more detail in the following sections.

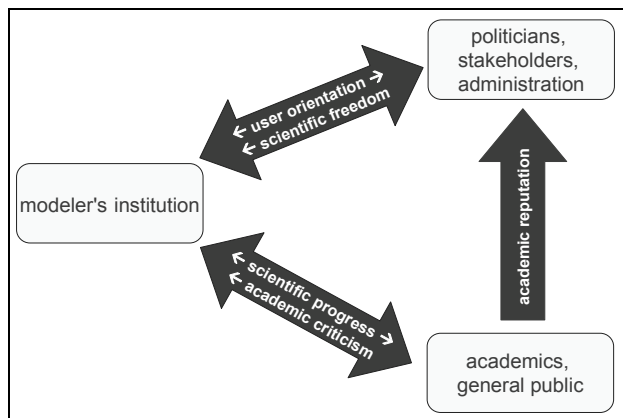
### 3.1 Acceptance

A key precondition for successful model-based policy advice is the general willingness of users to accept model results. To a large extent this receptiveness of users can be positively influenced by consequently considering the end users' needs in all stages of the modelling exercise, a tailored communication of results, and, as part of long-term strategies, an appropriate design and elaboration of the institutional and personal relations between modellers, administration and the scientific community.

#### 3.1.1 User orientation

A problem often faced by scientists new to the area of model-based policy advice is that to policy makers / administration, the delivered results are often little more than an 'academic exercise' in the derogatory sense, i.e., while not completely useless, the results fall short of the policy relevant issues and are thus perceived to be not 'usable'. It is therefore essential to correctly identify the central questions of the target group and design the model analysis accordingly. A key concern of policy makers is the feasibility of reaching political consensus when different potential policy alternatives are discussed (BRITZ, 1994). Welfare impacts and efficiency aspects - the typical economist's obsession - therefore constitute only a small part of the information needs. The analysis should also strive to cover, e.g., distributional aspects, financial / budgetary viability, feasibility of implementation (manageability), and, important for Common Agricultural Policy (CAP) analyses, the negotiating positions of other EU member states. The relative relevance of these individual aspects is generally de-

**Figure 2. Interaction in model based policy advice**



Source: own presentation

pendent on which stage of the policy process the model-based analysis is contributing to (see 2.1). In addition, an understanding of the existing administrative settings and procedures can be crucial in correctly identifying the information needs of the target group<sup>3</sup>. This is facilitated if modellers have experience with or insight into the respective administrative organisation (see below, 3.1.3).

Joint discussions of assumptions and scenarios by modellers and contact persons in the political administration are standard procedure in vTI model-based policy advice, and help to identify the key questions early in the modelling process, preventing both misdirected modelling efforts as well as precluding disappointments by policy makers about the type of possible model output. The baselines are generally central to policy assessments as they form the reference against which the impacts of alternative policies or shocks are measured. The regular generation of a consistent and accepted baseline scenario is therefore an iterative, 'participatory' exercise that forms one important strategy practiced by many institutions for establishing acceptance of model results. Maintaining a model network, i.e., an appropriate and accepted mix of models which is able to cover a large range of different aspects relevant for policy makers, has, at least in the experience of the vTI involvement in model-based policy advice, been indispensable for providing 'useful' results.

### 3.1.2 Availability

A precondition for a successful user orientation is the availability of model results within a reasonable time period. This, however, can not be achieved, when the model framework needs to be developed from scratch for each project. Rather it requires an appropriate technological infrastructure that includes a suitable mix of models (e.g., a model network, consisting of models for different scopes), a comprehensive access to different data bases (e.g., FADN, COMTRADE, TRAINS) and a knowledgeable staff which is able to mix these ingredients to form a sophisticated project. Once the technological infrastructure is developed it nevertheless needs continuous regular maintenance. Essential is here the update of the data base and model structure to anticipate economic and technical development of the considered sectors. Furthermore, the availability is also strongly supported through the regular generation of a consistent and accepted baseline scenario as mentioned above. Many of these preparatory and maintenance tasks yield little scientific glory. This and the fact that staff turnover is often high at universities explain why model-based policy advice is dominated by institutions with respective government funding or established within long-term research grants (e.g., FAPRI) which allow the establishment of a core group of permanent staff.<sup>4</sup>

### 3.1.3 Relations to administration

The (personal) relations between the modelling group and the political administration are of essential importance for

the success or failure of the process of model-based policy advice. Mutual trust is the central precondition:

- The administration must be able to rely on the strict confidentiality of the communication during the process of policy advice, which may also possibly lead to a delayed publication. Missing trust will impede any serious engagement of policy makers in the bilateral process of policy advice.
- For the modellers, trust encompasses the assurance that policy makers will not try to influence their analyses, and that, after an agreed-upon time, publication of results is possible. Missing trust will negatively affect scientific incentive as well as scientific reputation.

Communication is facilitated by model(ing) knowledge of contact persons in the political administration, and also by administrative and institutional knowledge of the modellers (DEN BUTTER and MORGAN, 1998). The establishment of the respective know-how, as well as of mutual trust, will generally be easier to achieve if the institutional setting allows for long term, continuous co-operation of model team and political administration. Mobility of personnel across the groups is also helpful; however large differences with respect to the permeability of institutional boundaries exist in different countries and organisations. In this respect, it is noticeable that the (temporary) deployment of scientists to the administration is significantly more common than the other way round, though some institutions or modelling teams increasingly offer regular training sessions or similar to administration personnel to ensure a continuous transfer of model(ing) knowledge.

## 3.2 Communication

In practical policy consultation, communicating model results to administration and policy makers has always proved to be a challenge for scientists. The requirements for successful communication differ fundamentally from those in the scientific arena (see the article by A. Burrell in this issue). Based on the experiences of the vTI model network, the following issues can be identified as being essential for tailoring the communication of model results to this specific target group:

- presentation of results should be result- and not model-oriented
- cause-effect relationships need to be explained for non-modellers
- where available, additional expert-based analyses should be embedded in the model analysis
- stability of results should be underpinned with sensitivity analyses

Specific attention needs to be paid to the issue of communicating 'conflicting' results of different models: while often seen as a source for scientific insight, such 'inconsistencies' have proven to be a major obstacle for acceptance in a non-academic institutional setting. A continuous, i.e., not project- or study-related, dialogue with discussing the scope and differences between the various models and their results with the contact persons in the ministry administration is an important part of any strategy to reduce potential frictions, and is facilitated in the case of the vTI modelling network by the long-term, institutional nature of the model-based policy advice activities. In addition, specific care

<sup>3</sup> KROPP et al. (2007) identify „a lack of insight into the administrative policy process“ as a key cause for disappointments with scientific policy advice in agriculture in Germany.

<sup>4</sup> Though notable exceptions exist (e.g. the Institute for Food and Resource Policy at the University of Bonn).

needs to be paid to the *presentation* of divergent results, an aspect which is often neglected in scientific policy advice. As far as possible, this problem should be resolved within the modelling group through the harmonisation of models (scope and scale), scenarios and key parameters. The consistency of model results has to be proven for common indicators (e.g., sector accounts). A typical ‘mistake’ in the presentation of results from a multi-model analysis is the sequential presentation of divergent individual model outcomes, which is a classical example of where results may be ‘not usable’ for policy makers. In the best case it will require a lot of subsequent supplementary explanation, whereas in the worst case it can reduce acceptance for overall model results considerably. To be clear: we don’t argue for the suppression of any information. Strict adherence to good scientific practice is essential to maintain one’s reputation and thus ultimately to be awarded acceptance. However, divergent results should only be presented if they convey information. If the reliability of different model outcomes for a specific indicator can be clearly ranked, e.g., if one model cannot fully represent an important policy instrument influencing this indicator, then constraining the communication to the relevant model results is preferable (even though for a scientific audience, as well as for the modellers, the discussion of the model shortcomings and potential methodological remedies is more interesting). If no clear comparative advantage of the models can be established with respect to the divergent results, then it is better to give ranges for the outcome of the respective indicator rather than to present a series of seemingly conflicting ‘point estimates’. Thus, the uncertainty related to this particular result can be illustrated in a way more easy to digest. In this case, it is particularly important to convey a ‘usable’ message. E.g., if the range of model results indicates that the respective indicator may possibly not develop in accordance with policy objectives, recommendations could include a continuous monitoring of the actual developments, and the anticipatory design of suitable policy measures.

To sum up, successfully overcoming the challenges of communicating conflicting model results means that “The relative relevance of the various theories has to be judged and the different outcomes have to be framed in one encompassing story, which is different from an encompassing model.” (DEN BUTTER and MORGAN, 1998).

#### 4. Conclusions

The strategies for successful model-based-policy advice discussed in this paper are based on the experiences of the vTI modelling network, and they must be reflected in this context. As the short overview of model-based-policy assessments in agriculture shows, many different successful institutional arrangements exist. This highlights that while the design of the organisational set-up is important, no single successful model can be identified. However, “while the specific structure may not matter, the way that it is used does” (DEN BUTTER and MORGAN, 1998), and we thus argue that many of the aspects discussed above relating to the design of the *process* of model-based policy advice can be transferred to other institutional settings and countries. The experiences, as well as the literature, point specifically to the importance of tight linkages between modellers and policy makers, which in practice deserve more attention. In

model-based policy advice, the abandonment of decisionist or technocratic approaches<sup>5</sup> of policy advice in favour of pragmatic approaches stressing the bilateral nature of communication is the way forward.

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<sup>5</sup> Which still dominate many areas of policy advice in Germany (LOMPE, 2006).