

# OECD Agricultural Outlook and Its Baseline Process using AGLINK model

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## Introduction

*The OECD Agricultural Outlook* is published annually during first half of the year. It provides a medium term assessment of future trends and prospects of markets for the main temperate zone agricultural products traded by OECD countries. It consists a part of continuing effort to promote informed discussion of emerging policy issues and to provide a yardstick for the analysis of policy options.

The sixth edition of the Outlook was completed this year on April 25. It contains projections to 2005, which constitute a medium-term future for the markets of these key commodities. under certain assumptions such as normal weather and constant policy. The OECD's AGLINK model is used to generate these projections.

AGLINK is a dynamic supply-demand model of world agriculture, developed by the OECD Secretariat in close co-operation with Member countries. The overall design of the model focuses particular attention to the potential influence of agricultural policy on agricultural markets in medium term. This design enables the use of AGLINK in analysing various policy options, such as the effects of the Berlin Agreement on further CAP reforms, or extended implementation of reforms under the Uruguay Round Agreement on Agriculture, so that the impact of options for reform can be evaluated by comparing the results of these scenarios with the baseline.

A CD-ROM, which contains the comprehensive results of this baseline and scenario projections, in conjunction with the historical database, is made available at the time of the publication.

## History

The development of a multi-country and commodity model in OECD goes back to the Ministerial Trade Mandate(MTM) model, for which the ministers mandated the OECD agricultural directorate to develop a model which facilitates "an analysis of the approaches and methods for a balanced and gradual reduction of protection"(Ministerial Council, 1982).

In 1987, a baseline projection generated by the MTM model and the result of the scenario analyses of balanced and gradual reductions of protection for agriculture were published. The model was comparative static in nature in that it measured the impact of a policy shock over a five-year period, but ignored the path of adjustment during the intervening period.

In late 1980s, OECD Member countries were increasingly aware of the limitations of the MTM model. In 1989, the development of AGLINK model was launched. They demanded that the model be dynamic, so that the path of adjustment could be analysed, and policy-specific, to address the concerns and questions of decision-makers.

In 1995, the new annual report, *The OECD Agricultural Outlook*, which provided a medium term assessment of future trends and prospects of world agricultural market was published. In this report, the AGLINK model was used for generating the projections. Since then, the reports are published annually in the first half of each year.

The size and coverage of AGLINK has been increasing. The Secretariat of the OECD and co-operating member states have made improvements in terms of coverage and quality of the Outlook. Scenario analysis, which shows the result of the projections under different assumptions on exogenous variables such as policies and macroeconomic variables, has been undertaken in addition to baseline. These analyses make it possible to evaluate the possible impact of policy changes, both in terms of medium term effects and the intervening path of adjustment.

## **Outlook process**

An important aspect of the outlook is the interactive process between Member countries and the OECD secretariat.

The starting point of the outlook process is an annual questionnaire circulated by the Secretariat at the beginning of the year to each member country. Through these questionnaires, the Secretariat obtains information from Member countries on future national market developments and on the evolution of agricultural policies. In other words, each Member country's questionnaire response provides a starting point for the OECD projections, based on certain assumptions regarding policies and world market prices. This information is supplemented by that obtained from other sources, such as the Food and Agriculture Organisation (FAO) of the United Nations, the World Bank or the International Monetary Fund (IMF), to establish a view of the main forces determining market developments in the non-OECD area. This part of the process is aimed at creating a first insight into possible market developments and at establishing the key assumptions which condition the outlook.

As a second step, the AGLINK model is used to integrate this information and to derive an initial set of global market projections (baseline). The individual national market projections are linked so that they interact directly through their trade in agricultural products. The final solution will be consistent across Member countries in that world and national markets will clear for the final prices. As a consequence of this second step, of course, AGLINK market projections for individual countries will differ from the original survey responses to the extent that Member countries' original world market price assumptions differ from the final prices of the Outlook.

During the second step, the baseline results are compared with those obtained from the questionnaire replies and Member countries are consulted. Significant differences are discussed in bilateral exchanges with Member countries or multilateral exchanges among them through Electric Discussion Group (EDG). Frequently, such discussions result in adjustments to the initial questionnaire response in terms of assumptions or projections. On the basis of the questionnaire response as supplemented by these discussions and of updated information, an initial baseline is produced.

Formal meetings in January of each year offer an opportunity to assess the initial Outlook for cereals, oilseeds and livestock products. The Group on Cereals, Animal Feeds and Sugar and the Group on Meat and Dairy Products of the OECD Committee for Agriculture offer a forum in which the outlook projections can be discussed and Member countries' assumptions subject to review. In addition to the preliminary Outlook these Groups are also responsible for reviewing initial drafts of analyses which will later be summarised as boxes or sections in the final outlook.

Subsequent to the meetings of the Commodity Working Groups and final data revisions, a revised baseline is produced. The revised projections form the basis of the outlook publication, which is discussed by the Working Party on Agricultural Policies and Markets of the Committee for Agriculture. Other components of the Outlook document, specifically scenario analyses, are

also discussed again at this time. It is largely the material of this meeting which will appear as the final Outlook document, which is usually released to the public in April.

The procedure implies that the projections presented in the Outlook report are heavily conditioned by those expressed by Member country questionnaire response. It also reconciles inconsistencies between individual Member country projections through the use of a formal modelling framework and highlights the sensitivity of the outcomes to key assumptions. The review process ensures that the judgement of Member country experts is applied to the projections and related analysis. However, the final responsibility for the projections and their interpretation rests with the OECD Secretariat.

## **Model structure**

AGLINK is a dynamic supply-demand model of world agriculture, developed by the OECD Secretariat in close co-operation with Member countries. It represents annual supply, demand and prices for the principal agricultural commodities produced, consumed and traded in Member countries. The overall design of the model focuses particular attention to the potential influence of agricultural policy on agricultural markets in the medium term. Development on the basis of agricultural economic literature, existing Member country models and on bilateral reviews has resulted in a model specification that reflects the views of participating Member countries, subject to constraints which required to ensure that the process can be managed.

AGLINK is a partial equilibrium model, primarily of major OECD commodity markets. The commodities covered at least in countries where of importance are wheat, coarse grains, rice, oilseeds, oilseed meals and oils, key dairy products, milk, beef, pork and poultry meats. Sheepmeat and eggs are less common. In major OECD and certain non-OECD markets, AGLINK estimates supply, demand and prices. Non-agricultural sectors are not modelled, and are treated as exogenously to the model. AGLINK does not take into account feedback to the macro-economy. This may be particularly important for some "Rest of World" countries which are not explicitly modelled in which agriculture is often a significant part of the domestic economy.

The model consists of complete modules for ten OECD countries/regions - - Australia, Canada, the European Union, Hungary, Japan, Korea, Mexico, New Zealand, Poland and the United States of America, as well as three non-OECD countries/regions - - Argentina, China and the Rest of the World. The rest of the OECD, the countries of the former USSR and Slovakia are considered exogenous to AGLINK.

The scope and nature of the linkage among each module depend on the specific commodity. For cereals, oilseeds and dairy products, all above thirteen modules interact with each other through world markets for what are assumed to be relatively homogeneous products. For red meats, AGLINK is based on a segmented market approach. In the foot and mouth disease free beef market, Australia, Canada, Japan, Korea, Mexico, New Zealand, the United States, Hong Kong, Singapore and Chinese Taipei are included. The second beef market concerns with Mercosur countries; Argentina, Brazil, Chile, Paraguay and Uruguay. Finally, the European Union forms a third beef market in AGLINK which interacts with the Mercosur market only to a limited extent, due to both the EU beef export regime and the differences of EU meat exports in terms of destinations and quality. Of course, such disaggregation of the beef market may be called into question if the traditional divisions become blurred by the increases in trade from Mercosur into the foot and mouth disease free zone.

Three pigmeat markets are also included in AGLINK; North Pacific(Canada, Japan, Korea, Mexico, the United States and Chinese Taipei), Oceania(Australia and New Zealand) and the

European Union with some trade to East Europe. However, the distinctions in the pork market are less binding as, for example, a portion of EU exports are shipped into the North Pacific market. Pork is deemed a more homogeneous good than beef. In the Rest of the World component, pork is included in the non-ruminant sector and beef is not available.

The functional relationships linking supply and demand to prices in AGLINK are in most cases linear in the logarithms of the variables. Equation coefficients are partial elasticities, many of which come from, or are based on, models currently in use in Member countries. Some are the result of econometric analysis initiated by the secretariat, through consultants or by Secretariat staff.

Illustrating briefly the structure of supply and demand specifications for the crop functions, crop production is expressed as the product of area harvested and yield per unit area. Area harvested and yield are represented separately and each may be influenced by relative prices and government policy variables. Competition among alternative crops for land is represented in the model by cross-price effects in the area equations. Prices appear in only a few yield equations in the model. Where yields are endogenous, they are usually represented as simple functions of time trend variables which proxy technical change. For food demand, each equation links quantity demanded to price, consumer income and population. Feed demand for cereals and oilseed meal is determined in AGLINK within system of feed expenditure and expenditure share equations undertaken within the Secretariat. Total feed expenditure in a country or region is modelled as a function of that country's livestock production. This total is then allocated to wheat, coarse grains and oilseed meal on the basis of their relative prices.

AGLINK simulates market determination of equilibrium prices for most of its commodities on the level of world trade and, where appropriate, for internal markets as well. For these commodities, it is assumed that world market prices must adjust to equate total exports and total imports. Often, where a country's policy dictates, an internal market-clearing price equates total demand, including carry-over, and total supply, including carry-in. Policy parameters may influence demand, through stocks or exports, or supply, through imports or production. More frequently, however, internal prices are a function of either the world price, adjusted for exchange rates and any tariffs, or a policy price if one applies. Clearly, the former method is chosen where the market is open to trade.

Trade for each country by commodity pairing is given one of three possible treatments. Obviously, the level of imports or exports, either bilateral or in total, can be set exogenously. This may be the case, for example, where a trade quota or an access agreement applies or the level is extremely small. In a few other cases certain bilateral trade links are reflected, for example, poultry trade between the United states and Canada. Finally, and almost commonly, trade is the residual of a supply-utilisation identity equation. It is this last case which corresponds to linking internal prices to either world market prices or policy prices.

It is not the aim of this paper to go into details of the specification in the equations of each sector. However, it would be worth mentioning that such specific characteristics of agricultural markets (i.e. lagged response of producers to prices, interaction between livestock production and feed costs, joint product relationships in oilseed-meal-oil complex and dairy products), are taken into account in the specifications.

Finally, the current AGLINK model contains 3425 variables, of which 1606 are endogenous and 1819 are exogenous. The model is operated using software systems; SORITEC and SIMPC.

## Overview of the Agricultural Outlook 2000-2005

The Agricultural Outlook 2000-2005 is forecasting that the agricultural markets will recover gradually from a cyclical trough that has seen the value of many commodities reduced to historic lows in the past two years. But the recovery will be modest in the early years of the Outlook, and real inflation-weighted prices will continue their long-term decline at a slowing rate (Table 1).

The main factor driving the recovery will be the strengthening demand for farm products as the global economy recovers from the economic and financial shocks of the past two years. Strong economic growth is forecast for the OECD area and sustained recovery in South east Asia.

While markets adjust to lower prices, OECD farm production will stagnate in the near term but quicken later as price prospects improve. Developing countries will account for more of the expected growth in global output in the next 5 years. However, yields and productivity improvements will play a far larger part than acreage increase due to land and water constraints in developing countries.

Food quality and safety, animal welfare and the environment are the some of the key issues and uncertainties of agricultural markets that are coming under more intense public scrutiny. Of course, the next round of trade negotiations may invalidate the routine Outlook assumption of current policy. The Outlook assumption of normal weather (implying normal yields) is never expected to hold true. The projections serve as a useful benchmark for policy analysis, but must be understood in that context rather than interpreted as the OECD's predictions of future market evolutions.

In this year's Outlook, scenario analyses are shown. Two of these address particularly important policies which will affect world agricultural markets in the course of the Outlook. The first of these estimates the effects of the European Union's Agenda 2000-Berlin Agreement reforms of the common agricultural policy reform package and another for the second analysis focuses on the implications of the USA loan deficiency payments on oilseeds.

For the Agenda 2000, the reform package can be summarised as continuing the shift from support prices to direct payments as, for cereals, dairy products and beef the support prices are reduced at some stage and compensating direct payments are raised or introduced. In the case of oilseeds, for which no support price exists, direct payments are reduced to the level of cereal direct payments. While most of these reforms begin in 2000, the dairy policy changes do not begin until 2005, apart from half of the agreed milk production quota increase which is introduced earlier. To understand the consequence of the Berlin agreement, we created a counter-factual baseline in which past policies (as determined by the 1992 CAP reform) remain operational to 2005. These projections are then compared with the Outlook. Hence, the analysis identifies the implications of the Berlin Agreement for EU and world commodity markets.

The results of the Berlin agreement analysis are presented as a special section in the Outlook. The lower oilseed direct payments than those under a counter-factual extension of the prior regime have a greater impact on producer planting decisions than the lower cereal prices which, again, are partially offset by direct payments. Thus, land is re-allocated from oilseeds to cereals (Table 2). The lower wheat price in the European Union and the projected increase in world wheat prices, particularly denominated in Euro, allow unsubsidised EU wheat exports to start by the end of the period. Consequently, small wheat intervention stocks are depleted by the end of the Outlook. On the other hand, coarse grain unsubsidised exports are not expected during the Outlook under either policy regime, so intervention stocks become large, although the lower support price of Agenda 2000 does slow the pace of this build-up. Oilseed imports increase due to

the decreased internal production which follows from the area re-allocation mentioned above. For beef, lower market prices are not fully offset by higher direct payments, thus the net impact on returns to producers is negative. However, the majority of beef production is a by-product of the dairy industry, for which there is little change in policy prior to 2005. Indeed, the only change in the dairy industry until the final year of the Outlook is a small increase in the milk production quota. To the extent that the milk production increases, subsidised dairy exports are expected to be increased in order to maintain internal prices near support levels. In summary, the Agenda 2000 decreases dependence of the European Union on subsidised exports and intervention stocks, although these policy instruments do remain critical given that support prices for several commodities remain higher than world prices.

Perhaps the greatest insight into the implications of Agenda 2000 which AGLINK offers is the sensitivity of the results to EU decision-makers' choices regarding implementation (e.g. how they manipulate policy parameters) and to the prevailing exchange rates. Regarding the latter, for example, magnitude of unsubsidised EU wheat exports -- if they are possible at all -- are extremely sensitive to the precise value of the Euro. Moreover, unsubsidised wheat exports will tend to raise internal prices above support levels, with implications for competing crops and for animal product makers through feed costs, all of which are linked automatically in AGLINK.

For analysing the effect of USA loan deficiency payments, we made a comparison of projected market outcomes with those which would have prevailed, had USA soyabean producers not received additional support under the loan programmes but only from market returns. The results show that marketing loans for soyabeans have a price depressing impact on world prices of soyabeans but this dissipates over time. We estimated the marketing loans to be US\$49 per tonne in 2000, US\$43 per tonne in 2001, US\$31 per tonne in 2002, US\$21 per tonne in 2003, US\$2 per tonne in 2004, and nothing in 2005. The withdrawal of such payments leads to lower soyabean output (initially -5 per cent) and increased output of maize (initially +2 per cent) and wheat (initially +1 per cent). These production changes have temporary impacts on export levels and world prices. Initially world prices of soyabeans are 6 to 7 per cent higher while world maize price are 3 per cent lower. However, these effects are eroded by 2004 as markets adjust (Table 3).

## **Future work**

The most important aspect of AGLINK for future work during the remainder of this year would be the scenario analysis through different exogenous assumptions on policies and macroeconomic conditions. In addition, the Secretariat and co-operating Member countries perform routine maintenance and updating of the model during the months between Outlook generation.

AGLINK has been developed with a goal of being relevant to policy decisions. Consequently, the Secretariat and Member states may use the Outlook as a basis of comparison in estimating the effects of policy issues throughout the remainder of the current year. The Secretariat will emphasise model developments which lead to policy scenarios for inclusion in the next Outlook Publication. In addition, various analyses on macroeconomic events which emerge as key issues shaping the agricultural market has been conducted in these years.

For example, the Outlook 1998-2003 shows (1) an analysis of integration of Mercosur into the Pacific beef market, and (2) an analysis of El Niño's impact on world commodity markets. In the Outlook 1999-2004, various policy issues are discussed, including the extended implementation of reforms under the URAA (Uruguay Round Agreements on Agriculture).

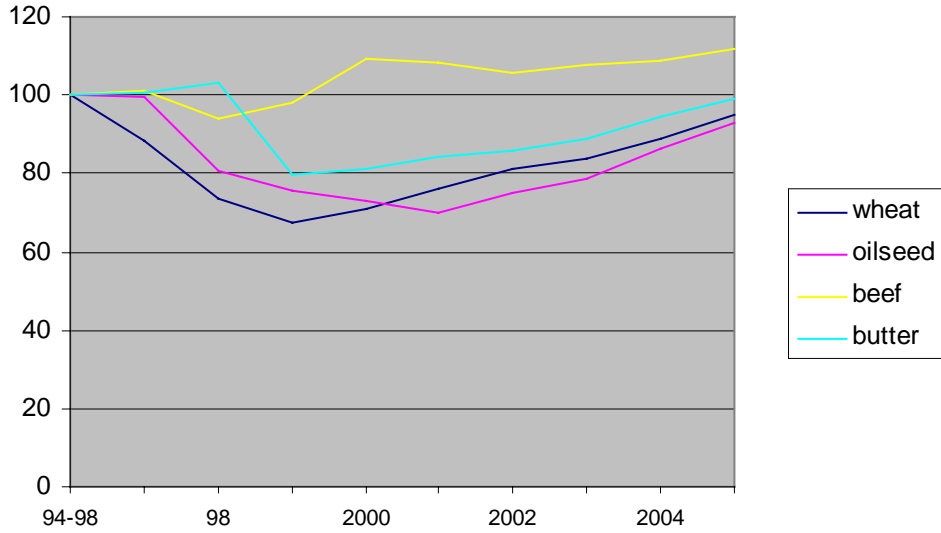
These scenario analyses have contributed to ongoing discussion among Member countries who seek answers to common problems and to the co-ordination of domestic and international policies. It is useful to Member countries that AGLINK continue to be a tool for the analyses of the impacts of agricultural policies, in a multilateral and multi-commodity context.

In this regard, further refinement of policy specifications for such mechanisms as tariff rate quotas and export competition policies is perhaps the most important issue at this moment due to current policy developments. These policies have become increasingly important in the world markets for the agricultural commodities since the implementation of URAA. In the situation where new trade negotiations are starting, analyses on these policies would be useful for the discussion towards better understanding and co-ordination of agricultural policies in a global context.

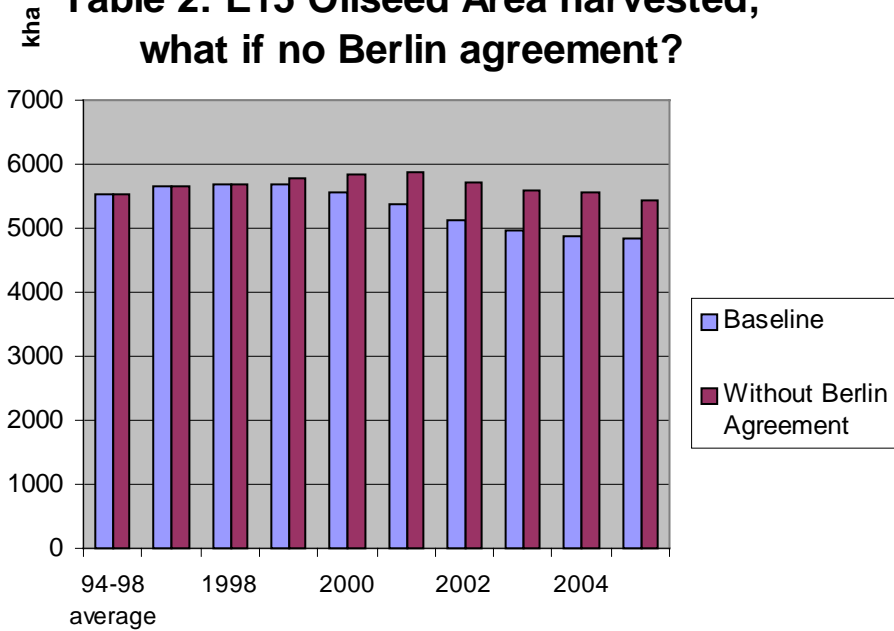
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**Table 1: Outlook projection 2000-2005:  
World Prices(nominal: 1994-98=100)**



**Table 2: E15 Oilseed Area harvested;  
what if no Berlin agreement?**





**Table 3: USA soyabean loan  
deficiency payment program;  
price depressing effect**

