METHODOLOGY

This section provides information on the methodological aspects of the generation of the *Agricultural Outlook*. It discusses the main aspects in the following order. First, a general description of the agricultural baseline projections and the *Outlook* report is given. Second, the compilation of a consistent set of the assumptions on macroeconomic projections is discussed in more detail. Section 3 provides reference to the underlying Aglink-Cosimo model.

The generation of the *OECD-FAO Agricultural Outlook*

The projections presented and analysed in this document are the result of a process that brings together information from a large number of sources. The use of a model jointly developed by the OECD and FAO Secretariats, based on the OECD's Aglink model and extended by FAO's Cosimo model, facilitates consistency in this process. A large amount of expert judgement, however, is applied at various stages of the Outlook process. The *Agricultural Outlook* presents a single, unified assessment, judged by the OECD and FAO Secretariats to be plausible given the underlying assumptions, the procedure of information exchange outlined below and the information to which they had access.

The starting point of the outlook process is the reply by OECD countries (and some non-member countries) to an annual questionnaire circulated in the fall. Through these questionnaires, the OECD Secretariat obtains information from these countries on future commodity market developments and on the evolution of their agricultural policies. The starting projections for the country modules handled by the FAO Secretariat are developed through model based projections and consultations with FAO commodity specialists. External sources, such as the IMF, the World Bank and the UN, are also used to complete the view of the main economic forces determining market developments. 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. The main economic and policy assumptions are summarised in the overview chapter and in specific commodity tables of the present report. The sources and assumptions for those assumptions are discussed in more detail further below.

As a next step, the modelling framework jointly developed by the OECD and FAO Secretariats is used to facilitate a consistent integration of this information and to derive an initial set of global market projections (baseline). In addition to quantities produced, consumed and traded, the baseline also includes projections for nominal prices (in local currency units) for the commodities concerned. Unless otherwise stated, prices referred to in the text are also in nominal terms. The data series for the projections are drawn from OECD and FAO databases. For the most part, information in these databases has been taken from national statistical sources. Trade data for regions, e.g. the European Union or regional aggregates of developing countries, refer only to extra-regional trade. This approach results in a smaller overall trade figure than cumulated national statistics. For further details on particular series, enquiries should be directed to the OECD and FAO Secretariats.

The model provides a comprehensive dynamic economic and policy specific representation of the main temperate-zone commodities as well as rice, cotton and vegetable oils. The Aglink and Cosimo country and regional modules are developed by the OECD and FAO Secretariats in conjunction with

country experts and, in some cases, with assistance from other national administrations. The initial baseline results for the countries under the OECD Secretariat's responsibility are compared with those obtained from the questionnaire replies and issues arising are discussed in bilateral exchanges with country experts. The initial projections for individual country and regional modules developed by the FAO Secretariat are reviewed by a wider circle of in-house and international experts. In this stage, the global projection picture emerges and refinements are made according to a consensus view of both Secretariats and external advisors. On the basis of these discussions and updated information, a second baseline is produced. The information generated is used to prepare market assessments for biofuels, cereals, oilseeds, sugar, meats, fish and sea food, dairy products and cotton over the course of the outlook period, which is discussed at the annual meetings of the Group on Commodity Markets of the OECD *Committee for Agriculture*. Following the receipt of comments and final data revisions, a last revision is made to the baseline projections. The revised projections form the basis of a draft of the present *Agricultural Outlook* publication, which is discussed by the *Senior Management Committee* of FAO's Department of Economic and Social Development and the OECD's *Working Party on Agricultural Policies and Markets of the Committee for Agriculture*, in May 2017, prior to publication. In addition, the *Outlook* will be used as a basis for analysis presented to the FAO's *Committee on Commodity Problems* and its various *Intergovernmental Commodity Groups.*

The *Outlook* process implies that the baseline projections presented in this report are a combination of projections developed by collaborators for countries under the OECD Secretariat's responsibility and original projections for the 65 countries and regions under the FAO Secretariat's responsibility. The use of a formal modelling framework reconciles inconsistencies between individual country projections and forms a global equilibrium for all commodity markets. The review process ensures that judgement of country experts is brought to bear on the projections and related analyses. However, the final responsibility for the projections and their interpretation rests with the OECD and FAO Secretariats.

Sources and assumptions for the macroeconomic projections

Population estimates from the *2015 Revision of the United Nations Population Prospects* database provide the population data used for all countries and regional aggregates in the *Outlook*. For the projection period, the medium variant set of estimates was selected for use from the four alternative projection variants (low, medium, high and constant fertility). The UN Population Prospects database was chosen because it represents a comprehensive source of reliable estimates which includes data for non-OECD developing countries. For consistency reasons, the same source is used for both the historical population estimates and the projection data.

The other macroeconomic series used in the Aglink-Cosimo model are real GDP, the GDP deflator, the private consumption expenditure (PCE) deflator, the Brent crude oil price (in US dollars per barrel) and exchange rates expressed as the local currency value of USD 1. Historical data for these series in OECD countries as well as Brazil, Argentina, the People's Republic of China and the Russian Federation are consistent with those published in the *OECD Economic Outlook* No. 100 (November 2016). For other economies, historical macroeconomic data were obtained from the IMF, *World Economic Outlook* (October 2016). Assumptions for 2017-2026 are based on the recent medium term macroeconomic projections of the OECD Economics Department, projections of the *OECD Economic Outlook* No. 100 and projections of the IMF.

The model uses indices for real GDP, consumer prices (PCE deflator) and producer prices (GDP deflator) which are constructed with the base year 2010 value being equal to 1. The assumption of constant real exchange rates implies that a country with higher (lower) inflation relative to the United States (as measured by the US GDP deflator) will have a depreciating (appreciating) currency and therefore an increasing (decreasing) exchange rate over the projection period, since the exchange

rate is measured as the local currency value of 1 USD. The calculation of the nominal exchange rate uses the percentage growth of the ratio "country-GDP deflator/US GDP deflator".

The oil price used to generate the *Outlook* until 2015 is taken from the short term update of the *OECD Economic Outlook* No. 100 (November 2016). For 2016, the annual average monthly spot price is used. Brent crude oil prices from 2017 are projected to grow at the same rate as projected by the World Bank Commodities Price forecasts (October 2016).

The underlying Aglink-Cosimo model

Aglink-Cosimo is an economic model that analyses supply and demand of world agriculture. It is managed by the Secretariats of the OECD and Food and Agriculture Organization of the United Nations (FAO), and used to generate the *OECD-FAO Agricultural Outlook* and policy scenario analysis.

Aglink-Cosimo is a recursive-dynamic, partial equilibrium model used to simulate developments of annual market balances and prices for the main agricultural commodities produced, consumed and traded worldwide. The Aglink-Cosimo country and regional modules covering the whole world, and projections are developed and maintained by the OECD and FAO Secretariats in conjunction with country experts and national administrations. Several key characteristics are as follows:

- World markets for agricultural commodities are assumed to be competitive, with buyers and sellers acting as price takers. Market prices are determined through a global or regional equilibrium in supply and demand.

- Domestically produced and traded commodities are viewed to be homogeneous and thus perfect substitutes by buyers and sellers. In particular, importers do not distinguish commodities by country of origin as Aglink-Cosimo is not a spatial model. Imports and exports are nevertheless determined separately. This assumption will affect the results of analysis in which trade is a major driver.

- Aglink-Cosimo is a "partial equilibrium" model for the main agricultural commodities. Non-agricultural markets are not modelled and are treated exogenously to the model. As non-agricultural markets are exogenous, hypotheses concerning the paths of key macroeconomic variables are predetermined with no accounting of feedback from developments in agricultural markets to the economy as a whole.

- Aglink-Cosimo is recursive-dynamic. Thus, each year is modelled over the projection period and depends on the outcome of previous years. Aglink-Cosimo models ten years into the future.

A detailed documentation of Aglink-Cosimo has been produced in 2015 and is available on www.agri-outlook.org.

The model used to generate the fish projections is operated as a satellite model to Aglink-Cosimo. Exogenous assumptions are shared and interacting variables e.g. prices for cross-price reactions are exchanged. The fish model went through substantial revision in 2016. The aggregated aquaculture supply functions of 32 components of the model were replaced by 117 species specific supply functions with specific elasticity, feed ration and time lag. The main species covered are salmon and trout, shrimp, tilapia, carp, catfish (including *Pangasius*), seabream and seabass, and molluscs. A few other minor productions such as milkfish were also included. The model was constructed so as to ensure consistency between the feed rations and the fishmeal and fish oil markets. Depending on the species, the feed rations can contain a maximum of five types of feed; fishmeal, fish oil, oilseed meals (or substitutes), vegetable oil and low protein feeds like cereals and brans.