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DOCUMENTATION OF THE AGLINK-COSIMO MODEL

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(Note by the Secretariat)

This report provides documentation of the AGLINK model and its FAO counterpart, COSIMO. It serves as a reference manual for equations, variables and model properties and provides validation of the model through review of its response to various shocks. It is the first such update that includes the collaborative work with the FAO which expands the model to many developing countries and regions. The joint model is referred to as the AGLINK-COSIMO model in this report. The documentation in this note does not include detailed equation specification; this can be found at the web site www.agri-outlook.org, which is available to collaborators in the AGLINK-COSIMO project. A cd-rom containing this will be made available at the time of the meeting and will be included in the final report.

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DOCUMENTATION OF THE AGLINK-COSIMO MODEL

CHAPTER 1. INTRODUCTION

Background

1. This document provides an update to documentation of the characteristics of the AGLINK model. It is the first such update that includes the collaborative work with the Food and Agriculture Organization (FAO) which expands the model to developing countries and regions. The combined model, which includes the various modules of AGLINK and the new modules which have been developed at FAO (COSIMO) is referred to as the AGLINK-COSIMO model in this document.

2. The current document is developed to meet two basic objectives. The first is to provide a reference manual for the AGLINK-COSIMO model that documents equations, variables and model properties. Such documentation is required by those in national agencies who use this model. Documentation is also critical to facilitate greater transparency in understanding model results, to confirm model design and attributes and to identify areas for further work. The second objective is to provide insight concerning what the model indicates about interactions among international commodity markets, and their responses to various shocks. This is achieved largely through the interpretation of model simulations, as these may enhance the understanding of markets, as well as to facilitate the validation of the modelling system. It points to aspects that may need to be investigated in more depth.

3. As with any significant modelling effort, continuous assessment and adjustment is required. As on-going experience is acquired in the annual outlook exercise, as necessary model changes to encompass more recently announced policy measures and examine new issues and as feedback is provided on country modules, further study of model properties and updated documentation is required. For these reasons, member countries have insisted on regular documentation updates. Furthermore, accurate documentation of the model also facilitates outside use and leads to better feedback on model design and applications.

4. This document focuses on general model characteristics, and has three additional sections and one annex. Chapter 2 provides a short description of model properties. Chapter 3 discusses model performance through a review of elasticity/multiplier properties. The final chapter presents potential for analysis of partially stochastic simulations performed on yields and macroeconomic variables. Annex 1 presents the AGLINK-COSIMO naming convention. As a supplement to this document, detailed equation specification is provided at the web site www.agri-outlook.org, which is available to collaborators in the AGLINK-COSIMO project.

AGLINK

5. AGLINK is a recursive-dynamic, partial equilibrium, supply-demand model of world agriculture, developed by the OECD Secretariat in close co-operation with member countries and certain Non Member

Economies (NMEs). It covers annual supply, demand and prices for the principal agricultural commodities produced, consumed and traded in each of the countries represented in the model. The overall design of the model focuses in particular on the potential influence of agricultural and trade policies on agricultural markets in the medium-term. Development on the basis of the (agricultural) economics literature, existing country models, and on formal bilateral reviews has resulted in a model specification which reflects the views of participating countries. To remain tractable, the model specification must impose some degree of uniformity across country modules. Within the constraints of this uniformity, agricultural markets are modelled specifically to best capture individual policies and particular market settings relevant for each country.

6. The AGLINK project started with the proposal that a pilot application of the model be undertaken in conjunction with the 1992 *OECD Agricultural Outlook* cycle. This was approved by the April 1993 meeting of the OECD Working Party on Agricultural Policies and Markets and the Joint Working Party of the Committee for Agriculture and the Trade Committee. Since then, AGLINK has played an important role in the medium-term outlook activity by providing a consistent analytical framework. Its ability to perform alternative scenarios has made it one of the key tools at the disposition of the OECD Secretariat and collaborating countries for forward-looking policy analysis. The ability to capture interaction between commodities and between countries is a major strength of a quantitative model such as AGLINK, allowing analysts to assess not only the direction but also the magnitude of market adjustments resulting from economic or policy changes.

COSIMO

7. In 2004, after discussions between the OECD Secretariat and the Commodities and Trade Division at the FAO, the decision was made to collaborate in the extension of the AGLINK model to a larger number of developing countries and regions, and to jointly undertake the annual medium-term outlook exercise. For the FAO, this work essentially replaces the long standing projection programme based on its World Food Model (WFM). The project to develop new modules has been known as the COSIMO project (COmmodity SImulation MOdel). The parameters of the WFM were used as a basis for development of the new country modules. New database procedures were developed to capture the FAO's commodity balance sheet data, a system also used as an input in its *Global Food Outlook*. For the OECD, this collaboration brings the possibility of a more detailed representation of non-OECD markets as well as access to the developing country expertise in establishing and analysing projections that is available in the FAO Secretariat. For the FAO, the primary purpose of the collaboration with OECD is to enhance its medium-term commodity analysis for key developing countries and regions, and in particular to study how policies affect markets and food security. The collaboration with OECD has been viewed by members to the FAO as an efficient means of undertaking common work, making best use of the relative strengths of each Organisation. Ultimately, however, in a plan to involve FAO members in discussing policies and emerging events, the modelling work is intended to foster a greater ability to look at events in specific countries/regions. To this end, the COSIMO project aims at further increasing the list of commodities relevant to developing countries. Such further model development will enhance the tools available to the FAO in the appraisal of commodity development projects.

8. In undertaking projection work with the joint AGLINK-COSIMO model, the individual country modules modelled in AGLINK are calibrated on baseline projections received from participating countries through a system of annual questionnaires. The AGLINK and the COSIMO country modules are then merged and the entire model is solved simultaneously to generate a commodity baseline. This baseline is first reviewed by staff at both the OECD and the FAO, and subsequently by country experts in the OECD's Commodity Working Groups, before becoming a key component of the annual Agricultural Outlook activity.

9. The AGLINK-COSIMO model is currently composed of 10 800 equations and covers 39 individual countries and 19 regions. It contains 17 world market clearing prices. Detailed equation specification for the model and its various components is provided on www.agri-outlook.org.

Validation

10. Validation of quantitative models such as AGLINK-COSIMO is a difficult task: these models are large, they are a combination of estimated and composite information, and they do not have many benchmark alternatives with which to compare. The evaluation criteria may also depend on the type of application that the model is used for, which in the case of AGLINK-COSIMO may range from the specific analysis of an individual agricultural policy to the wider examination of global trade linkages. Therefore, there is no one statistic which can indicate whether such a model is "valid". Statistics on inter-sample accuracy indicate how well a given model reproduces historical numbers for specific variables of interest. However, since the models described here are typically constructed to serve as a forward looking analysis tool, modifications to policies are continuously incorporated. As a result, performance over the historical period is less meaningful as the policy framework in the model at any particular point in time will be different from that which prevailed in previous years.

11. AGLINK has had the benefit of review by participating countries. Therefore, certain specifications that have been imposed on the AGLINK dataset may relate more to the way in which the model has been calibrated to that dataset, rather than to whether forecasts or analyses based on the model might be valid. In this context, "validation" should be judged in terms of what the information generated by the model contributes to the OECD’s agricultural outlook process but also to specific analysis of policies and markets. In the case of COSIMO the projections are generated without member country contribution. FAO projections are made in consultation with the market analysts of the FAO. Validation in this case is related to the quality of model linkages, that is, what additional information is the model capable of providing from the mixture of projections for individual countries and regional aggregates? More specifically, how effective is the model in evaluating policies in developing countries in the context of world agricultural markets?

CHAPTER 2. PROPERTIES OF THE AGLINK-COSIMO MODEL

Characteristics - AGLINK-COSIMO

12. In reviewing the information provided in this document, it is important to keep the scope and structure of the model in mind while interpreting results. Several key factors or assumptions are as follows:

1. World markets for agricultural commodities are competitive. Buyers and sellers do not behave as if they had market power, and market prices are determined through a global or regional equilibrium in supply and demand.

2. Domestically produced and traded commodities are viewed to be perfect substitutes by buyers and sellers. In particular, importers do not distinguish commodities by country of origin.

3. AGLINK-COSIMO is a "partial equilibrium" model for the main agricultural commodities. Non-agricultural markets are not modelled and are treated exogenously to the models.

13. Table 1 provides a summary of the main commodity markets modelled in AGLINK-COSIMO which have complete representations of supply, demand, trade and prices, with an indentation indicating components that are not completely modelled but rather included as part of an aggregate. Certain markets, such as butter oil, concentrated milk, cotton, lamb, roots and tubers, fish and wool are modelled incompletely. This may affect the interpretation of model properties. 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. In developing countries, where agriculture is often a significant part of the domestic economy, this simplification may constitute a non-negligible abstraction from reality. But modelling such a diverse range of feedback mechanisms in developing countries adds a level of complication to the model which is not warranted by the gains in accuracy or inference.

Table 1. Main agricultural commodity markets

Wheat	WT	Oilseed meals	OM	Cheese (pw)	CH
Coarse grains	CG	.. Soybean Meal	SM	Wholemilk powder (pw)	WMP
.. Barley	BA	.. Rapeseed Meal	RM	Skim milk powder (pw)	SMP
.. Maize	MA	.. Sunflower Meal	SFM	Fresh dairy product	FDP
.. Oats	OT	Vegetable oils	VL	.. Other dairy product	ODP
.. Sorghum	SO	.. Palm oil	PL	Whey powder (pw)	WYP
Rice	RI	.. Oilseed oils	OL	Casein (pw)	CA
Oilseeds	OS	… Soybean Oil	SL	Beef and veal (cwt)	BF
.. Soybeans	SB	… Rapeseed Oil	RL	Pigmeat (cwt)	PK
.. Rapeseed	RP	… Sunflower Oil	SFL	Poultry meat (rtc)	PT
.. Sunflower seed	SF	Milk	MK	Sheep meat (cwt)	SH
		Butter (pw)	BT	Eggs	EG

14. The AGLINK component of the model consists of endogenous modules for eight OECD countries/regions and four non-OECD countries. The eight OECD countries (OECD-8) are Australia, Canada, European Union (25) Japan, Korea, Mexico, New Zealand and the United States. The four NMEs are Argentina, Brazil, China and Russia. The aggregate EU25 module is itself composed of three endogenous modules (the former EU15, Hungary and Poland) and one exogenous group of the remaining eight EU countries. In particular, production and consumption functions are specific to the EU15, Hungary and Poland with trade and stocks being determined endogenously for the EU25 at the aggregate level. The COSIMO component of the model consists of complete modules for Turkey, twenty three non-OECD countries and fifteen regions (see Annex Table A.1). Additional countries or country groups that are considered exogenous to AGLINK-COSIMO are Norway, Switzerland, Other western European countries and Other central American countries.

15. The scope and nature of the linkage between AGLINK and COSIMO modules depends on the specific commodity. For cereals, oilseeds and dairy products, there is interaction between all endogenous AGLINK and COSIMO modules.

16. For red meats, AGLINK-COSIMO is based on a segmented market approach. In the foot and mouth disease free Pacific beef market, Australia, Canada, Central America, Indonesia, Japan, Korea, Mexico, New Zealand, Thailand and the United States are included as well as part of trade by China and India. The second market concerns the Atlantic beef market which is comprised of the following regions and countries: Algeria, Egypt, Europe (TRQ imports and subsidized exports), Iran, Malaysia, Philippines, Russia, Saudi Arabia, South Africa, South America, Turkey, Ukraine and Vietnam. Finally, all other areas of the world are included in the residual FMD beef market in AGLINK-COSIMO. These last two beef markets have been defined using historical and geographical trade patterns.

17. Three pigmeat markets are included in AGLINK-COSIMO. First, the foot and mouth disease free Pacific market which includes Australia, Canada, Chile, Japan, Korea, Mexico, New Zealand, Philippines, Thailand, the United States and part of European Union and China. The second pigmeat market is the Atlantic market which comprises of the remaining part of Europe and China trade, South America with the exception of Chile, Ukraine and Russia. Finally, all other areas of the world are included in the residual FMD pork market in AGLINK-COSIMO. As mentioned above for beef, these last two pigmeat markets have been defined using historical and geographical trade patterns.

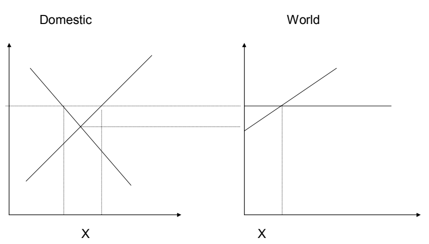
18. AGLINK-COSIMO simulates market determination of equilibrium prices for most of its commodities. For these commodities it is assumed that a market price must adjust to equate exactly total demand, including carry-over, to total supplies, including carry-in. For each such market, reference prices are used as presented in Table 2.

Table 2. AGLINK-COSIMO world reference prices

World wheat	No.2 hard red winter wheat, ordinary protein, USA f.o.b. Gulf Ports (June/May).
World coarse grains	No.2 yellow corn, US f.o.b. Gulf Ports (September/August).
World rice	Milled, 100%, grade b, Nominal Price Quote, NPQ, f.o.b. Bangkok (August/July).
World oilseeds	Weighted average oilseed price, European port (October/September).
World oilseed meal	Weighted average meal price, European port (October/September).
World vegetable oil	Weighted average price of oilseed oils and palm oil, European port (October/September).
Pacific beef	Choice steers, 1100-1300 lb lw, Nebraska.
Atlantic beef	Buenos Aires wholesale liner, young bull.
EC beef	EC Farm price.
FMD beef	Export unit prices.
Pacific pork	Barrows and gilts, No. 1-3, 230-250 lb lw, Iowa/South Minnesota.
Atlantic pork	Pig for slaughter prices paid to producers: Brazil average.
EC pork	EC Farm price.
FMD pork	Export unit prices.
World butter	F.o.b. export price, butter, 82% butterfat, northern Europe.
World cheese	F.o.b. export price, cheddar cheese, 40 lb blocks, Northern Europe.
World skim milk powder	F.o.b. export price, non-fat dry milk, extra grade, Northern Europe.
World whole milk powder	F.o.b. export price, WMP 26% butterfat, Northern Europe.
World whey powder	Edible dry whey, f.o.b. US West region.
World Casein	Export price, New Zealand.

19. In AGLINK-COSIMO, considerable effort was made to retain a calendar year basis for all data. This was not possible for many series, particularly for crops and for dairy products and in putting the model together, this has implications for certain price-quantity combinations. This in turn affects the short-run dynamics of the model.

Figure 1: Exporting price taker



20. The functional relationships linking supply and demand to prices are, in most cases, linear in the logarithms of the variables. Equation coefficients are partial elasticities. In developing the model, an attempt has been made to obtain up-to-date estimates of these elasticities. Many of these elasticities come from, or are based on, models currently in use in member countries. Some are the result of econometric analysis initiated by the OECD and FAO Secretariats, through consultants or by Secretariat staff. For countries that are directly affected by the evolution of world prices, the market structure is typically modelled as an open economy price-taker as illustrated in Figure 1.

21. Where world market prices and domestic producer and consumer prices are linked, that link is represented through price equations which are linear in world market prices (converted to local currency), a margin approximating transportation costs and quality differentials, and border measures such as tariffs, taxes, subsidies etc., when they are not explicitly modelled.

22. In the model, wheat includes durum wheat. The composition of coarse grains is not the same for each country. In Australia, Mexico and the United States it includes maize (corn), barley, oats, sorghum, rye and all other cereals. Sorghum is excluded for Canada, New Zealand and the European Union (15) but rye and mixed grains are included in the EU. Totals for oilseeds and the oilseed products are composed in each country of soybeans, rapeseed/canola and sunflower (sunflower is not included in Japan). In order to include a greater percentage of the world production of vegetable oil, palm oil has been included in addition to oilseed oil.

23. Where live animal trade is important, a distinction is made between slaughter and indigenous production. Indigenous production is the amount of meat on a carcass-weight basis produced on farms, while slaughter production is the amount produced in slaughterhouses and is equal to indigenous production minus the meat equivalent of live animal trade (exports minus imports). In this case, trade has two elements, meat and the meat equivalent of trade in live animals. Milk production includes estimates of on-farm use, except in Australia.

24. Trade for each country by commodity pairing is given one of three possible treatments. In a few cases, 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. In a few other cases, certain bilateral trade links are reflected, for example, poultry trade between the United States and Canada. Finally, and most commonly, trade is the residual of a supply-utilisation identity equation. In these cases, it is the responsibility of the market analyst to identify cases where simulated exports are above export limits or where simulated imports are below import access.

Structural characteristics

Crop components: Supply

25. Crop production is expressed as the product of area harvested and yield per hectare. Area harvested and yields are represented separately and each may be influenced by relative prices and, predominantly in the case of area harvested, government policies.

26. Complete supply-utilisation accounting of crop commodities is made in the model for wheat and rice only. Coarse grains and oilseeds are accounted for as aggregates. However, in most modules the area, yield and production of individual crops included in these aggregates are represented separately.

27. Competition for land among alternative crops is represented in the model by cross-price effects in the area equations. More precisely, crop area depends on gross revenues for the crop in question and for competing or, in a few cases, joint commodities. 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 serve as proxies for technological change.

28. Farm production of oilseeds is handled in the same way as farm production of cereals. Additionally, the production of the derivative products -- vegetable oil and oilseed meal - is also represented. This is done through equations linking the quantity of oilseeds processed (crushed) in each country, to prices of oilseeds, vegetable oil and oilseed meal. Quantities produced of vegetable oil and of oilseed meal are expressed as the product of crush times the extraction rate (exogenous in most cases).

Crop components: Demand

29. Six components of crop utilisation are distinguished in the model: domestic food use, domestic feed use, domestic crush (for oilseeds only, see section on crop supply), domestic other use (for wheat and coarse grains only), trade and ending stocks.

30. For each country, the model contains food demand equations for wheat, for an aggregate of coarse grains, for rice and for vegetable oil, as well as for oilseeds in Japan, Korea and China. Each equation links quantity demanded to price, consumer income and population.

31. Individual feed expenditure quantities generally depend on relative feed prices and on ruminant and non-ruminant livestock production. Feed quantities are then used to calculate total feed expenditure, feed share and consequently a feed cost index. This index is then is used in the determination of livestock

production. The adjustment of feed demand to a change in feed price has two components in AGLINK; a 'share' effect and a 'scale' effect. Within the system of feed demand equations themselves, feed demand elasticities are defined under a constant output assumption. The only part of the total response of feed demand to a change in price reflected in these elasticities is that which is due to substitution or to complementarities between feeds -- the 'share' effect.[1] However, livestock production adjusts to changes in farm prices of feedstuffs through the feed cost index, which is an aggregate indicator of these feedstuff prices. Feed demand in the model thus also changes with the expansion or contraction of livestock supply -- the 'scale' effect.

32. For wheat and coarse grains, domestic use other than food and feed is represented separately. In most cases, other use is determined by the commodity's price, the gross domestic product (as a proxy for industrial growth) and/or a time trend.

33. Cereal stocks are modelled in one of the three following ways: for some regions, stocks are set exogenously. In other regions, stocks are a function of the domestic market price of the commodity and either domestic production, supply (production plus carry-in stocks) or total consumption. Finally, ending intervention stocks may be represented as a function of domestic prices and support prices

Livestock components: Beef and milk supply

34. The dairy component covers production and consumption of milk and main dairy products in all modules. As for other commodities, dairy markets are modelled specifically to best capture individual policies and particular market settings relevant for each country.

35. Milk production is expressed as the product of the milk cow inventory and milk yields. In Canada and the EU, milk production is determined by production quotas. Since output prices do not guide producer decisions, price elasticities of milk supply have not been defined for these countries. A shadow price of milk supply in quota countries has to be identified in order to specify an underlying supply function in these countries. This was essential for the analysis of scenarios that involve a substantial policy change, including the total elimination of a quota system.

36. The link between milk and beef production is based on a theory of supply in which producers invest in breeding stock by retaining cows and heifers from slaughter when the capital value of these animals exceeds their current market value. The capital value of a beef-breeding cow is a function of the expected income stream earned from future sales of calves. The higher the expected value of future beef and milk production the greater the investment in the breeding herd. The retention for breeding lowers the availability of animals for slaughter in the short run. Thus, to the extent that current beef prices influence expectations of future beef prices, there exists the possibility of a negative elasticity of beef supply response in the short run.

37. The investment demand equations for specialised beef cows (as opposed to beef production from dairy cows) link ending inventories to expected producer prices, feed costs and other factors. The beef and milk production equations link supply in a particular year to the breeding inventories in earlier years, to producer prices for beef, to costs and in some cases to lagged prices for competing products.

38. Dairy supply is modelled on the assumption that the value of milk components (fat and non-fat solids) will tend to equalise across products. Only butter and SMP prices are typically used as proxies for

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1 The parameters of the feed demand system were last estimated in 2000. These parameters have been used since then, but in certain cases, they have been updated on an ad hoc basis. They may be found in the documentation of the feed component of each country module.

fat and non-fat solids prices. If demand for a product made primarily from one of the components grows relative to demand for products made from the other one, then the relative value of components would adjust. That is, a unit of fat in cheese would have the same value as unit of fat in WMP or butter, after adjusting for processing costs.

39. Typically, in AGLINK, butter and SMP production are residuals of the market-clearing for milkfat and non-fat solids, respectively. The production functions of cheese and WMP are logit functions that depend on the price of that good relative to the input cost. This last term is calculated on the basis of the butter and SMP prices and the shares of milkfat and non-fat solids in the various products. In COSIMO modules, processed dairy products have simple production equations whereby the share of milk production allocated to a specific product depends on the ratio of the output to the (milk) input price. Fresh dairy product production is then residual and assumed to be non-tradable. Its price is derived through internal market clearing to satisfy domestic demand.

40. As is the case for other commodities, where world dairy prices and domestic producer and consumer prices are linked, that link is represented through price (transmission) equations which are linear in world market prices (converted to local currency terms), a margin approximating transportation costs and quality differentials, and border measures. In several countries that have a large domestic dairy market and operate with border protection measures, a domestic market clearing price is modelled. In these cases, typically, the trade equations are linked to the evolution of domestic policy and market prices and conditions established under relevant multilateral and regional trade agreements.

Livestock components: Pork, poultry and egg supply

41. Pork production is also characterised by lags in the response of breeding inventories to changes in expected producer returns. The pork supply equations in AGLINK-COSIMO relate annual production to lagged production, producer prices and feed costs with lags up to 3 periods.

42. Poultry and egg industries in OECD countries are characterised by a production technology and an associated cost structure which allows rapid adjustment of supply to changes in demand. Production cycles are relatively short, and variable costs, mainly for feedstuffs, constitute a high proportion of total costs. At the time of writing this documentation, a complete revision of the representation of poultry markets was underway. After having been tested, this representation will be included in future updates of this document.

43. In AGLINK, it has been assumed, for most countries, that the link between the supply and prices of poultry and eggs is sufficiently elastic (in the context of an annual model) for these sectors to be treated as 'constant cost' industries, *i.e.* their price is assumed to be determined completely by costs. Quantities are determined in the model as the sum of domestic demand, which is endogenous, and net trade in these products, which is exogenous for most countries. The latter is endogenous for Canada because of the import quota system tying imports to the previous year's production and in the United States to capture the movement in trade between the US and Canada. It is also endogenous in Japan because of the strong increase in imports. For COSIMO modules, explicit poultry and egg production equations are specified.

Livestock components: Beef, pork, poultry and egg demand

44. Demand for meat and eggs are represented in AGLINK as functions of farm prices, deflated by the national PCE deflator index, and of per capita consumer incomes and population. For some countries meat demand is influenced by prices of fish or crop products.

CHAPTER 3. PERFORMANCE OF THE AGLINK- COSIMO MODEL

Stability simulation

45. AGLINK-COSIMO is a recursive dynamic model with specifications for supply and demand that incorporate lags in both exogenous and endogenous variables. Beyond the primary objective of deriving a baseline solution, a main concern for any dynamic model is the stability of the solution in the face of rational exogenous shocks. More specifically, the question is whether the equilibrium solution is unique to a set of values of the exogenous variables and furthermore, how quickly does the model return to that equilibrium solution after being subjected to shocks to a subset of the exogenous variables, if at all? A rather straightforward test of stability was performed on the AGLINK-COSIMO model. In what will be referred to as the *stability simulation*, the exogenous variables were held constant at their 2005 values, over a period of 20 years. The model was solved over the entire period, and the paths of the endogenous price variables were then examined for convergence by looking at the evolution in the year-on-year percent differences in the solutions. The main indicator of stability is simply the dampening of annual percentage changes in the values of the endogenous prices. As we see in Figures 2 to 6, world price indicators demonstrate a "cobweb" dampening pattern over time.

46. There are three main characteristics of the price plots: (i) the size of the price changes in the first few years of simulation which is driven by both the model characteristics and the nature and size of market shocks in the recent past data, (ii) the amplitude and period of oscillations over the projection period and (iii) the length of time required for the model to stabilise, that is, for the plot to settle around zero. The three are obviously related, but each can reveal distinct features of the model structure. The simulations start in 2005 with the plots showing the percentage change in 2006 at period 1. In the dataset used, 2005 values are in many cases preliminary estimates. For 2005, adjustment factors have been estimated to calibrate the model to these estimates and, as exogenous variables in the model, these adjustment factors are projected constant for the entire simulation period.[2]

47. Large differences in the first years of simulation indicate either large movements or singularities in the recent data which take time to reconcile in the model. While the model is calibrated to take into account recent events, often the partial elasticities of the structural equations have been estimated over longer periods. Inherently, these estimates include time trends and structural factors with varying degrees of relevance for current markets. The effect of recent trends is evident in the plots of world grain prices (Figure 2). Throughout the world, recent events were characterised by droughts and low production in 2002-2003, rebounding to bumper crops and high production in 2004. These events affected production differently, depending on the crop. There was wide variation in coarse grain production but less in rice

2 Note that for a large number of variables, the year 2005 (as many other historical years) shows values significantly different from their respective longer-term trends, corresponding to fluctuations in weather, macroeconomic or other exogenous factors. As these deviations are reflected in the calibrated adjustment factors for 2005, holding those adjustment factors constant at their 2005 level does not necessarily provide for useful baseline projections. In this stability test, however, the objective is not to generate a realistic projection, and absolute levels of projected price paths in this test therefore are of no interest.

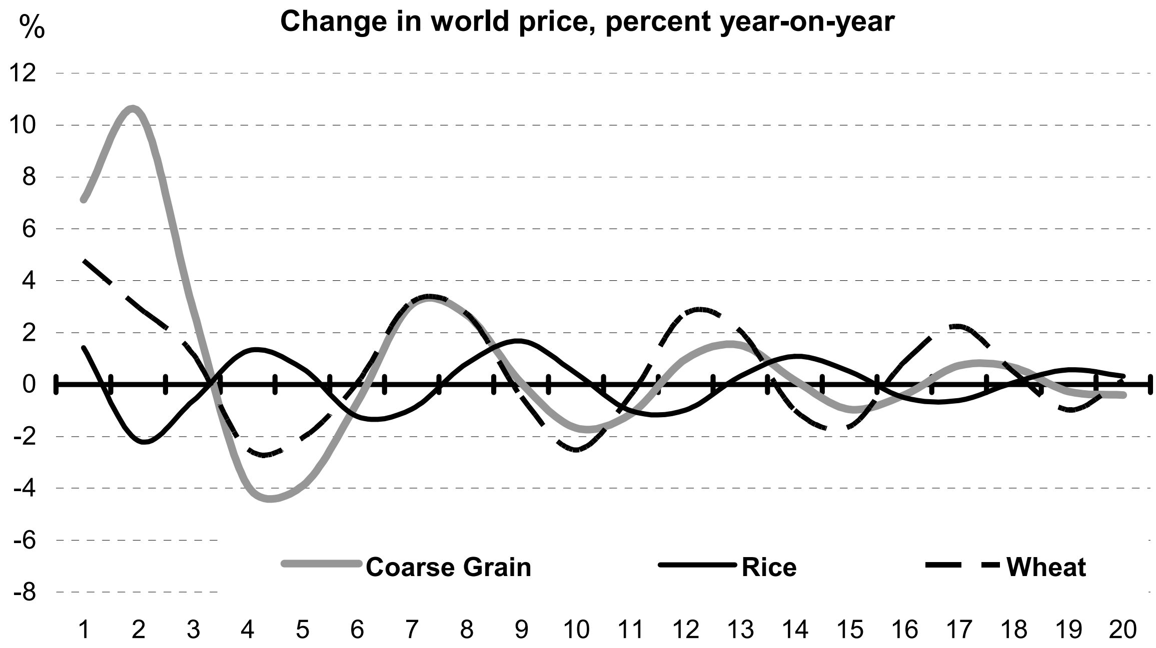
production. This shows up in the plots over the first five years as the impacts of these movements dissolve over time.

48. The amplitude and period of the price cycles depends both on the degree of time-dependency in the model equations and the extent to which that time-dependency influences the market. For example, markets can be characterised by differences in the speed of price-adjustment between consumption and production (the former adjusts generally faster than the latter). In addition, domestic policies concerning stock levels and the nature of international trade have an effect on how quickly and to what extent price adjustments take place in world markets. In AGLINK-COSIMO, a small number of model equations have lags going back four years, and slightly more equations include lagged price effects (own-price, cross-price and costs) for three years. However, in general, even if there are multiple lags in the structural equations, lags of one year have the greatest impact. One year ahead is the largest lead in AGLINK-COSIMO, but it is only exogenous variables that are used as leads (and they are held constant from 2005 in the design of the experiment). The world price plots show that the oscillations in price changes have a cycle length which varies between four and six years.

49. The length of time that prices need to stabilise is an important indicator of model performance. Prices that do not show evident dampening behaviour within the twenty year simulation period may cast a shadow of doubt over the model's validity for inference over a ten-year projection period. The model may, in fact, provide an accurate representation of reality, in that market prices tend to oscillate for long periods. But, conclusions based on a non-stable model are highly dependent on the choice of length of the projection period.[3] All three characteristics of the price plots depend crucially on the price responsiveness of production relative to that of consumption, in that, the more price-elastic is demand relative to supply, the quicker is adjustment.

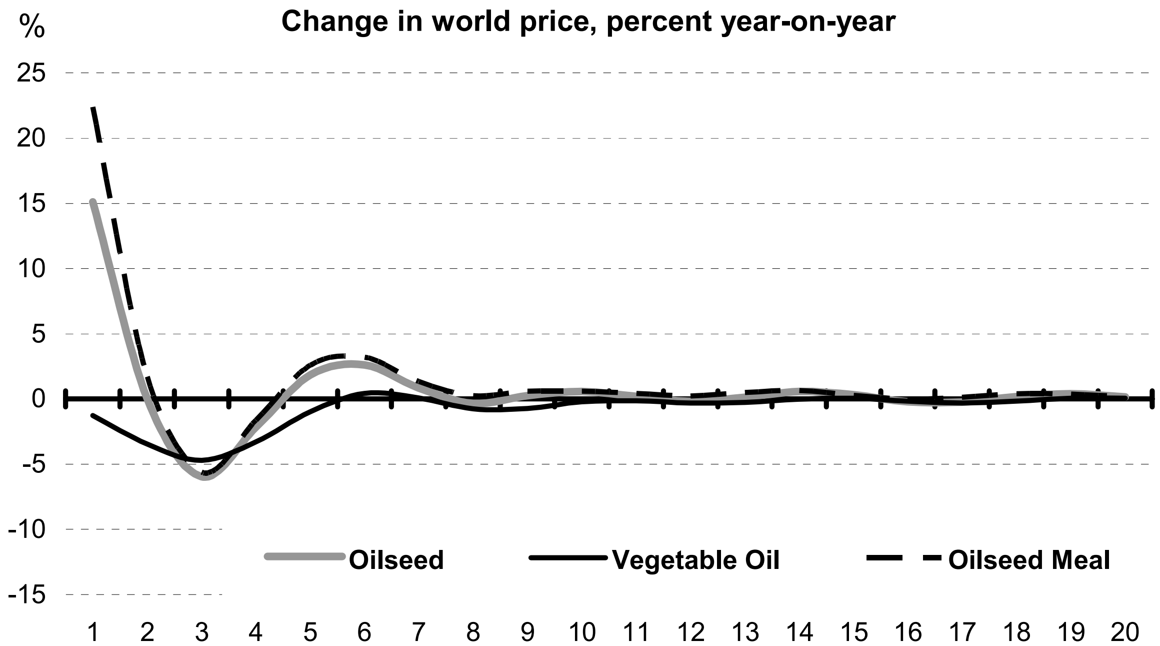
3 In fact, this points to a question that is not easy to decide. One element of that discussion is that, as mentioned, the continued oscillations in market prices may actually reflect reality. It seems, however, that often the user of baseline projections does not like continued oscillation, and that a model that does not converge quickly is perceived as problematic. In fact, it is true that actual baseline projections do not show these oscillations for crop prices, indicating that already in the generation of the baseline oscillations are to be minimised. In this context, it is interesting to note that, while for crop markets the model is supposed to converge relatively quickly, for livestock markets the same model is supposed to show what is called the livestock cycle. Yet, *a priori* it is impossible to state that livestock markets should continue oscillating while crop markets should not.

Figure 2. World grain prices



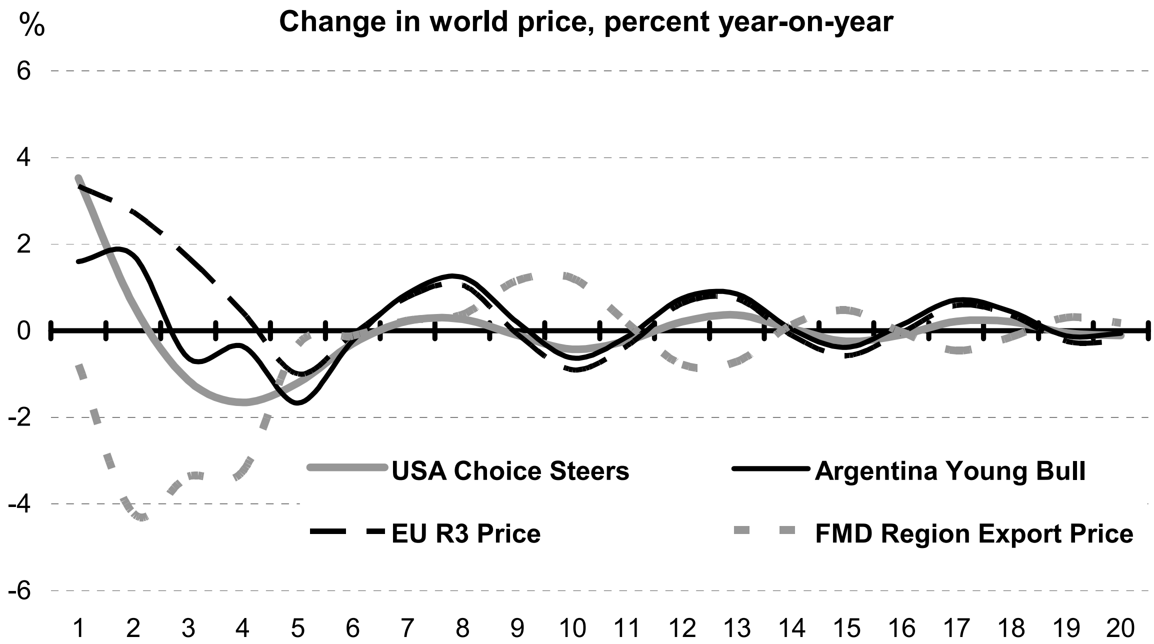
50. In the plot of world grain prices, there are clearly differences in the speed at which prices dampen. The coarse grain price, while being affected most by the recent variations in supply, adjusts relatively quickly. The rice price, on the other hand, shows only slight dampening over the twenty year simulation. The wheat price is between the two, showing dampening by the end of the period, despite having the oscillations of the greatest amplitude from year ten and beyond.

Figure 3. World oilseed prices



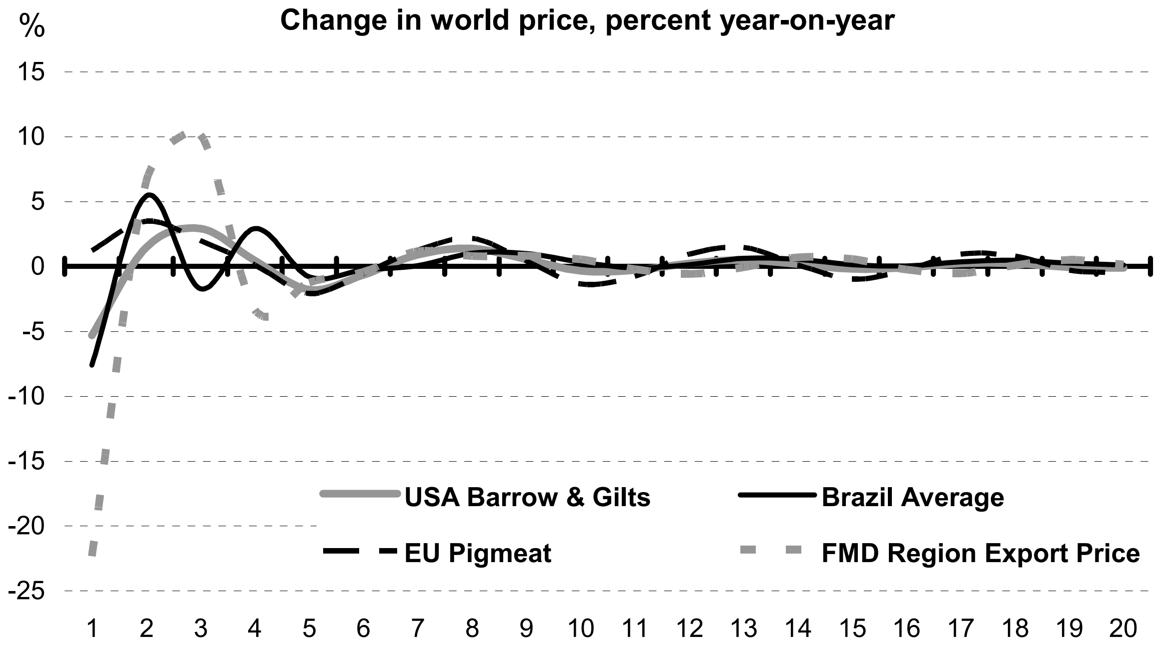
51. World oilseed prices stabilise quickly with oscillations fading from the seventh projection year onward. The vegetable oil price shows much less variation than the oilseed and meals prices, the latter two showing the effects of big changes in oilseed markets since 2003: high prices in 2003 led to the growth of global production of oilseeds from 2004 and a subsequent drop in prices for oils and meals. The model has difficulty reconciling these large changes at the beginning of the simulation, but nevertheless, markets are still capable of adjusting quickly. As demand for vegetable oil is primarily driven by food consumption, it is relatively more stable than meal which is used as livestock feed and where there are larger substitution possibilities. Moreover, production of vegetable oil adjusts quickly to both oil price changes and oilseed crush margins.

Figure 4. World beef prices



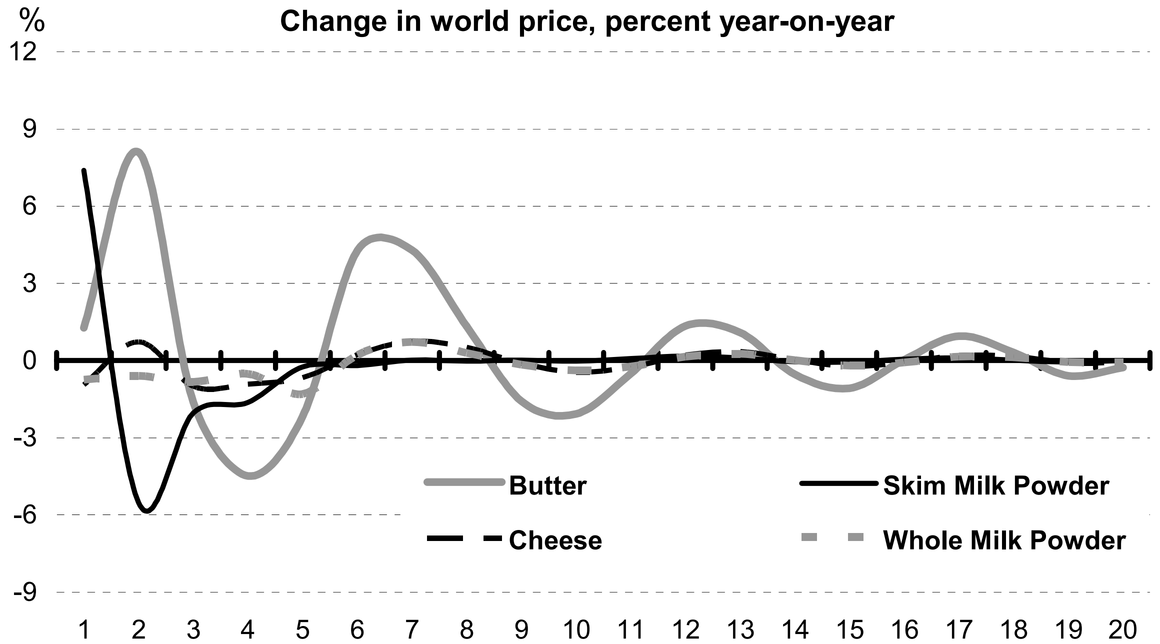
52. The plot of beef prices reveals differences between the regional markets, most notably that the FMD price is clearly out of phase with the other market prices, and that there is co-movement in the Argentina and EU prices. The latter two prices represent opposite geographical ends of the same Atlantic regional market, in which the EU price is the "domestic" market clearing price for the EU25. The FMD market represents a residual market, thus, non-FMD excess supply can eventually find its way into the FMD market. Conversely, higher prices in the former market will ultimately engender a similar, but lagged price rise in the lower-quality meat segment. The FMD price movement can be characterised as irregular, responding to both its own market signals, and through trade, to the market dynamics of the other regions. The Atlantic market price (Argentina) oscillates quickly at the beginning of the simulation, reflecting the high price-responsiveness of the Atlantic market beef consumption. Similarly, the US price dampens quickly but more smoothly, with oscillations diminishing noticeably after the sixth year of the simulation.

Figure 5. World pork prices



53. Pork prices stabilise much along the same lines as beef prices in the previous plot. Once again, the FMD market price is out of synch with the other prices, with price changes twice as large in the first few periods. Also, as in the case for beef prices, the Atlantic pork price (Brazil) oscillates quickly in the beginning of the simulation, later slowing to the typical period of five or six years. Price-response in consumption is even higher for pork than it is for beef.

Figure 6. World dairy prices



54. In the dairy market prices, the large but eventually dampening oscillations in the butter price are most noticeable, as well as the large drop in SMP price which does not in fact oscillate above zero but rather flattens twice before stabilising. These patterns are understandable given the residual nature of butter and SMP production in the clearing of the milkfat and non-fat solids markets in AGLINK. While the cheese and WMP world prices show more subdued volatility, nevertheless, the influence of butter and SMP prices is being transmitted to the cheese and WMP markets through supply. The large beginning oscillations in the butter price result from the market adjustment subsequent to singularities in the last year before the simulation.

Elasticity and multiplier calculations

55. To supplement the stability simulation, an investigation has been conducted into the short, medium, and long-term multiplier effects of a one-time shock. A simulation was run in which a shock was imposed on a selected exogenous macroeconomic variable at the beginning of the projection period. The multiplier values were calculated at each of the three horizons as the percentage difference between the shock simulation and the baseline simulation conducted above, that is: (shock simulation minus baseline simulation)/baseline simulation. The shock was generated by a simulated *increase* in the selected control variables. This experiment provides an indication of the interdependence and complexity of domestic and international commodity markets and enables an assessment of model quality.

56. Four key macroeconomic variables are included in the AGLINK-COSIMO model. These are:

- Gross Domestic Product, expressed as an index, which is used as a proxy for consumer income;
- Private Consumption Expenditure Deflator, a broad based indicator of inflation, which is used to deflate consumption prices thus enabling specification of consumer demand relations;
- Gross Domestic Product Deflator, which is used as a proxy for economy-wide prices;

- Exchange Rate, expressed as the Local Currency Unit price of USD 1, which enables spatial price linkage relationships to account for changes in the values of currencies;

- World Oil Price, which is the Brent crude oil price in US dollars per barrel.

57. Production costs are approximated by the Commodity Production Cost Index which measures a mixture of energy and non-energy costs to producers in local currency. The index is constructed from GDPD, the World Oil Price and the Exchange Rate.

58. In considering this set of macroeconomic variables, one of the most fundamental relationships to investigate is the effect of changes in income on agricultural commodity production and consumption, and the subsequent impacts on market clearing prices. Three scenario simulations with respect to GDP were performed using the 2005-2025 baseline from the stability simulation. The first was a 1 per cent increase in GDP in all countries simultaneously (Table 3.1), followed by separate increases in the countries in the AGLINK component of the model only and then in the countries in the COSIMO component of the model only. In each case, the impacts on production and consumption are considered for each commodity in Table 3.2 while Table 3.3 presents the impacts on market clearing prices. An exchange rate scenario was not performed due to the difficulties involved in defining such a scenario.

59. Overall, shocks to income should have the largest effect on high value-added agricultural commodities like meat and dairy products. This is confirmed in Table 3.1 which shows that multipliers are largest for these products, in particular for the medium-term and beyond. There is a strong immediate (1st year) impact on poultry production and consumption in both components, but also in the market for FDP in the COSIMO component. In the medium-term, income multipliers are highest for beef production and consumption, with a slightly higher contribution to the overall impact coming from consumption increases in the AGLINK part of the model. All elasticities are small for both consumption and production of crops, with consumption being slightly more responsive, not because consumption is more responsive, but because stocks depend on prices – in the experiment, prices go up, so stocks go down. Hence consumption must go up by more than production to balance markets. In other words, the first-round increase in consumption due to the higher income causes second round effects that are shared between consumption, production and stocks. In general, the increase in the consumption of crops is highest in the short-term for the COSIMO component (notably wheat) and in the medium-term predominantly in the AGLINK component (notably oilseeds and oilseed meal). An increase in income raises medium-term consumption of vegetable oils in AGLINK countries, which stimulates production in the medium-term in not only the AGLINK countries but also in COSIMO countries/regions.

AGLINK MULTIPLIER TABLES

Table 3.1. Multipliers with respect to GDP: AGLINK and COSIMO model effects of a simultaneous 1% increase in GDP in all countries

	Production			Consumption		
	%			%		
AGLINK component	ST	MT	LT	ST	MT	LT
Wheat	0.03	0.04	0.13	0.03	0.12	0.17
Coarse Grain	0.01	0.08	0.11	0.11	0.19	0.20
Rice	-0.01	0.00	0.02	0.00	0.00	0.02
Oilseed	0.03	0.25	0.25	0.12	0.24	0.24
Oilseed Meal	0.13	0.25	0.26	0.12	0.25	0.27
Vegetable Oil	0.16	0.28	0.29	0.17	0.38	0.38
Beef	0.04	0.46	0.47	0.12	0.53	0.55
Pork	0.19	0.33	0.40	0.22	0.33	0.41
Poultry	0.42	0.39	0.44	0.56	0.50	0.54
Fresh Dairy Products	0.13	0.22	0.21	0.06	0.14	0.14
Cheese	0.10	0.28	0.29	0.11	0.31	0.31
Butter	-0.09	-0.03	0.01	0.07	0.18	0.16
SMP	-0.07	-0.03	0.02	-0.17	-0.05	-0.03
WMP	0.11	0.32	0.32	0.17	0.41	0.40
COSIMO Component	ST	MT	LT	ST	MT	LT
Wheat	0.07	0.15	0.14	0.16	0.19	0.18
Coarse Grain	0.08	0.29	0.33	0.12	0.15	0.13
Rice	0.09	0.13	0.14	0.15	0.14	0.13
Oilseed	0.07	0.16	0.17	0.09	0.09	0.10
Oilseed Meal	0.06	0.06	0.07	0.15	0.12	0.06
Vegetable Oil	0.12	0.27	0.30	0.25	0.15	0.20
Beef	0.26	0.45	0.45	0.06	0.30	0.27
Pork	0.00	0.22	0.20	-0.11	0.19	0.18
Poultry	0.37	0.25	0.23	0.31	0.20	0.18
Fresh Dairy Products	0.52	0.55	0.62	0.52	0.55	0.62
Cheese	0.15	0.54	0.47	0.04	0.31	0.30
Butter	-0.37	0.60	0.37	-0.48	0.41	0.24
SMP	-0.20	0.22	0.12	0.09	0.12	0.15
WMP	0.25	0.34	0.26	0.06	0.23	0.23
Both Components	ST	MT	LT	ST	MT	LT
Wheat	0.05	0.08	0.14	0.09	0.15	0.17
Coarse Grain	0.03	0.13	0.16	0.11	0.18	0.18
Rice	0.05	0.08	0.09	0.09	0.09	0.09
Oilseed	0.04	0.24	0.24	0.12	0.22	0.22
Oilseed Meal	0.12	0.23	0.23	0.12	0.23	0.24
Vegetable Oil	0.14	0.28	0.29	0.21	0.29	0.31
Beef	0.10	0.46	0.46	0.10	0.46	0.47
Pork	0.17	0.31	0.38	0.17	0.31	0.38
Poultry	0.41	0.35	0.39	0.49	0.41	0.43
Fresh Dairy Products	0.34	0.40	0.44	0.31	0.37	0.40
Cheese	0.10	0.31	0.31	0.10	0.31	0.31
Butter	-0.24	0.30	0.20	-0.24	0.31	0.20
SMP	-0.09	0.00	0.03	-0.09	0.00	0.03
WMP	0.12	0.32	0.31	0.13	0.34	0.34

ST,MT,and LT refer to first year impact, 6th year impact and 20th year impact of changes.

GDP increase: AGLINK versus COSIMO

60. Two other simulations indicate the different degrees to which growth affects agricultural commodity markets in the model. In the first, the effects of GDP growth in the AGLINK component are compared with those in COSIMO (Table 3.2). Subsequently, the effects of GDP growth on market clearing prices are compared for shocks imposed on the entire model and on each of its components separately (Table 3.3).

61. Table 3.2 presents the income elasticities when the AGLINK and COSIMO components are treated separately. In each case, the short-term, medium-term and long-term responses on production and consumption are considered of a 1% increase in GDP. For the AGLINK component, the largest response is in the poultry market with positive elasticities of around 0.5 for both consumption and production. The effect is exclusively short-term, which can be seen from the table where medium-term and long-term elasticities remain around 0.5 (that is, the bulk of the change occurs in the short-term). A similar magnitude of response is found for beef consumption and production, but in this case the response is predominantly in the medium- and longer term. Most notable among the responses for dairy products is the positive effect on both cheese and WMP consumption and production, once again with the impact taking place over the medium- and longer term. There are small negative effects on SMP production and consumption and butter production, predominantly in the short-term, which dissipate over the projection period. The responses of crop consumption and production are similar to those shown in Table 3.1 under the simultaneous shock, that is, by and large, the effects are muted apart from a moderate income elasticity of crop consumption in the medium-term. However, for vegetable oils there is a more substantial income response over the short to medium-term, in particular on the consumption side.

62. In the COSIMO component, the greatest impact of an increase in GDP is in the FDP market, with an immediate effect on both production and consumption (exceeding 0.4). As in the AGLINK component significant short-term effects are observed in poultry production and consumption and vegetable oil consumption, which taper off slightly with time. These responses are smaller in the COSIMO component than in the AGLINK component. The income response in the COSIMO markets for beef and pork is apparent from the medium-term and beyond. Once again, the effects are smaller than in AGLINK. In general, the impact on the consumption of dairy products is larger in the COSIMO area, in particular for cheese, butter and SMP, high value-added products for which income elasticities of demand are higher in developing countries than in the primarily developed countries of AGLINK. The income effect on butter builds strongly over the medium-term, both in consumption and production. In the COSIMO area, crop consumption responses are larger than those for crop production and the (positive) short-term effects for wheat, coarse grains and oilseed meal are greater than in the AGLINK area. The only (small) negative responses for the COSIMO component are the first year impacts on butter, SMP and WMP.

Table 3.2 Multipliers with respect to GDP: AGLINK and COSIMO model effect of a 1% increase in GDP for each of the models separately

	Production			Consumption		
		%			%	
AGLINK component	ST	MT	LT	ST	MT	LT
Wheat	0.02	0.02	0.08	0.06	0.13	0.18
Coarse Grain	0.01	0.07	0.09	0.11	0.20	0.20
Rice	-0.01	-0.01	0.00	0.00	0.01	0.03
Oilseed	0.03	0.19	0.20	0.10	0.18	0.20
Oilseed Meal	0.10	0.19	0.21	0.13	0.25	0.28
Vegetable Oil	0.12	0.22	0.24	0.30	0.44	0.45
Beef	0.04	0.43	0.46	0.16	0.53	0.56
Pork	0.19	0.33	0.40	0.23	0.34	0.41
Poultry	0.42	0.40	0.45	0.55	0.51	0.56
Fresh Dairy Products	0.15	0.22	0.22	0.08	0.14	0.14
Cheese	0.09	0.27	0.28	0.15	0.33	0.33
Butter	-0.12	-0.04	-0.02	0.10	0.18	0.17
SMP	-0.11	-0.06	-0.03	-0.11	-0.02	0.01
WMP	0.06	0.26	0.26	0.26	0.44	0.43
COSIMO Component	ST	MT	LT	ST	MT	LT
Wheat	0.06	0.11	0.09	0.15	0.17	0.17
Coarse Grain	0.05	0.12	0.11	0.14	0.17	0.16
Rice	0.07	0.11	0.12	0.13	0.13	0.13
Oilseed	0.02	-0.01	0.01	0.05	0.03	0.04
Oilseed Meal	0.01	-0.01	0.00	0.20	0.25	0.24
Vegetable Oil	0.03	0.06	0.07	0.32	0.25	0.26
Beef	0.11	0.25	0.28	0.22	0.30	0.29
Pork	0.00	0.20	0.20	0.08	0.24	0.23
Poultry	0.31	0.27	0.27	0.26	0.22	0.21
Fresh Dairy Products	0.41	0.43	0.45	0.41	0.43	0.45
Cheese	0.01	0.26	0.23	0.25	0.37	0.36
Butter	-0.05	0.42	0.33	0.00	0.41	0.34
SMP	-0.02	0.17	0.14	0.23	0.23	0.24
WMP	-0.15	0.17	0.14	0.24	0.26	0.27

ST,MT,and LT refer to first year impact, 6th year impact and 20th year impact of changes.

63. Table 3.3 contrasts the effects on market clearing prices of GDP growth in the entire model with similar growth in the AGLINK and COSIMO components individually. There are no negative price impacts, and in general, price responses are greatest in the short-term. Moreover, the effect of income growth in COSIMO countries on world prices is lower than in the AGLINK countries, which reflects the dominant position of the latter in most markets and the generally higher income elasticities in less developed countries. Also, it is worthwhile noting that in many COSIMO countries, GDP growth levels are higher and more volatile than those of AGLINK countries.

64. Short-term price responses in the entire model exceed 1% for all non-crop commodities (Table 3.3) and are especially strong for butter, beef and pork. Under a simple market structure, the effects on prices would be determined by the ratio of the sum of supply and demand income elasticities to the sum of the supply and demand price elasticities. In general, since in the short-term, the supply elasticities of most agricultural commodities are very low, the driving factor behind first year price response will be the relative size of the income-effects and price-effects of demand. The strong positive price response in the

short-term functions as an incentive to increase supply and as break on consumption. This leads to a stabilisation of market prices, and the table shows that the price response over the medium-term is typically much lower than that in the short-term. In the longer term, however, consumption begins to pick up as prices stabilise, leading in turn to a strengthening of the increase in market clearing prices. This pattern is particularly evident in the responses for crop prices: an initial impact with higher prices, then lower prices in the medium-term and a subsequent rise in the long-term.

65. The pattern is exaggerated for butter, beef and pork, with an initial amplified shock to prices (which rise strongly). The reduced demand will then cause prices to substantially readjust downward. After the medium-term adjustment, consumption levels have rebounded and will eventually lead to a renewed increase in market prices in the long-term. Of note in Table 3.3 is that the price multipliers for the whole model are the sum of the responses in each component (AGLINK and COSIMO).

Table 3.3 The effects of a 1 per cent increase in GDP growth on market clearing prices due to shocks imposed on the entire model and on the AGLINK and COSIMO components separately

Market Clearing Prices (Per Cent)

	AGLINK component			COSIMO Component			Both Components		
		%			%			%	
	ST	MT	LT	ST	MT	LT	ST	MT	LT
Wheat	0.30	0.20	0.36	0.23	0.15	0.20	0.53	0.36	0.56
Coarse Grain	0.54	0.50	0.65	0.29	0.21	0.26	0.83	0.70	0.91
Rice	0.16	0.10	0.28	0.44	0.28	0.33	0.60	0.38	0.62
Oilseed	0.53	0.40	0.49	0.18	0.03	0.09	0.71	0.43	0.58
Oilseed Meal	0.38	0.54	0.68	0.13	0.03	0.10	0.51	0.57	0.77
Vegetable Oil	0.97	0.57	0.56	0.35	0.15	0.18	1.33	0.72	0.73
Beef Pacific	2.00	0.67	0.54	0.15	0.03	0.06	2.16	0.70	0.60
Beef Atlantic	1.18	0.36	0.39	0.41	0.07	0.08	1.59	0.43	0.48
Beef FMD	0.94	0.02	0.17	0.61	0.07	0.16	1.56	0.09	0.33
Pork Pacific	2.01	0.54	0.58	0.20	0.10	0.11	2.21	0.65	0.69
Pork Atlantic	1.19	0.51	0.55	0.38	0.14	0.15	1.57	0.65	0.70
Pork FMD	0.99	0.22	0.30	1.47	0.45	0.49	2.47	0.68	0.78
Cheese	1.15	0.53	0.56	0.51	0.15	0.18	1.66	0.68	0.74
Butter	1.89	0.31	0.62	1.42	0.19	0.37	3.33	0.49	0.99
SMP	1.04	0.71	0.63	0.31	0.16	0.14	1.35	0.87	0.77
WMP	1.18	0.33	0.35	0.42	0.14	0.16	1.60	0.47	0.51

ST,MT,and LT refer to first year impact, 6th year impact and 20th year impact of changes.

CHAPTER 4. POTENTIAL FOR ANALYSIS PROVIDED BY PARTIALLY STOCHASTIC SIMULATIONS

66. OECD has so far provided deterministic price projections of agricultural commodity supply and demand quantities and prices. However, policy developments in agricultural markets and also the context of trade negotiations are encouraging agricultural economists to depart from fully deterministic models by incorporating stochastic elements. The Outlook projections depend on the assumption of normal weather conditions and a stable macroeconomic environment. These assumptions are necessary to generate a set of baseline results that can be used to understand market evolutions and to serve as a basis for policy analysis. However, there are many uncertainties concerning these assumptions. Partially stochastic simulations can help to provide more robust projections and scenario results, and contribute to a better understanding of asymmetric effects of policies. They have already been used in two previous OECD Agricultural Outlook publications.[4]

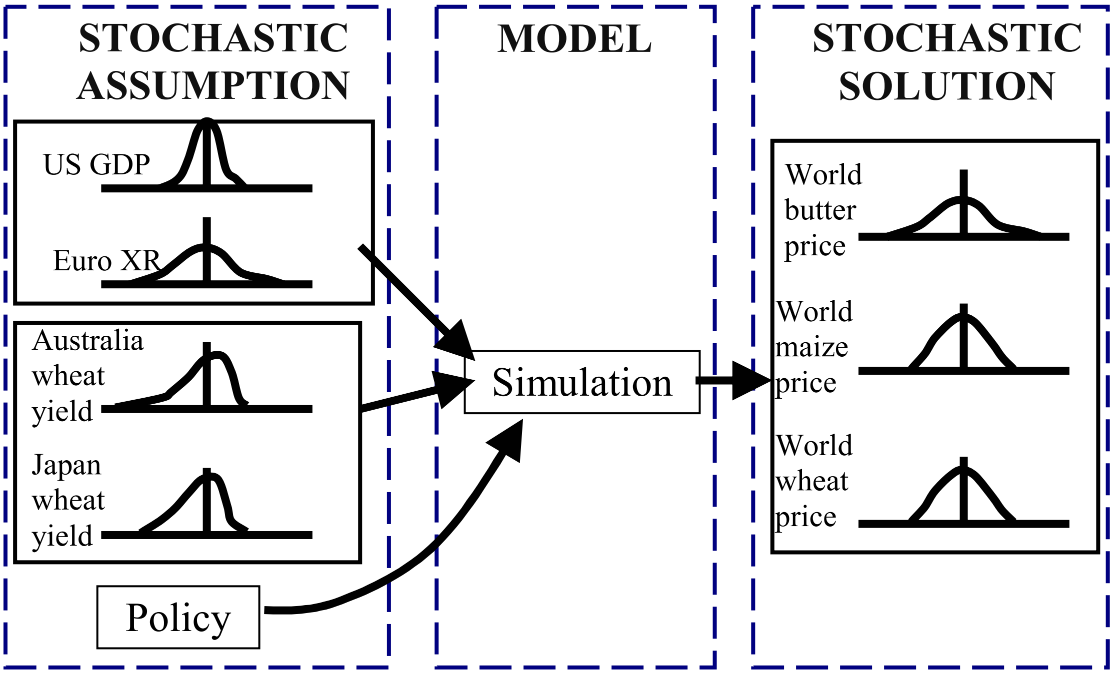
67. As mentioned above, the OECD-FAO Agricultural Outlook represents a single outcome that is contingent on a single set of input variables. This deterministic outcome corresponds to a particular market environment. If the external factors are at least partly defined by a range of possible values and the underlying model is simulated repeatedly for several random samples drawn from this range, then the process is stochastic as multiple output values span a range of different market situations (Figure 7).

The sensitivity of farm income to fluctuations in yields and prices has become increasingly relevant

68. Variability of prices, for example, is usually derived from past variability, without regard to how future policy developments may limit or augment the impacts of stochastic elements on market prices in the future. The two scenarios presented in the above mentioned OECD Agricultural Outlook publications, allowed two of those stochastic elements, yields and macroeconomic variables, to vary in the projection period. Those simulations resulted into a partially stochastic baseline which looked into a wider range of possible outcomes. The inclusion of stochastic elements in baselines and scenarios increases the relevance of the outlook and other analytical results, as it makes them less dependent on a particular set of assumptions.

[4] A partially stochastic simulation based on yields was presented in the OECD Agricultural Outlook 2003, a partially stochastic simulation based on macroeconomic variables was presented in the OECD Agricultural Outlook 2004.

Figure 7. Illustration of a partially stochastic baseline



ANNEX 1
AGLINK-COSIMO NAMING CONVENTION

The naming convention for AGLINK variable names is composed of three fields in most cases. The first field is an abbreviation for the country using the U.N. three digit codes, the second field for the commodity and the third one for the variables. Where required, there may also be an extension to help clarify policy implementation and measures. The following presents the abbreviations used in the first three fields.

Table A.1 List of major abbreviations

Country		Commodity		Variable	
AEL	LDC - East Africa	BA	Barley	AH	Area harvested
AEO	Other East Africa	BAF	Barley (feed)	AHA	Allocatable crop area
AGL	Aglink aggregate	BF	Beef and veal (cwt)	AHE	Area harvested (expected)
ANO	Other North Africa	BT	Butter (pw)	AHT	Total allocatable crop area
AOL	Other Latin America	CA	Casein (pw)	APT	Area planted
AOS	Autres pays d'Afrique Sub-Saharienne	CE	Cereals	ARP	Diversion program
APL	LDC - Asia Pacific	CF	Corn gluten feed	AU	Alternative usage
ARG	Argentina	CG	Coarse grains	CCP	Counter-cyclical payments
ASL	LDC - Southern Africa	CH	Cheese (pw)	CI	Cow inventory
ASO	Other Soutern Africa	CMK	Concentrated milk	CON	Cheese conversion to milk equivalent
ATL	Atlantic market	CR	Cream	CP	Consumer price
AUS	Australia	CT	Cotton	CPCI	Commodity production cost index
AWL	LDC - West Africa	DY	Dairy	CPI	Consumer price index
AWO	Other West Africa	EG	Eggs	CR	Crush
BGD	Bangladesh	FDP	Fresh dairy product	CSU	Consumer subsidy
BRA	Brazil	FE	Feed	CVD	Countervail duty
CAN	Canada	FH	Fish	DEL	Deliveries
CCD	LDC - CLA	FP	Field peas	DP	Direct payments
CHE	Switzerland	FT	Fertiliser	DPF	Fixed direct payments
CHL	Chile	GR	Grain	EEP	Export enhancement programme payments
CHN	China	HP	High protein	EEPTN	Export enhancement programme payments per tonne
COL	Colombia	LA	Lamb meat	EPP	Effective producer price
COS	Cosimo aggregate	MA	Maize	ERH	Expected returns per hectare
DZA	Algeria	MAW	Maize white	ESP	Effective support price
E08	European Union-08	MAY	Maize yellow	ET	Ethanol
E10	European Union-10	MD	Meat and dairy	EX	Exports
E15	European Union-15	ME	Macro Economic	EXL	Exports live
E25	European Union-25	MF	Milk fat (pw)	EXM	Exports meat
EGY	Egypt	MK	Milk	EXP	Export price
EUR	European market	MKB	Milk from buffalo	FAT	Butterfat content of milk
FMD	FMD affected market	MKC	Milk concentrate	FDP	Fixed direct payments
GHA	Ghana	MKG	Milk from goats	FE	Feed
HUN	Hungary	MN	Manioc	FECI	Feed cost index
IDN	Indonesia	MP	Milk powder (pw)	FEEXP	Feed expenditure
IND	India	MT	Total meat	FM	Fluid milk
IRN	Iran	MU	Mutton	FO	Food; waste and seed
JPN	Japan	NR	Non-ruminant	FP	Fluid milk price
KOR	Korea	OC	Other cereals	GDPD	GDP deflator
MER	Mercosur	ODP	Other dairy product	GDPI	GDP index
MEX	Mexico	OL	Oilseed oils	IM	Imports
MOZ	Mozambique	OM	Oilseed meals	IML	Imports live
MYS	Malaysia	OS	Oilseeds	IMM	Imports meat
NGA	Nigeria	OT	Oats	IMP	Import price
NME	Non-OECD	PA	Pasture	MLP	Marketing loan benefits
NOR	Norway	PK	Pigmeat (cwt)	MP	Market price
NZL	New Zealand	PL	Palm oil	NT	Trade balance
O29	OECD	PO	Potatoes	NTM	Net trade in meat
OAF	Other African Countries	POL	Polyester	OU	Other use
OAP	Asia Pacific; other	PT	Poultry meat (rtc)	PC	Consumption per capita
OAS	Other Asian Countries	RI	Rice	POP	Population
OCA	Other CLA	RL	Rapeseed oil	PP	Producer price
OEC	Other European Countries	RM	Rapeseed meal	QC	Consumption
OEE	Other East Europe	RP	Rapeseed	QCC	Commercial consumption
OIS	Other Independent States	RSU	Raw Sugar (in raw sugar equivalent)	QP	Production
OLA	Other Latin America	RT	Roots and tubers	RH	Returns per hectare
OSA	Other South America	RU	Ruminant	SD	Statistical difference
OWE	Other West Europe	RY	Rye	SP	Support price
PAC	Pacific market	SB	Soybeans	SPT	Specific tariff scheduled
PAK	Pakistan	SC	Special crops	ST	Ending stocks
PHL	Philippines	SCA	Sugar Cane	TAH	Total area
POL	Poland	SF	Sunflower seed	TAR	Tariff
PRY	Paraguay	SFL	Sunflower oil	TAX	Export tax
REG	Regional aggregate for poultry	SFM	Sunflower meal	TP	Target price
RUS	Russia	SH	Sheep meat (cwt)	TRQ	Tariff rate quota
SAU	Saudi Arabia	SL	Soybean oil	VST	Variation in stocks
THA	Thaïland	SM	Soybean meal	WAS	Waste or statistical difference
TUR	Turkey	SMK	Skimmed milk	WP	Wholesale price
TZA	Tanzania	SMP	Skim milk powder (pw)	XP	World price
UKR	Ukraine	SNF	Solids non-fat	XPU	World price
URY	Uruguay	SO	Sorghum	XR	Exchange rate
USA	United States	SU	Sugar (in raw sugar equivalent)	YLD	Yield
VNM	Vietnam	VL	Vegetable oils		
WLD	World	WL	Wool		
ZAF	Republic of South Africa	WMP	Wholemilk powder (pw)		
ZMB	Zambia	WS	Wheat/Soyabeans		
		WSU	Refined Sugar (in raw sugar equivalent)		
		WT	Wheat		
		WYP	Whey powder (pw)		