Accession of the East-European countries to the European Union and the impacts on arable world and European markets : a WEMAC analysis

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Abstract

This contribution proposes an evaluation of the impacts of the accession of the East-European countries to the European Union by a quantitative modelling analysis. The study analyzes the effects of the latest CAP reform and the European enlargement both on the world and European arable markets. By using a world arable multi-market model, the paper provides a market outlook through the year 2010 which includes the recent reform of the Common Agricultural Policy. It compares three scenarios. the first one the situation of 2002 is supposed to remain in place indefinitely and the European Union is composed of 15 countries, the second one includes the effects of the 2003 CAP reform and in the third scenario incorporates the 2003 CAP reform and the European enlargement. For most of the cases, impacts of the reform and of the enlargement are the same but with a different magnitude, the enlargement scenario affects world cereal markets more than CAP reform. The enlargement EU-25 scenario has, in general, higher impacts than that of CAP reform EU-15.

Keywords: partial analysis, world market ,accession

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1. Introduction

The paper focuses on the consequences of enlargement of the European union to the east-European countries both on the world and European arable markets. By using a world arable multi-market model, the paper provides a market outlook through the year 2010 which includes the recent reform of the Common Agricultural Policy. Furthermore, two scenarios based on different sets of assumptions regarding the implementation of the Common Agricultural Policy in the new member states are considered. The consequences for grains and oilseeds markets at both the European and the world level are investigated.

The world arable multi-market model used to study the impact of the accession of the East-European countries is a partial and dynamic econometric model called WEMAC (acronym WEMAC stands for World Econometric Modelling of Arable Crops), which focuses on the world arable crops markets. The model covers world markets for the main cereals and oilseeds. As the assessment of the impact of agricultural policies depends crucially on the level of world prices, one major aim of the model is to analyze the price formation mechanism in world cereals and oilseeds markets.

The major trading countries are individually modelled with the rest of the world aggregated into one region. An important feature of the modelling is that we do not consider the European Union as a bloc: the model provides country level estimates for each of the major crops producers of the European Union (France, Germany, Italy, Spain and the United Kingdom).For the East-European countries, the model provides country level estimates at least for the supply equation for the most important countriess. For all the other countries modelled, the model generates the main domestic market variables: supply, demand, domestic prices and trade estimates. Each of the country sub-models contains the behavioural response of economic agents to changes in prices and exogenous variables.

The paper is organized as follows. In the next section, the model structure is presented along with the general features and national details on the specifications applied to study major arable crops exporters and importers behaviors. Potential effects of the enlargement of the European union to the east-European countries on European Union and world arable crops markets are discussed in section 3. The fourth section concludes.

2. The structure of the World Econometric Modeling of Arable Crops model

This section outlines the general structure and modeling approach used in the World Econometric Modeling of Arable Crop (WEMAC). Before presenting the behavioral equations of each regional sub-models (in the modeling, a country represents a state and a region refers to an aggregate of different countries), we first describe the general features of the model, the current country and commodity coverage.

2.1 Model overview

WEMAC is an econometric, dynamic, multi-product, partial equilibrium model that focuses on arable crops. The model covers several countries/regions and includes a rest of the world aggregate. Major producing, exporting and importing countries are included in the model. The model generates medium-term annual projections for the main cereals and oilseeds markets, under alternative external conditions such as exchange rates or macro-economic shocks, and it is used for policy analysis.

The aims of WEMAC are to provide quantitative evaluations of national and international agricultural policies reforms and to carry out annual market projections over a medium-term perspective and for the main arable crops. This model consists of sets of equations which (except for accounting identities) will be estimated using standard econometric techniques (estimations realized with the software Eviews). Most of the equations in the model are estimated using annual data from the period 1970-2001 (or shorter intervals if data are unavailable).

The model provides information on production, consumption, domestic prices and trade for the main cereals and oilseeds. Agricultural and trade policies are included in each country considered in the model to the extent that they affect the supply and demand decisions of the economic agents. The model consists of a set of country or regional sub-models with linkages established across countries and commodities.

Projections are the results of WEMAC over a ten year period if current situation and trade policies are assumed to remain in place indefinitely. Simulations will be results of exogenous shock or changes in policy variables.

The country coverage includes all the main producing and consuming countries of arable crops and allows analyzing simultaneously equilibria on the world markets for the main cereals and oilseeds. The countries modeled are: Argentina, Brazil, Canada, China, European Union, India, United States, Central and Eastern European Countries (CEEC), Russia, Ukraine and a bloc North Africa and Middle East. An important feature of the modeling is that we do not consider the EU as a bloc. Indeed the model provides country levels estimates for France, Germany, Italy, Spain, and United-Kingdom while treating the other countries of the EU as a group. In the definition of the "Rest of the Union", we take into account EU country enlargement over the estimation period. The bloc CEEC is composed of 6 countries: Bulgaria, Hungary, Poland, Romania, Slovakia and Czech Republic. The model generates supply, demand, domestic prices, and trade estimates for most of the regions/countries. Additional countries (Russia, Ukraine, Africa and Middle East), which are important players on cereals world trades are included. For these countries, only the net trade function is endogenized. And the rest of the world aggregate is exogenous.

Each regional sub-model consists of the following sets of behavioural equations: production(harvested area, yields), consumption (feed use, food use, crush for oilseeds, and stocks), price linkages (prices transmission mechanism between domestic and world prices), trade flows (import and export equations) and the market clearing. The market clearing which must be satisfied for each country, corresponds to the following identity : Beginning stock + production + imports = Ending stock + consumption + exports.

For CEEC region, the model provides country level estimates at least for the supply equations. For these 6 countries, we estimate harvested areas, yields and domestic prices. The other behavioural equations are estimated for the aggregate region of 6 countries.

The model is based on econometric estimates of behavioral equations. In all countries, the equations are estimated in levels, as this offers the advantage of ranking the effects of all the explanatory factors (prices, technical change, policies,...). Most of the equations in the model are estimated using annual data from the period 1970-2001 (or shorter intervals if data are unavailable). The main source for production, consumption, stocks, imports and exports in the WEMAC model is the USDA's Production Supply and Distribution (PS&D) database. For the prices we used the database from USDA/ERS and from national agriculture departments. For the European Union all the data were obtained from NewCronos data bank of EUROSTAT[1]. Tariff data and other data on border measures were taken from the OECD database. Macroeconomic data such as income, exchange rates and inflation are obtained from the International Monetary Fund (IMF) (to have further information on the database, the tools developed to select data and to treat results of the model, see Herrard, Houée, 2005).

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[1] The reason for using Eurostat is that in the model intra-EU trade must be netted out. Indeed PSD database include intra-EU trade. That required data are available from Eurostat.

Another key issue with the dataset is to choose rule adjustments when net global trade for a commodity is no equal to zero. In general we adjusted the Rest of the World data so net global net trade would be zero.

2.2. Behavioral equations and model closure

The WEMAC model includes behavioral equations describing domestic supply, demand, stocks, prices linkages and trade flows, which defines the general structure of the country sub-models.

We first describe the way used for modeling Domestic supply

Individual models used for each country/region have been estimated by introducing cross-linkages between other arable crops. Production in country/region is determined as the product of estimated harvested area and yield equations. In each sub-model, we assume a specific separability structure in crop production. According to that assumption land allocation decisions are taken in three stages. In a first stage, producers split the total available area between fodder crops and arable crops. In the second stage, they allocate the area under arable crops among industrial crops and cereals and oilseeds. In the third stage, the area of cereals and oilseeds is divided among the arable crops cultivated in the considered country. The land allocation scheme is specific to each country studied. We restrict to the third stage where the total area under grains and oilseeds is assumed to be fixed but allocable across the various grains and oilseeds (Coyle 1993, Guyomard and al, 1996). Hence, we model a system of arable crops acreage demand as conditional on total arable crops areas. The crop acreage equations can be written as

$$sur_{i,t} = sur(p^a_{j,t} / v_{t-1}, surgcu_t, Z_t) \qquad i, j = 1,...,n \tag{1}$$

where $sur_{i,t}$ is the crop acreage in year t for the commodity i, $p^a_{j,t}$ is the expected crop output price j ($j=1,...n$), v_{t-1} the input price in t-1, $surgcu_t$ is the total crop acreage allocated to arable crops and Z_t defines a vector of exogenous which could have an impact (these variables depend on the country and include for instance domestic policy variables). We assume that producers do naïve expectations on prices, i.e. $p^a_{j,t} = p_{j,t-1}$. For the estimations, symmetry conditions and adding-up restrictions are imposed.

By and large, the traditional factors behind yield changes are weather conditions (rainfall, temperature), technological innovation (generally introduced as a linear trend with a positive effect), commodity price.

In the WEMAC model, the general specification of the yield equation is as follows

$$rdt_{i,t} = rdt(p^a_{i,t} / v_{t-1}, T) \tag{2}$$

where $rdt_{i,t}$ defines the yield of crop i in year t, $p^a_{i,t}$ the expected price in year t for crop i, t a linear trend and T is a linear trend. Added to this basic specification are other variables such as dummy variables. Dummy variables measure gain or loss of yield for a specific crop in specific years, owing in particular to exceptional weather conditions. They are used for years when there are peaks and troughs in yield indicating climate events (such as the drought in 1976 in the EU). They are not necessarily the same for all of the commodities or countries under analysis. This is because the yield patterns for each crop in the same season are highly contrasted. Also, countries do not necessarily experience the same climate events at the same time.

When producers make these production decisions, they do not usually know the price of the commodity, except in the case of regulated markets, and must therefore rely on expected prices.

Various expectation patterns were tested, based on prices lagged by one, two or three periods, the more convincing schema was the price lagged by one period.

The area and yield equations are jointly estimated using the iterative Seemingly Unrelated Regression Method.

It is worth noting that in contrast to other partial world models, we do not include income per hectare in the specification, this choice allows to distinguish the effect of prices and other policy instruments As noted above, previous general specifications may vary for some individual countries particularly for the European Union and the United States in order to take into account the respective domestic policies.

For the supply modelling, in the European Union we include direct payments introduced by the European Union in 1992 in area equations. The CAP reform in May 1992 consisted largely in reducing support prices and offsetting the ensuing loss of income with direct payments based on factors of production, i.e. acreage in the case of COP (cereal, oilseed and protein) crops. In the literature on decoupling, these area payments are usually defined as partially decoupled instruments (OECD, 2002). Indeed, they affect the level of supply via land allocation mechanisms, in that they promote decisions to put land down to crops that ensure the highest area payments. These payments have a direct effect on land demands for each crop. The land set-aside policy is taken account by introducing it in the second stage in the land allocation decisions.

For the United States, we incorporate the influence of commodity programs in the area and yield equations by including an additional explanatory variable, which corresponds to the average (per hectare) of the production flexibility contracts, the deficiency, diversion and disaster payments. Furthermore, the marketing loan is included in the definition of the producer price (both for supply equations and prices linkages equations).

2.2.2. Domestic demand

In each country, total cereals consumption is the sum of food/consumer demand, feed demand, crushing demand and all other uses of cereals (which includes seed, waste and industrial use). This last use is rather small and is treated as exogenous in the model.

Food/consumer demand is estimated per capita and is specified by the following equation

$$nfh_{i,t} = nfh(pc_{i,t}, pib_t / pop_t, nfh_{i,t-1}) \qquad (3)$$

where $nfh_{i,t}$ is the per capita non-feed demand for the crop i, $pc_{i,t}$ the real consumption price, pib_t / pop_t is per capita real income. The lagged variable $nfh_{i,t-1}$ is included to represent the partial adjustment toward desired demand. Total food use is determined as the product of per capita food use and population.

Because feed is an input into the livestock production equation the theoretical specification of feed demand follows the derived demand approach. The demand for feed use of cereals is essentially determined by changes in livestock production and changes in the prices of individual feedstuffs.

The determination of cereals feed demand rest upon a two stage framework In the first step, the demand functions for cereals and for oilseeds meals are determined. Feed demand is expressed as the following system

$$\begin{aligned} cfocer_t &= cfocer(pc_{cer,t}, pc_{txt,t}, pc_{psc,t}, pc_{amp,t}, PB_{kt}) \\ cfotxt_t &= cfotxt(pc_{cer,t}, pc_{txt,t}, pc_{psc,t}, pc_{amp,t}, PB_{kt}) \end{aligned} \qquad (4)$$

where $cfocer_t$ is the aggregated feed demand for cereals, $cfotxt_t$ is the aggregated feed demand for oilseeds meals. Both variables depend on the real price of the cereals $pc_{cer,t}$, the real price of the meals $pc_{txt,t}$, the price of the cereal substitute product $pc_{psc,t}$ and the price of other protein feeds (protein crops, corn gluten feed, fish and meat meals) $pc_{amp,t}$, PB_{kt} the livestock productions (we distinguish three types of livestock: production poultry, beef and pork production). Both equations are estimated together with constraint of symmetry on prices.

In the second step demand functions for the different cereals and oilseeds meals are expressed in terms of shares with respect to the total amount of the considered feed demand. For the cereals, they depend on the real prices of competing cereals and on the livestock productions (poultry, beef and pork production).

Feed demand in the second step is determined as a system of share, each share is expressed as the following equation:

$$\frac{cfo_{i,t}}{cfocer_t} = cfo(pc_{i,t}, pc_{l,t}, PB_{k,t}) \qquad (5)$$

where $\frac{cfo_{i,t}}{cfocer_t}$ is the share of the cereal i in the total cereal in year t, $pc_{i,t}$ the real price of the cereal i, $pc_{l,t}$ the real prices of competing cereals and PB_{kt} is the livestock productions (with k=poultry, beef and pork production). All equations are estimated together with constraint of symmetry on prices and adding-up restrictions.

In the same way, each share of meals is a function of the real price of the meal, the real prices of the competing meals and the livestock productions.

Stocks

The stock level depends, generally, on the market price and on the beginning stock (lagged value of the stock variable). This structure is modified to accommodate policy intervention, in particular, in EU, United States and China. The intervention system in EU is modelled in stocks equations with the intervention price of the considered commodity. In United States, adjustments are included for cereals to account for government loan program and stockholding policies: Commodity Credit Corporation inventory and Farmers-Owned Reserve program In China, different programs of cereals self-sufficiency are implemented during the two last decade. Hence, we take into account these programs in the evolution of Chinese stocks.

Price transmission

A single world price is assumed to exist for each of the commodity. World prices are expressed in US dollars. Domestic prices are expressed in local currency. Exchange rates are treated as exogenous.Since producer and market domestic prices are different we have two types of transmission price equations to estimate. Except where there are set by government, domestic prices are linked to world prices via linkage equations including exchanges rates. The system to estimate can be written as

$$p_{i,t} = p(pm_{i,t}, h_{i,t}) \qquad (6)$$

$$pc_{i,t} = pc(p_{i,t}) \qquad (7)$$

where $p_{i,t}$ is the producer price of the crop i $pm_{i,t}$ the world price converted in local currency and $h_{i,t}$ other exogenous variables that affect prices levels (the specification allows to take into account domestic policies for instance, in the case of the European Union we introduce the support price as an additional explanatory variable). These price equations are estimated using Three-Least Squares method.

In the European Union, at the level of the individual country model, most prices are linked to the French market prices which are generally defined as the leading prices.

Import and export equations

The WEMAC model distinguishes between imports and exports. Many barriers to trade remain in place and there has been an expansion of the relative importance of non-tariff barriers to trade e.g. tariff-rate quotas and preferential access agreements. The nature and operation of such measures varies between countries and in-itself complicates the modelling of trade flows (Meilke, 1996).

The general specification of the imports equation is as follows:

$$imt_{i,t} = imt(pib_t, \frac{ipc_{i,t}}{ipm_{i,t}}, T, ddd_{i,t}) \quad (6)$$

where $imt_{i,t}$ defines the imports of crop i in year t, pib_t the real income of the country, $\frac{ipc_{i,t}}{ipm_{i,t}}$ the ratio between domestic and world price of crop i in year t, (which measures an indicator of competitiveness), T the trend which allows to the growing openness of the economy in the world market. and $ddd_{i,t}$ the tariffs (when they exist).

We distinguish imports on the import regime under which they enter. Indeed, for countries applying of the tariff quotas, we do not estimate the total of the imports but the level of imports which the tariff quota used are withdrawn . Hence the imports that occur under the Tariff Rate Quotas (TRQ) system are exogenous and equal to the scheduled TRQ. We defined an import equation for the out of quota imports which is calculated as the following way.

$$iml_{i,t} = imt_{i,t} - trq_{i,t} \quad (7)$$

where $trq_{i,t}$ defines the tariff rate quota of crop i in year t (considered as exogenous).

Then we estimate the import demand without the tariff rate

$$iml_{i,t} = iml(pib_t, \frac{ipc_{i,t}}{ipm_{i,t}}, T, ddd'_{i,t}) \quad (8)$$

where $ddd'_{i,t}$ defines the general tariff (except tariff quota) of crop i in year t.

The general specification of the exports equation is as follows:

$$ext_{i,t} = ext(\frac{ipm_{i,t}}{ipc_{i,t}}, qpr_{i,t}, ctt^{p}_{i,t}, sub_{i,t}) \quad (9)$$

where $ext_{i,t}$ defines exports of crop i in year t, $\frac{ipm_{i,t}}{ipc_{i,t}}$ the ratio between domestic and world price of crop i in year t, (which measures an indicator of competitiveness), $qpr_{i,t}$ the domestic supply (production plus beginning stocks) of the commodity considered, $ctt^{p}_{i,t}$ the domestic demand of trade partners and $sub_{i,t}$ the unit amount of the export subsidy i (when it holds). A time trend is sometimes included in export equations to represent the entry of new competing countries.

For the cereals exported as food aid, instead of considering exports total, we estimate total exports of the volume exported minus the level of food aid. Hence we calculate an another variable called « free exportations » as follows.

$$exl_{i,t} = ext_{i,t} - aid_{i,t} \tag{10}$$

where exl are the free exports, $aid_{i,t}$ define crops exported under food aid programs (which is considered as exogenous).

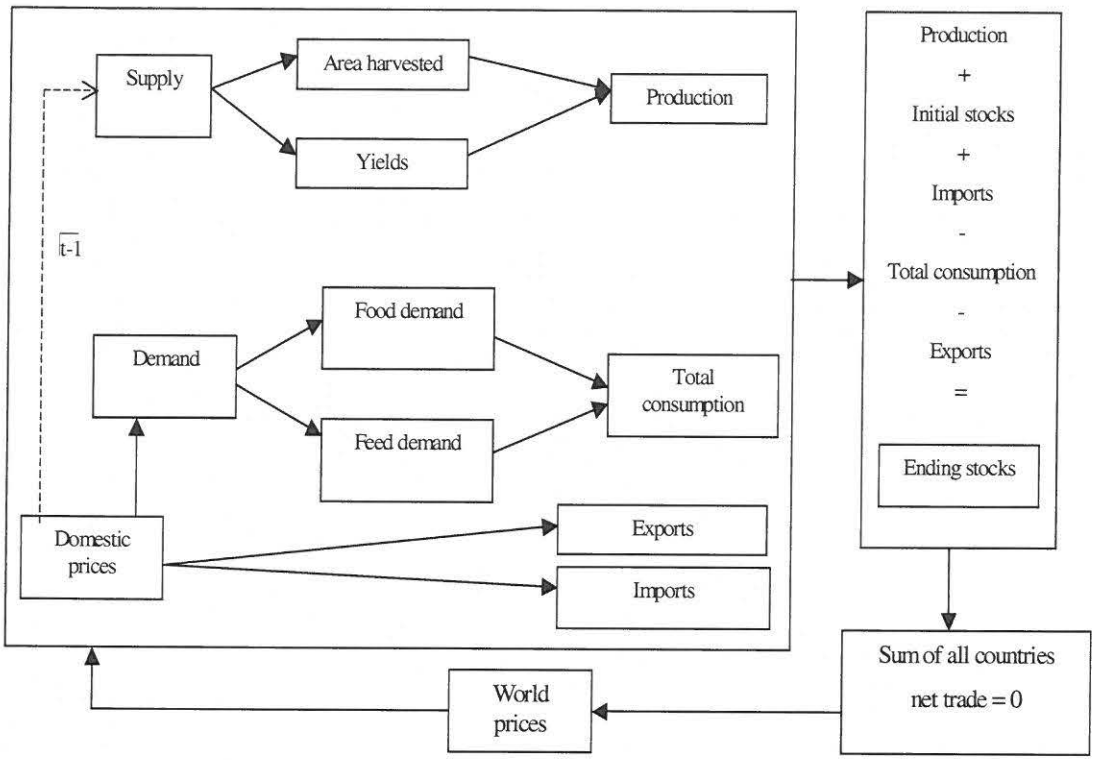
Then we estimate that variable using the explanatory factors described above.

$$exl_{i,t} = exl(\frac{ipm_{i,t}}{ipc_{i,t}}, qpr_{i,t}, ctt^{p}_{i,t}, sub_{i,t}) \tag{11}$$

Closure of the model

For each country model, market clearing is obtained by selecting one behavioral variable as a residual variable. It means that a variable is not estimated but calculated as the residual to check the equilibrium on each regional market. The choice of the residual variable depends on policy and market characteristics relevant for the specific commodity. The flowchart in figure 1 provides an overview for the specification of each country model. In the example illustrated in figure 1, the variable ending stock defines the residual variable.

Figure 1. Country modelling structure



Market clearing condition that determines the world prices is implemented by forcing the sum of net trade across all countries in the model to zero. On the world market clearing is obtained by endogenous world price. Hence, after modeling each country, the net trade positions are summed across all countries. The clearing identity imposed is that the sum of all countries net trade is equal to zero. This identity determines the world price of the corresponding product. Simultaneous solutions of the models are obtained with market clearing equilibriums of the different cereals. We use the Newton's method to solve the world price.

3. Scenarios and simulations results

This study analyzes the effects of the latest CAP reforms and the European enlargement. It compares three scenarios. In the reference scenario, the situation of 2002 is supposed to remain in place: the European Union is composed of 15 countries, the 2003 CAP reform is not considered and the ten new members maintain their independent economic. Hence Hungary, Poland, Slovakia and Czech Republic are included in the CEEC region, and the other new members (Slovenia, Estonia, Latvia, Lithuania, Cyprus and Malta) are stored in the aggregate Rest of the world data. The second scenario, "CAP reform EU-15", considers the 2003 CAP reform in the EU-15 but it does not change the country coverage. The third scenario, "Enlargement EU-25", incorporates the 2003 CAP reform and the European enlargement. To include the new members in the EU, we remove Hungary, Poland, Slovakia and Czech Republic from the CEEC region from 2004 (Bulgaria and Romania are included in the rest of the world data from 2004) and we add these countries in a New Members bloc. The other countries Slovenia, Estonia, Latvia, Lithuania, Cyprus and Malta are removed from the rest of the world data and are added in the New Members bloc. So we obtain a region of ten new members which is introduced in the region EU from 2004. The countries considered in the EU region from 2004 are: France, Germany, Spain, Italy, United Kingdom, a bloc Rest of EU-15 and a bloc New Members. Supply, demand, and trade are aggregated for the ten new members.

CAP reform EU-15

The reform is being implemented starting in 2004.

The current intervention price for cereals is maintained with the exception of rice for which the price is cut nearly by half. Rye is excluded from the intervention system. Changes are in the monthly increments which are cut by half.

Regarding decoupling, members states are expected to implement CAP reform in different ways, therefore resulting in different degrees of decoupling. Since, we consider five individual countries, we can assume different degrees of decoupling for these countries. We assume partial decoupling for France from 2006, more precisely we assume that 25% of the area payments is still coupled to the production. We assume total decoupling for Germany, Italy, United-Kingdom and the Rest of the EU from 2005, and for Spain from 2006.

Modulation (reduction in direct payments for large farms) rates are not considered in the scenarios.

The "CAP reform EU-15" scenario is implemented from 2004 in the EU region composed of 15 countries. The enlargement is not considered in this scenario. Hence we suppose the ten new members maintain their independent economic: Hungary, Poland, Slovakia and Czech Republic are included in the CEEC region, and the other new members (Slovenia, Estonia, Latvia, Lithuania, Cyprus and Malta) are stored in the aggregate Rest of the world data.

Accession (Enlargement EU-25)

Accession took place in May 2004 with policy changes being phased in over time as well. In general CAP policies are adopted by the new members but with some variations to accommodate accession.

Hypothesis on the evolution of new members markets are obtained from 2004 FAPRI baseline.

The "Enlargement EU-25" scenario is implemented starting in 2004. In this scenario, the 2003 CAP reform is considered. Hence all features of the "CAP reform EU-15" scenario are included in the EU-15 and the country coverage is modified. To include the new members in the EU, we remove Hungary, Poland, Slovakia and Czech Republic from the CEEC region from 2004 and we add these countries in a New Members bloc. The other countries Slovenia, Estonia, Latvia, Lithuania, Cyprus and Malta are removed from the rest of the world data and are added in the New Members bloc. So we obtain a region of ten new members which is introduced in the region EU from 2004. The countries considered in the EU region from 2004 are: France, Germany, Spain, Italy, United Kingdom, a bloc "Rest of EU-15" and a bloc "New Members". Supply, demand, and trade are aggregated for the ten new members.

In both scenario, an attempt is made to incorporate the WTO proposals. The choice of implementation in the model is complicate by the fact that the modalities proposal only suggests average rates of reduction for export subsidies and tariffs. In the scenario these are applied uniformly across commodities. Expenditure estimates are based on the assumption that WTO notifications will be made in a similar way in the future as they have in the past.

Results of scenarios

The impacts of the CAP reform and enlargement scenarios on world cereal markets are shown in tables 1-4. For each scenario, the tables report the averages of the 5 annual levels, and percent-change in levels.

For most of the cases, impacts of the reform and of the enlargement are the same but with a different magnitude, the enlargement scenario affects world cereal markets more than CAP reform. We detail the results by crop.

	Soft wheat	Maize	Barley
Baseline ($/t)	81.28	95.63	67.98
CAP reform EU-15 ($/t)	81.42	96.07	67.69
% change	**0.17**	**0.46**	**-0.43**
Enlargement EU-25 ($/t)	81.86	96.10	66.36
% change	**0.68**	**0.49**	**-1.92**

Table 1: cereals world prices (2004-2009 average)

	Net exporters					
	Argentina	**Canada**	**CEEC**	**European Union**	**Ukraine**	**United States**
Baseline (thousand metric tons)	14649	28068	1398	12472	2952	20441
CAP reform EU-15 (thousand metric tons)	14644	28072	1402	12469	2954	20443
% change	**-0.03**	**0.01**	**0.30**	**-0.03**	**0.05**	**0.01**
Enlargement EU-25 (thousand metric tons)	14648	28084	0	13614	2959	20492
% change	**-0.01**	**0.06**	**0**	**9.12**	**0.21**	**0.26**
	Net importers					
	Brazil	**China**	**India**	**North Africa**		
Baseline (thousand metric tons)	7102	12838	5509	28158		
CAP reform EU-15 (thousand metric tons)	7107	12834	5489	28179		
% change	**0.07**	**-0.03**	**-0.35**	**0.07**		
Enlargement EU-25 (thousand metric tons)	7093	12841	5394	28138		
% change	**-0.15**	**0.03**	**-2.13**	**-0.08**		

Table 2. Wheat net trade (2004-2009 average)

On the wheat market, the CAP reform EU-15 has small impacts. The world soft wheat price increases slightly because changes in European soft wheat net trade are nearly negligible (-0.03%). In net exporters, the CAP reform has positive impact on net trade except for Argentina and EU-15. countries which are the most affected by the CAP reform are the smallest exporters ie: CEEC region. In net importers, the CAP reform has positive impact on net trade for Brazil and North Africa, and has negative impact for China and India. The changes are slight but are higher than that for net exporters. India is the most affected by 0.35%.

The enlargement EU-25 scenario has higher impacts than that of CAP reform EU-15. The world soft wheat price increases by an average of 0.68%. The accession of the ten new members augments European soft wheat net trade by an average of 9%. Exports in Ukraine and United States increase by 0.21% and 0.26% whereas the changes was 0.05% and 0.01% respectively. This is caused by the increase in world price. The changes are still negligible for importers, India is the only one country which is affected by the increase in world price, Indian imports decline by an average of 2.13%.

	Net exporters					
	Argentina	**Brazil**	**CEEC**	**China**	**European Union**	**United States**
Baseline (thousand metric tons)	12780	1354	1704	6031	7141	41769
CAP reform EU-15 (thousand metric tons)	12805	1369	1719	6096	6641	42119
% change	**0.19**	**0.99**	**0.86**	**1.10**	**-6.43**	**0.83**
Enlargement EU-25 (thousand metric tons)	12795	1369	0	6129	8983	42091
% change	**0.10**	**1.10**	**0**	**1.93**	**26.55**	**0.79**
	Net importers					
	Canada	**India**				
Baseline (thousand metric tons)	1186	4315				
CAP reform EU-15 (thousand metric tons)	1173	4297				
% change	**-1.10**	**-0.39**				
Enlargement EU-25 (thousand metric tons)	1148	4302				
% change	**-3.31**	**-0.29**				

Table 3. Maize net trade (2004-2009 average)

On the maize market, the CAP reform EU-15 has higher impacts than that of wheat markets. The world maize price increases by an average of 0.46%. This change is slight relatively to the impact on European maize net trade. The European maize exports decline by an average of 6.43%. The CAP reform has positive impact for all exporters except the EU-15 and the world maize market is largely dominate by the United States. American maize exports increase by an average of 0.83%, this is the reason why the impact on world maize price is so slight. For importers, the CAP reform decreases imports of Canada and of India, and Canada which is the smallest importer, is the most affected by the reform (diminution of 1.1%).

The enlargement EU-25 scenario has, in general, higher impacts than that of CAP reform EU-15. The world maize price increases by an average of 0.49%. We can notice that the impact on maize is smaller than that on soft wheat whereas it was exactly the contrary in the CAP reform scenario. The accession of the ten new members increases European maize exports by an average of 26.5%. The new members are net exporters of maize and the accession of these ten countries removes the negative impact of the CAP reform on European maize exports. Hence the changes in world maize price is caused by the slighter diminution of American maize exports than in the CAP reform. The changes are higher for importers, Canada which is the smallest importer is the most affected by the enlargement of the EU (diminution of 3.31%).

	Net exporters				
	Argentina	**Canada**	**European Union**	**Russia**	**Ukraine**
Baseline (thousand metric tons)	395	2869	9972	960	1099
CAP reform EU-15 (thousand metric tons)	395	2859	9999	959	1098
% change	**-0.06**	**-0.37**	**0.27**	**-0.03**	**-0.15**
Enlargement EU-25 (thousand metric tons)	395	2831	11154	958	1090
% change	**-0.14**	**1.32**	**11.85**	**-0.14**	**-0.87**
	Net importers				
	Brazil	**China**	**CEEC**	**United States**	
Baseline (thousand metric tons)	180	3763	401	528	
CAP reform EU-15 (thousand metric tons)	180	3768	402	536	
% change	**0**	**0.15**	**0.24**	**37.08**	
Enlargement EU-25 (thousand metric tons)	180	3771	0	557	
% change	**0**	**0.24**	**0**	**89.64**	

Table 4. Barley net trade (2004-2009 average)

The CAP reform and enlargement scenarios have different impacts on the world barley market relatively to the impacts on wheat and maize markets.

The world barley price declines by an average of 0.43% under the CAP reform EU-15. This diminution is caused by the impacts on barley trade in particular in EU. The barley exports of all exporters decrease slightly except for EU: European exports increase by 0.27%. The barley imports increase for all importers due to the reduction of world price. The change in United States seems to be considerable because of the low imported quantity. The impacts of the CAP reform on the world barley markets are relatively slight.

The barley market is more sensitive with the barley world price decreasing by 1.92% on average under the enlargement scenario. The barley exports increase for EU and Canada, but decline for Argentina, Russia and Ukraine. The changes are higher than that of the CAP reform. The accession of the ten new members increases European barley exports by an average of 11.85%. The EU confirms its leading position in the world barley market. The imports increase for China and United States, the highest change is in the United States, but the imported quantity is still low.

4. Conclusion

For most of the cases, impacts of the reform and of the enlargement are the same but with a different magnitude, the enlargement scenario affects world cereal markets more than CAP reform. The enlargement EU-25 scenario has, in general, higher impacts than that of CAP reform EU-15.

On the wheat market, the CAP reform EU-15 increases slightly the world price (0.17%). The enlargement EU-25 scenario has higher impacts than that of CAP reform EU-15 (augmentation of 0.68%). On the maize market, the CAP reform EU-15 has higher impacts than that of wheat markets. Impacts of enlargement scenario on world maize price are not really higher than that of the CAP reform scenario. The United States are largely major exporter of maize, the slighter diminution of American maize exports allows to explain the changes in world maize price. The CAP reform and enlargement scenarios have different impacts on the world barley market relatively to the impacts on wheat and maize markets. The barley market is more sensitive with the barley world price decreasing by 1.92% on average under enlargement scenario. This change is caused by the impact of the accession on European barley trade. The enlargement allows EU to confirm its leading position in the world barley market.

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