

MID-TERM REVIEW, ENLARGEMENT AND “EFFECTIVE MARKET ACCESS” IN THE EU: AN EVALUATION IN A CGE CONTEXT

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Abstract

The European Union (EU), during last two years, has experienced two significant events: the reform of the Common Agricultural Policy (CAP), known as the “Mid-Term Review”, and the enlargement of the European Union to 10 new members.

This work aims at evaluating some economic changes due to these events.

One issue regards the main domestic effects produced within the “new” EU composed of 25 members (EU25) with respect to the “old” EU (EU15).

The other issue of this work consists of understanding the level of market access, in terms of effective protection, by a new theoretical consistent index (Anderson, 1998), doing a comparison between the “old” EU15 and the “new” EU25, in terms of effective protection.

The methodology chosen in this work is a CGE model and, in particular, the Global Trade Analysis Project (GTAP) model.

Resumen

La Unión Europea (UE), en los últimos dos años, ha pasado a través de dos grandes eventos: la reforma de la Política Agrícola Comunitaria, mejor conocida como "Mid-Term Review" y la expansión de la UE a diez nuevos miembros.

El presente trabajo intenta evaluar algunos cambios económicos producto de estos dos eventos.

Un tópico concierne a los principales efectos producidos en la "nueva" UE compuesta de 25 países (UE25) en relación a la "antigua" UE (UE15).

Otro tópico abordado consiste en la comprensión del nivel de acceso de mercado en términos de protección efectiva, por un nuevo índice consistente teórico (Anderson, 1998), haciendo una comparación en términos de protección efectiva, entre la antigua UE15 y la nueva UE25.

La metodología elegida es el modelo CGE y en particular el modelo de “Global Trade Analysis Project” (GTAP).

Introduction

The fall of the “Berlin Wall” is the beginning of a process of transformation for the Central Eastern Europe without any precedent: on the political side, it has meant the transition to a democratic regime; on the economic side, the conversion from the planning economy towards a market economy. The latter process has been carried out by activating severe policies of macroeconomic stabilisation (regarding principally inflation and public accounts); the restructure of the productive capacity; radical institutional reforms (privatisation); opening towards the international trade.

In 1998, six countries² have been recognised as candidate members for the admission in the European Union. Then, in 2000, this first group was opened to other applicants: Slovakia, Latvia, Lithuania, Romania, Bulgaria and Malta. However, the number of the Accession Countries (AC) and the timing of accession has been under uncertainty for a long time, since when the decisions of the European Council (2002) declared which countries would be admitted and when (1st may 2004 10 countries, Poland, Hungary, Lithuania, Latvia, Estonia, Slovenia, Czech Republic, Slovakia, Cyprus, Malta, became officially members of the EU). The integration process we focus on requires the liberalization of the internal market, the application of the common external tariff (CET) to the new members and the extension of the same level of EU export subsidies to the Accession Countries. More, the integration implies the uniformity of the internal policy, such as the application of the Common Agriculture Policy (CAP) package to the AC. Indeed, because of the crucial role and the high importance of the Common Agriculture Policy in the EU context, we explicitly modelled the CAP measures into our simulations. The inclusion of these measures indubitably does not captures all the potential effects of the enlargement, but allows us to analyse the overall impact of the integration. At the same time, the EU is a partner of the WTO agreement and one of the most relevant market for the agri-food products in the world. So, other issue of the analysis, then, regards the level of market access in terms of effective protection of the EU25 and comparing this level with those of EU15. In this context, furthermore, another goal of the work consists of introducing a new index of effective protection which improves, both empirically and theoretically, the measure of effective protection, overcoming the limits of the “traditional” index introduced in the '70.

The paper is structured into 6 sections. Section 1 and 2 gives some essential elements for a better understanding of the general picture. Section 3 presents the structure of the model and the main changes applied on the base data. In section 4 and 5 the main results in terms of domestic economic effects and of changes in the levels of market access are shown. Finally, section 6 reports, briefly, concluding remarks.

1. Some background considerations

In December 2002, the Copenhagen European Council decided the accession of ten new member states in the EU15. Negotiation for the EU enlargement were difficult and complex but the final agreement was reached and permitted to enlarge EU15 to eight new members of the Central Eastern Europe, plus Cyprus and Malta, scheduled for 1st May 2004.

The reasons of such a hard work - that started in 1993 with the Danish EU Presidency and lasted for almost one decade - is due to the fact that political, institutional and economic organisation of the planned economies in Central East Europe has determined an indispensable operation of a structural conversion to allow these countries to fully adopt the *acquis communautaire* required by the European rules. Moreover, the extension of the CAP to the candidate countries has expanded the phase of the negotiations in the aim to assess the most appropriate shape and measures of the agriculture policy to extend. Last, the administration of ten countries around the table of negotiations has been made particularly tough by the disparities, in terms of political power as well as economic assets, among the single AC and between the AC and EU15.

Nevertheless, the transition period has been partly favoured by EU institutions with the intention of stimulating the economic convergence of AC before the integration process was completed and facilitating the adoption of the *acquis communautaire*. In fact, the enlargement must not only answer to a political opportunity, but also to the economic principles that constitute the foundation of the Union, established in the Treaty of Amsterdam. The inclusion of the new Members Countries must contribute to the economic improvement of Europe in its complex without to weaken the “nucleus” of the EU institutions and, in particular, the domestic market.

However, although the transition period is officially over for eight candidate countries the integration process is still far to be entirely completed. Formally, the abolition of trade protection measures between the accession countries and the former EU has been implemented, but many obstacles coming from differences in production structure suggest that still exists the menace to reach a *deeper integration*.

² The 10 new members are: Cyprus, Czech Rep., Estonia, Hungary, Poland, Slovenia.

2. The CAP and the Eastward enlargement

The EU enlargement process takes place during one of the most significant CAP reforms which determines the continuation of Mac Sharry reform and the definitive consolidation of the principles contained in Agenda 2000.

Agenda 2000 reform and Commission decisions in the Mid Term Review (MTR) imply relevant changes of the EU agricultural policies. The new package of measures adopted in June 2003 - in response of the proposal of the Commission of July 2002 - introduces some specific measures, for bovine meat and cereals in particular, that encourages the members states to implement a further *decoupling* policy for direct payments. Further additional measures concerning intervention price reduction and new internal mechanisms (*modulation* and *dégrossion*) have been set.

Altogether, the sense of this reform is to complete the process in favour of the producer support rather than production support which is particularly relevant in sight of the enlargement. In fact, these two events - the CAP reform and the EU enlargement - are absolutely complementary and their linkages are especially visible in the European Council of Berlin (1999), that produced Agenda 2000 reform. In occasion of this council two important commitment were placed: the budget allocation (known as “financial framework”) for the period 2000-2006 and the extension of production quota and direct payments to the new members countries.

Concerning the “financial framework”, initially no direct payments would have been extended to the new members, fixing the EU spending on the CAP (excluding rural development) at 40.5 billion € (in 1999 prices) per year over the period 2000 – 2006, plus 2 % yearly addition to adjust for inflation.

Successively, in order to cover the period 2007-2013³, the EU *policy makers* extended this agreement in the October 2002, previewing 1% per year of adjustment for inflation. This financial framework was necessary for the European Commission in order to establish the resources required to finance the direct payments and market expenditures in an enlarged EU.

Probably, budgetary constraints imposed under the Brussels 2002 agreement, may necessitate more CAP reform to provide the last round of enlargement with Bulgaria and Romania in 2007.

³ According to the final decision of the European Council (2002), direct payments will be extended to the AC starting with the 25% in 2004 of the actual amount of direct payments in the old Europe, increasing by 5% in the next three years and by 10% until 2013, year of full implementation of direct payments.

3. The structure of the model

By a methodological point of view we choose to analyse the economic effects of PAC reform and the enlargement in a general equilibrium context, using a Computable General Equilibrium (CGE) model as is the Global Trade Analysis Project (GTAP).

The model employed represents the global economy and the baseline of latest available version of the GTAP database (version 5.2) is 1997. It includes up to a maximum of 78 regions and 57 sectors (Dimaranan and McDougall, 2002). The GTAP model is a standard multi-regional, static CGE where all markets are assumed to be perfectly competitive, and technologies exhibit constant returns to scale (Hertel, 1997); tariffs come from the AMAD base data and are those bounded after the Uruguay Round. The sector/country aggregation could be chosen in such a way as to isolate the most sensitive sectors and world regions to the simulated policy experiments⁴.

The world is divided into geographical regions; within each region, consumers are assumed to have identical preferences. They allocate a constant fraction of income between private consumption, public consumption and savings (Cobb-Douglas aggregation), while demands for different private goods have Constant Difference of Elasticities (CDE) functional forms. Each product is perceived as different if produced in another country (Armington differentiation). The elasticity of substitution between any pair of domestic and imported goods is constant within each sector, and the elasticity of substitution between each pair of imported goods originating from different countries is twice higher than that between domestic and foreign goods.

The production side of the model assumes fixed production coefficients between primary and intermediate inputs (Leontief technology); this means that substitution in production between intermediates and primary inputs is not allowed. Production factors are fully employed. Primary production factors (agricultural land, skilled and unskilled labour, capital) are mobile across sectors. The degree of intersectoral factor mobility is captured by a Constant Elasticity of Transformation (CET) revenue function.

Returns to factors of production accrue to households in the form of income which, in turn, feeds into consumption demand and savings. Households' savings can either finance domestic or foreign investment. Total world savings equals total world investment and expected rates of returns on savings are equalised across world regions (neo-classical closure).

Trade data are combined with protection and transportation cost data to represent the fundamental international trade linkages across world regions. Detailed input-output data base derives, for production account, from the inter-sectoral linkages within each region.

⁴ Several problems arise with sectors and countries due to the original aggregation of the model. The Caribbean countries, for example, are aggregated in one region; similarly, fruit and vegetables are highly aggregated, i.e., they are aggregated in unique sector.

Protection data available in this version of GTAP model includes: MFN, *ad-valorem* tariff levels and the tariff equivalents of agricultural shares.

In this work, the world is founded on a aggregation of 3 regions for the first experiment, while, for the market access evaluation we aggregated the EU15 and AC into EU25; the production is shared in 17 sectors, of which 13 are agriculture products (table 1).

Table 1 - Regions, products and endowments aggregation used

Regions	Products	Endowments
EU15 AC (EU25) ROW	paddy rice cereals fruits and vegetables oilseeds sugar cane & beet other primary oilseeds raw milk vegetable oils dairy products processed rice processed sugar other food products motor vehicles textile manufactory sectors services	Land (<i>only for agricultural sectors; fixed factor</i>) Natural Resources (<i>only for extractive and forestry sectors; fixed factor</i>) Capital (<i>sluggish endowments</i>) Labour (<i>skilled and unskilled labour; mobile factor</i>)

The baseline has been updated to the year 2004 since the agreements on enlargement require that the openness of EU15 to the candidate countries takes place in 2004, therefore we believe that it is a reliable to project the database up to this date⁵.

The procedure by which the database has been projected to 2004 is carried out by shocking the main variables of the model and by introducing new elements into our analysis. Related to this aspect, we remind that GTAP model determines changes in production through a double effect: expansion effect and substitution effect in every region/country.

The first, expansion effect, captures changes in domestic and foreign demand increase which is represented by population and income growth. The second, substitution effect, reflects changes in

⁵ To update the baseline to 2004, taking account of the enlargement, we have extended completely the PAC to the AC even if, in reality, the whole application is not immediate and is modulate trough several years starting from 2004.

regional competition by changes in factor productivity, such as production costs and changes in domestic and foreign policies.

Therefore, on the ground of the official statistics, the main variables of the model - GDP, labour force, total factor productivity (TFP) and population - has been shocked according to these projections⁶.

Similarly, new elements have been modelled in the basic version related to new policies introduced into CAP: Agenda 2000 and Mid Term Review (Conforti, De Filippis, Salvatici, 2003).

The baseline scenario

The updating assesses Agenda 2000 and Mid-Term review policies and takes into consideration also the four variables projections to 2004. The main measures of Agenda 2000 included in our analysis are showed in table 2. Given this setting, it is evident how Agenda 2000 is still anchored to a coupled, or partial decoupled, formula of direct payments. In this version of the CAP the intention of the Commission is to reduce gradually and slowly the income support in order to prepare the field for further reforms and under the concern of the EU enlargement.

Table 2 - Agenda 2000 measures modelled

Product	Measure
cereal	- Reduction of the intervention price through the decrease in import tariffs as in Van Tongeren and Van Meijl (2000). - Increase in direct payments cereals as an increase in the subsidy to land by + 16%, from 54 to 63 Euro/ton
Milk	- Introduction (partially) of quotas. - Increase in milk shares by 2.4% as well as a decrease in the intervention prices for butter and skimmed modelled as a decrease in the import tariff -15%, as a weighted average of the reduction for butter and skimmed milk powder
oilseeds	decrease in direct payment for oilseeds modelled as a decrease in the subsidy to land by -33% from 94 to 63 Euro/ton
bovine meat	- Introduction of a slaughtering (coupled) bovine premium as an increase in the output subsidy for livestock. The value of bovine meat has been calculated on the sector as the 80% of the livestock sector - increase in the semi-decoupled premium for bovines as an increase in subsidy to capital by 44% decrease in the premium (weight of bovine)

Source: our elaboration in the ground of Conforti, Salvatici De Filippis (2003)

In table 3, rather, are showed the main measures of the Mid-Term review implemented in the model. In our representation some of the main frameworks of the reform, like rural development measures, the cross compliance, “modulation” and “degression” of direct payments are not

⁶ In particular, the official statistical centres are: IMF for GDP, FAO for labour force, UN for population. In order to update TFP we simply refer to Hertel and Martin (2000).

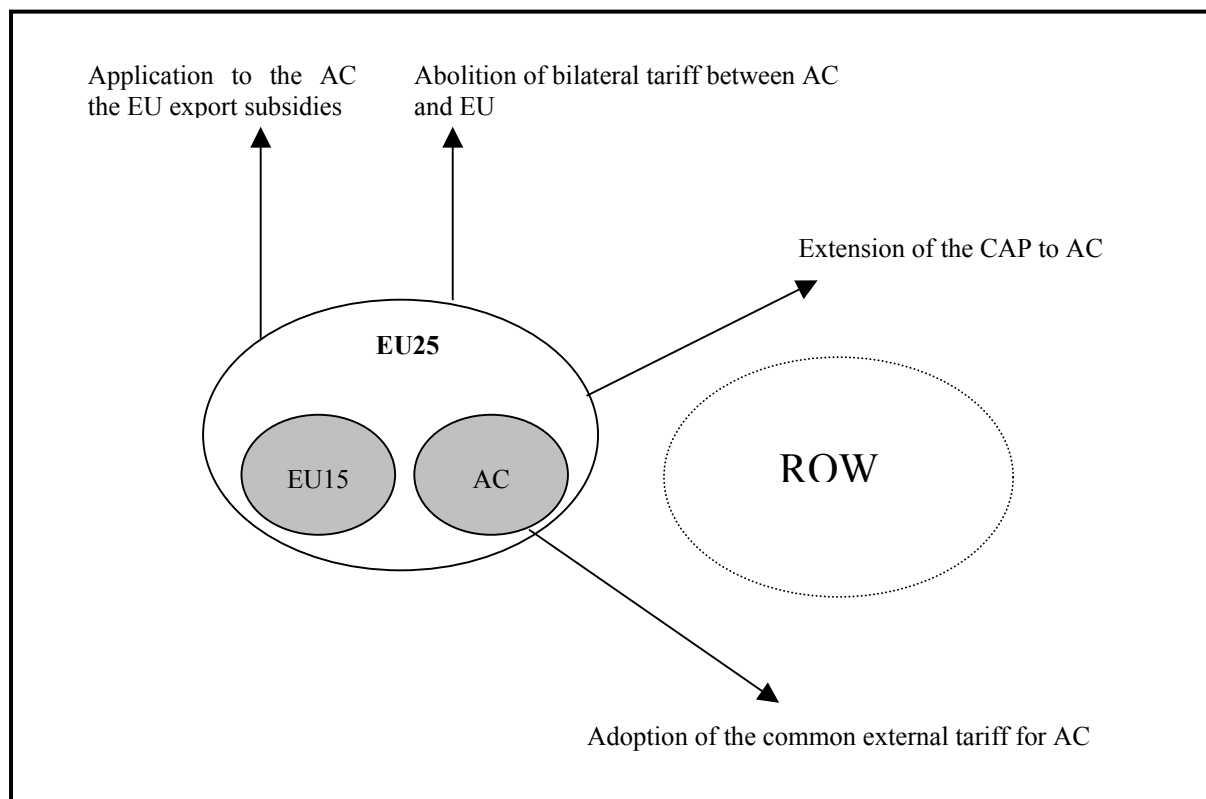
employed⁷. However, as it is known, the final agreement on the CAP reform concerns essentially market policy changes, which are the core of the budget expenditure in the Union and which are introduced in our “2004” baseline.

Table 3 - MTR measures modelled

Product	Measure
rice	- Reduction of the intervention price by 50% - the increase in the direct payment for rice growers
milk	- Introduction of shares. - Increase in milk shares by 2.4% as well as a decrease in the intervention prices for butter and skimmed modelled as a decrease in the import tariff -15%, as a weighted average of the reduction for butter and skimmed milk powder
cereals and oilseeds	We opted for maintaining up to 25% coupled premium and full decoupled the remaining 75%.
bovine meat	- Total decouple of slaughtering (coupled) bovine premium

Source: our elaboration in the ground of Conforti, Salvatici De Filippis (2003)

Fig 1. The integration scenario



⁷ Other market regulations have been approved by the Commission and directed to specific products - such as rye, durum wheat, potato starch, nuts, etc.- but, the model does not include sufficiently disaggregated goods to allow to address those market interventions.

Turning to the approach followed for the direct payments, *decoupling* is introduced in the model through an endogenous uniform land subsidy granted to all agricultural products, and this option is supposed to be chosen by the old member states as well as the new members.

4. The enlargement effect

In this work, we are interested in analysing the main domestic economic effects and the market access changes produced in the EU after the enlargement. At a first approach, it is possible to verify the basic effects produced on domestic production share, net trade position and *welfare* effects (terms of trade and allocation efficiency), while, in the second case, we compare the level of effective protection between the EU15 at 2004 and the EU25.

Output and trade effect

In table 4 the changes in the distribution of production and exports, among the agricultural sectors, as a share of the total value of domestic production and exports are represented. The data reflect the propensity of EU and the AC to the relocate their production and export among different sectors as a result of the integration process.

The extension of Agenda 2000 and the MTR to the AC appears to have a direct impact on some sectors in particular: livestock, cereals, milk and paddy rice. Moreover, the assumption to which a total *decoupling* policy to the direct payments has been introduced uniformly in the two regions, seem to produce only marginal increase in the share production of those sectors.

Tab. 4 - Production and export share in EU and AC: pre and post integration for agriculture products, (%)

	AC10 domestic production share		EU15 domestic production share		AC15 export share		EU15 export share	
	Pre- integration	Post- integration	Pre- integration	Post- integration	Pre- integration	Post- integration	Pre- integration	Post- integration
paddy rice	0,55	0,92	0,54	0,01	0,00	0,00	0,00	0,00
cereals	1,61	1,71	0,35	0,34	0,43	0,83	0,59	0,58
oilseeds	0,12	0,11	0,05	0,05	0,14	0,13	0,06	0,06
fruits and vegetables	0,54	0,61	0,20	0,19	0,42	0,35	0,67	0,70
livestock	3,81	4,29	1,65	1,65	2,28	4,00	1,27	1,29
raw milk	0,84	1,21	0,81	0,79	0,03	0,00	0,00	0,00
dairy	0,04	0,06	0,01	0,01	0,96	2,10	0,86	0,85
processed rice	0,84	0,80	0,28	0,28	0,02	0,09	0,03	0,03
sugar	0,59	0,55	0,36	0,36	0,24	0,63	0,17	0,16
vegetable oils and fats	0,82	1,68	0,40	0,38	0,33	0,43	0,39	0,40

Source: GTAP simulation (base data update to 2004)

In both regions, EU15 (or “old” members) and AC, livestock sector holds the higher share of production and export products over the totality of agricultural sector. Enlarging the EU15, under the condition of total decoupling, influences the new members production share of livestock by increasing it up to 4,3%, which retains the same level of percentage for the “old” members.

Cereals production is also estimated to increase their share in the new member states by 0,1% compared to the pre-integration scenario, while for the “members” it declines by 0,01%. Similarly as for the livestock sector, the application of the CAP to the AC stimulates the AC production as well as their export.

Tab. 5 - Domestic production changes in Eu, Ac and ROW. (%)

	Domestic production changes	
	AC10	EU15
paddy rice	44,23	-1,15
cereals	1,13	-0,33
oilseeds	0,93	0,27
fruits and vegetables	1,93	1,88
livestock	17,59	0,10
raw milk	-4,70	-0,70
dairy	35,90	-1,65
processed rice	36,76	-1,74
sugar	17,89	-1,65
vegetable oils	0,50	0,53
other food products	7,40	0,67
motorveich	42,78	-1,30
textile	12,59	0,21
manfcs	5,83	0,07
svces	2,10	0,07
Total	7,36	0,02

Source: GTAP simulation (base data update to 2004)

Observing table 5, livestock still captures a relevant change of production in the accession countries, which raise their production by 17,6 % compared to the base year. However, dairy and rice sectors register the most significant expansion on the agriculture production while, on the contrary, the production of raw milk declines by 4,7 %.

On the other hand, for “old” members, livestock production and oilseeds are estimated to remain stable respectively around 0,1 % and 0,3% increase, while the other traditional sectors highly supported under the CAP, such as cereals and rice (paddy and processed) show slightly larger reductions by 0,3% and on average approximately 1,4%.

Among the agricultural products, the enlargement is expected to have a major impact for vegetables and fruit production on supply response that expand the domestic quantities by 1,8%.

Finally, the negative change in the production rate of “old” members associated to a decline in EU15 of some agricultural productions - such as rice, cereals, and dairy – let us suppose that a relocation from those regions to the new members may occur. The enlargement process and the

extension of the CAP to the accession countries has a direct impact to the domestic production of the agricultural products. Although this effect may be partly moderated by the full *decoupling* policy of direct payment instead of the adoption of other similar measures, like partial *coupled* payments (Salvatici, Conforti De Filippis, 2003), the final consequence of the implementation of the CAP package results in a stimulation of the supply response and the expansion of production.

Tab. 6- Change in the net trade position, for the main agricultural products by regions, between pre and post enlargement, (%)

	AC10	EU15
cereals	-72,9	182,7
oilseeds	-11,0	6,4
fruits and vegetables	71,5	-76,9
livestock	101,3	-225,4
raw milk	31,9	-0,2
dairy	86,4	10,8

Source: GTAP simulation (base data update to 2004)

Concerning trade (table 6), the simulation results reflect a deterioration of the net trade position for cereals and oilseed products for the new members, due to a more significant import increase than exports flows, and a consequently improvement of the other agricultural product net trade. In particular, livestock captures the larger percentage variation in AC but great reductions in Eu15 as a result of the integration process.

Welfare implications

Welfare implications deriving from European economic integration is one of the most important element in approaching the EU enlargement. Although most of the literature on eastward EU integration believes that budget implications are the most relevant component of the enlargement impact⁸, welfare implication gives rise of the economic dimension of resources allocations and terms of trade effect.

GTAP model permits to isolate the different elements of welfare composition in order to focus directly on single welfare effect.

⁸ See: Jensen and Frendsen (2003) and Bach, Jensen and Frandsen (2000), etc.

Under the model specifications it is possible to examine essentially two main elements in the welfare perspective:

- Terms of trade
- Allocation efficiency

Concerning terms of trade, it is known that a raise in border protection determines a terms of trade improvement. As the enlargement of EU means essentially to extend the Common External Tariff (CET) to the new member states, for which an increase of their import tariff is required, we expect a general improvement of terms of trade of the new integrated region and, therefore, a welfare increase (at least on this side).

Tab. 7 - Import *ad valorem* tariffs of AC and EU15 before enlargement, %

	AC	EU15
paddy rice	96,4	86,2
cereals	67,8	48,0
oilseeds	64,3	37,3
fruits and vegetables	50,3	62,9
livestock	94,9	82,9
raw milk	11,8	11,8
dairy	179,4	110,2
processed rice	179,3	29,0
sugar	222,3	47,1
vegetable oils	49,2	46,6
other food products	34,7	52,7
motorveich	29,6	22,8
textile	27,6	22,9
manfcs	18,2	13,6
svces	0,4	0,2

Source: GTAP simulation (base data update to 2004)

In fact, the adoption of the same level of EU15 protection determines for the new members a general worst of terms of trade, as the initial tariff rate results higher in AC (table 8). In particular, the largest gains comes from vegetables-fruit and other primary factors sector, for which AC tariffs were lower, while, conversely, motor vehicles, textile and manufactory higher applied tariffs were in place.

Tab. 8 - Overall welfare effect of EU enlargement, %

	Allocation	Terms of trade	Other factors	Total
AC	-1.347,9	-663,9	567,7	-1.444,1
EU	1.181,8	222,2	-156,4	1.247,5
ROW	816,0	449,3	-423,6	841,7
Total	649,9	7,6	-12,3	645,1

Source: GTAP simulation (base data update to 2004)

Tab. 9 - Allocation efficiency and terms of trade by product and region as a consequence of the integration, %

	AC10		EU15		ROW	
	Allocation efficiency	Terms of trade	Allocation efficiency	Terms of trade	Allocation efficiency	Terms of trade
paddy rice	1,2	-0,3	-0,6	0,7	-0,1	-0,6
cereals	-54,6	-209,2	24,3	117,6	-26,1	113,0
oilseeds	-3,1	-11,1	-0,3	10,3	0,9	-1,1
fruits and vegetables	50,6	71,4	18,2	-70,3	-5,4	0,3
livestock	-89,6	-32,5	128,3	-364,3	161,1	426,8
raw milk	-7,8	15,3	1,4	-8,4	2,5	-5,9
dairy	-77,3	170,8	103,6	-343,6	250,2	226,5
processed rice	-20,5	-8,9	-1,3	7,6	8,7	3,7
sugar	88,0	-8,4	43,8	6,8	-2,0	14,8
vegetable oils	3,9	-51,7	4,2	3,5	-3,6	51,3
other food products	-158,6	-889,0	107,2	128,8	55,6	849,2
motorveich	44,5	-1050,2	452,2	614,0	179,2	427,8
textile	18,5	-114,2	39,4	-19,4	-39,2	135,9
manfcs	280,4	-682,0	338,2	315,0	-46,4	344,5
svces	-367,1	2135,7	-135,3	-176,0	265,1	-2136,9
Total	-291,6	-664,3	1123,3	222,2	800,5	449,3

Source: GTAP simulation (base data update to 2004)

Turning to the analysis of the resource efficiency distribution it seems that enlargement process reveals an inefficient allocation in total terms, where the “misleading” effect of the Common Agriculture Policy are probably the main responsible of the negative percentage change in AC. In fact, in AC the deterioration of terms of trade and the allocation “inefficiency” reduces total welfare while in the remaining regions the improvement in welfare is clearly evident.

In this view, analysing product by product, most of the agricultural commodities involved in the support market measures of the CAP- basically cereals, oilseeds, livestock and dairy products – show a negative, thus inefficient, value in terms of resources allocation. This tendency is confirmed by the outcome of terms of trade for the same products, except for dairy and vegetables and fruit that result in a welfare improving.

The final welfare impact, which results by summing up terms of trade effect, highlights a general inefficient allocation in AC that gives rise of a overall welfare deterioration.

On the other hand, EU15 and ROW are better off for the almost totality of agricultural commodities. In terms of allocation efficiency, paddy and processed rice such as oilseeds show a slight misleading allocation in EU15, while the negative values of vegetables, livestock, milk and dairy products indicate a deterioration of their terms of trade.

5. The market access in terms of effective protection

As it is known, in spite of the Agreement on agriculture during the Uruguay Round, the level of protection in agricultural and food products trade among countries, in terms of tariffs, is still quite high (De Filippis, Salvatici, 2003). Market access, therefore, continues to be one of the major bone of contention within the World Trade Organization (WTO) negotiations on agriculture; countries with a comparative advantage in agriculture, as Cairns group, underline the fact that while trade of manufacturing goods has been liberalised, many OECD countries maintain restrictions on import of agricultural and food products. Furthermore, tariffs are generally higher on processed agricultural products than on primary commodities. Tariff escalation - which refers to the wedge between the tariff on a processed commodity and the one on the corresponding primary commodity – has been discussed in the round within the WTO as one of the major obstacles, for developing countries, to the establishment of processing industries and to the diversification of agricultural exports .

Negotiations on agriculture require measuring the degree of openness of agriculture markets. Given the large dispersion of tariffs across commodities, one question facing policy makers and negotiators is whether a single, aggregate indicator can be derived that compares the levels of agricultural tariff protection across countries.

One measure gauging the effects of border policies is the effective protection rate (ERP). The ERP seeks to capture in a single figure support to productive factors resulting from a complex tariff structure. By including the price-distorting effects on intermediate inputs as well as on output, ERP provides a measure of the "net" effect of border policies.

Accordingly, the effective rate of protection of industry i (ERP_j) measures the increase in industry's value added per unit of output under protection (V_j') as a percentage of the free trade value added per unit (V_j):

$$(1) \quad {}^9 ERP_j = \frac{V_j' - V_j}{V_j}.$$

In terms of the possibility for the ERP to be a good predictors of gross outputs change, effective protection is a partial equilibrium index, that measures the impact of protection on the ability of sectors to compete with other industries in factors markets. Given the assumption of non-substitutability between imported inputs and domestic factors, one can conceive of the domestic factors as producing a value-added good in each activity, which is combined in fixed proportions

⁹ Another way to write the standard measure of ERP, is $ERP_j = \frac{T_j - \sum a_{ij}T_i}{1 - \sum a_{ij}}$, where T_j is the tariff on the final product and T_i on the input; a_{ij} is the input cost-share coefficients. Effective rate can also be negative. For example, for a given rate of duty on

with imported inputs in the manufacture of the final good. The relative prices of value-added goods will then depend on the structure of effective protective rates. The effective protective rates for an activity determines the price of its value-added good in precisely the same manner that the nominal rate determines the price of a final good when intermediate goods are not traded. It follows that, if there are two activities, the levy of a tariff will pull resources toward the activity enjoying the higher effective protective rate.

Although we have identified value-added per unit as a price of gross output, and have defined the ERP as the proportional divergence of this price from its free trade level, Ethier (1977) showed that the link between nominal rates and net outputs is not always equal to the link between effective rates and gross output. Moreover, a key assumption of the basic effective protection model is fixed coefficient or separability in the production function. If there is any substitutability between primary factors and intermediates, the computation of effective rates is biased (Anderson and Naya, 1969). If the value of intermediate inputs is close to the value of output when these values in domestic prices are converted into free trade prices, the effective rates approaches positive infinity, and then switch to negative infinity. Negative value added can be explained by inefficient inputs use in highly protected industries, but it is also likely to be the consequence of the fixed coefficient assumption. If the assumption of fixed physical input coefficients does not hold, free trade input-output coefficients must be inferred from the observed distorted coefficients. This is the approach followed by Bureau and Kalaitzandonakes (1995).

In general equilibrium, though, the prices of primary (non-produced) factors are endogenous, and the prices of (internationally) non-traded goods may change as well. The fundamental theoretical critique moved to the effective protection concept stems largely from concerns about drawing general equilibrium inferences from a partial equilibrium measure (Ethier, 1971, 1977; Davis, 1998). Even if the fixed coefficient assumption is met, as a matter of fact, ranking effective rates may not allow ranking percentage output changes: a non-prohibitive import tariff or export tax in partial equilibrium, for example, might become prohibitive in general equilibrium (Anderson, 1970; Bhagwati and Srinivasan, 1973). In other words, if we instead focus in the general equilibrium effects of a market access analysis (in terms of effective protection) the main concern with the index problem is not that the calculated ERP indexes by sectors are biased, but that the bias varies across sectors, resulting in distortions in the ranking of ERPs. In this case, the ERP index does not necessarily work in predicting output shifts where the latter could be a great interest in trade negotiations (Davis, 1998; Bhagwati, Srinivasan, 1973).

outputs (T_j), which is lower than a given rate of duty on the inputs (T_i) then as the free trade input cost-share coefficients (a_{ij}) rises, the ERP declines and become negative, i.e., when, $T_j < (a_{ij} * T_i)$.

Even if effective protection rate suffers from well known drawbacks, according to Anderson (1998) "Effective protection concept is the ranch house of trade policy construction – ugly but apparently too useful to disappear". In order to avoid the critiques that were brought to the index originally conceived by Corden (1971), In this perspective, Anderson suggested an interesting new definition of the index: the *distributional effective rate of protection* (DERP), based on “the uniform tariff (on distorted goods) which is equivalent to the actual differentiated tariff structure in its effects on the rents to residual claimants in sector j ”.

Following Anderson, let v denote the fixed supply of primary factors which are mobile between sectors at price w , while let k denote the vector of sector specific factors, and let p is the domestic price vector. It is important to notice that the vector k is a convention, not necessarily associated with any measurable factor, which accounts for diminishing returns, and thus positive profits ($\Pi = \sum_j \pi_j$) which go to residual claimants.

The sum of payments to all factors is equal to gross domestic product function g , defined as

$$(2) \quad g(p, v, k) = \min_w \{w'v + \Pi(p, w, k)\}.$$

Drawing on the properties of the gross domestic product function we know that:

g_p = the vector of general equilibrium net (final) supply function;

g_v = the vector of competitive factor prices for intersectorally mobile factors;

g_k = the vector of the sector specific competitive factors returns (ad a proxy of the sectoral profit function).

The effective rate of protection $DERP^j$ of sector j in general equilibrium is defined as the uniform tariff which exert on the return to specific factor j an effect which is equivalent to the initial tariff structure. That is

$$(3) \quad DERP_j = 1/D_j - 1, \text{ where}$$

$$(4) \quad D_j(p^1; p^0, v, k) \rightarrow D_j \Big|_{g_k^j(p^1/D_j, v, k) = g_k^j(p^0, v, k)},$$

The function, D is the distance function applied in tariff distorted price space. Accordingly, D^j is the uniform output price deflator which maintains profits in j constant. Since D is equal to the inverse of a uniform tariff factor, $DERP^j$ is equal to the uniform tariff on distorted goods, which has the same effect on the profits of sector j as the initial tariff vector. This index rely on the idea that the entire tariff vector can be "summarised" by a single tariff that, if applied to the whole set of imports, would holds constant the income of a sector's fixed factor (thought, the profit of a sector) than the vector of heterogeneous tariffs.

In a special case, that of partial equilibrium with fixed coefficients of production, the formula implied by the new definition is identical to the usual effective rate of protection formula;

with variable coefficients but still in partial equilibrium, the formula is a simple variant of the usual formula (Anderson, 1998).

Sector specific factor income changes are a product of two elements: the level of protection given to the sector (and this is what the old effective protection concept tried to measure) and the rate at which the level of protection is translated into sector-specific factor's income. Differences in income changes across sectors arise from the differences in both elements of the product, and the new concept gives a precise measure of the "level" of protection in this context. In other words, the main difference refers to the concepts of effective protection and tariff escalation: these two concepts, even if correlated, are different because the former refers "only" to the tariffs, while the latter takes into account the structure of production. The traditional ERP captures only the tariff escalation, while the new index tries to compute all the effects on the production function arising from the tariff structure (Anderson, 1998).

The higher a sector's DERP, the higher the economy-wide costs associated with the protection afforded to the sector's fixed factor by the whole tariff schedule; a negative DERP provides the tariff equivalent of a negative effective protection (IATRC, 2001).

The definition of the DERP requires the "small country" assumption while in the GTAP model foreign trade is described according to an Armington specification, which implies endogenous world prices. If the vector p is a function of the tariff vector τ , equation (4) becomes:

$$(5) \quad D_j(p^1, p^0, v, k) \rightarrow D_j \left[g_k^j \left[p^1(\tau^1 / D), v, k \right] = g_k^j \left[p^0(\tau^0), v, k \right] \right]$$

This extension is already suggested in the original work by Anderson (1998), though it was not implemented in his analysis of US agriculture effective protection (Antimiani, 2004).

In this work, we depart from the standard GTAP in two main respects. Firstly, in order to compute the DERP, we introduce a new variable $tr(j)$ defined as the power of a uniform (that is, product-generic as well as source-generic) *ad valorem* import tariff. Secondly, capital is moved from the set of mobile factors to the sluggish one. This allows us to set exogenously factor used by the sector for which we are computing the index, while for the rest of the economy capital is still mobile, since we set its elasticity of transformation parameter at a high level. In other words, this allows us to leave the capital factor mobile across sectors, like it is in the real economy, however it enables us to fix it in a specific sector in order to compute the index (Antimiani, Conforti, Salvatici, 2003).

In order to compute the uniform tariff equivalent of the actual protection levels, the policy experiment requires the elimination of all existing tariffs and export subsidies. In this free-trade scenario, the new variable, $tr(j)$ is swapped with the capital endowment available to firms in the sector under consideration. In other words, to compute the DERP, we ask the model to compute the

uniform tariff that would eliminate any incentives to reallocate the "fixed factor" to or from the sector for which we are computing the index¹⁰.

Tab. 10 - Market access in EU: levels of effective protection by DERP with different scenarios, 2004

	EU15 _{2004 with MTR}	EU25
paddy rice	121,56	173,34
cereals	69,69	80,69
oil seeds	-0,43	-9,7
sugar	(-)	(-)
livestock	98,77	166,75
dairy	(-)	(-)
processed rice	264,68	332,9
vegetables and fruit	22,18	28,02
vegetables oil and fats	32,78	45,09

Source: GTAP simulation (base data update to 2004)

(-) Lack of solution

In table 10 are showed the results of the simulation, where we look at the changes in effective protection between the EU25 and the EU15, both with the baseline update to 2004 and the Mid-Term Review of the PAC implemented. In terms of the new index of effective protection, DERP, the EU enlargement bring about an increase in the effective protection of the EU or, on the other side, a reduction in the effective market access of the EU. This result might be expected if we think that the DERP measure the protection gained by different sectors from the trade policy. Agrifood sectors of new members is starting to be influenced by the PAC and, overall, there an obvious increasing in their level of effective protection. As a matter of fact, we have to underline that we are using an index of effective protection based on the rents on specific factor and not just on nominal rates: with the EU25 we have an "enlargement" of the tariffs structure on sectors of 10 more countries. Note that the sector showing the highest change is the livestock one, that is, one of the main production in the agri-food sector of the new members.

The DERP shows a slightly increase of effective protection in cereal sector as well as vegetables oil and fats and vegetables and fruit sectors. More relevant it is the effect of the enlargement on the oilseed sectors: in this case, due to the absence of nominal protection already in the EU15 we had a negative effective rate of protection, i.e. a tax on this production. In fact, this sector, while has no nominal protection, has to pay more for its inputs due to nominal protection on the other sectors, (where these sectors are producer of inputs for oil seed production) and, consequently, the value

¹⁰ We know that in the model the formula which define the factor employed amount is $qoes = qo + \sigma(pm - pmes)$, where $qoes$ is the sectoral specific factor amount, qo the total factor amount, σ the coefficient of transformation and pm and $pmes$, respectively, the global price and the sectoral specific price of the factor. We can rewrite the formula like as $qo - qoes = (pmes - pm)\sigma$, knowing that σ and qo are exogenous while $qoes$, pm and $pmes$ endogenous, fixing $qoes$ we fix the difference between pm and $pmes$, that is, the economic rent of the factor for using in a specific sector.

added of oil seeds it's "depressed" by the tariff structure. With the enlargement, the "tax" increase to 10% and it will be interesting to see the effects in the next period.

6. Concluding remarks

During the last two years, CAP reform and enlargement, have influenced considerably the economic structure, of EU, especially with regards to the agrifood sector.

Many works have studied the impact of the Mid-Term Review and the consequences of the access of 10 new EU members. In this paper we have attempted to understand these changes analysing the “joint” effect, of CAP reform and enlargement, on both the agrifood chain and the market access.

The main results highlight that some sectors, like cereals, livestock and vegetables and fruit, show the most relevant changes. In particular, the new EU25 shows an increase of cereals export in terms of share in total agrifood exports while, in terms of share in imports to production and to consumption, the vegetables and fruit sector shows a slightly increase, respectively, from 4,9 to 5,4 and from 15,6 to 17,2.

With regards to terms of trade and efficiency allocation the sectors which gain more, by the enlargement, are livestock and vegetables and fruit while, in contrast with the results of table on domestic and export share (tab. 4), the cereal sector shows negative value in both the indicators.

Going from internal effects to the market access topic, we can see that the enlargement of the EU15, with the mid-term review implemented, involves in a generalised worsening of the market access of the EU25, with an increase of the effective protection computed by DERP. Especially for livestock, processed rice and paddy rice the results reveal a relevant rise in the level of effective protection.

Concluding, this work on the effects of the enlargement of the EU, with the Mid-Term Review of the CAP, shows that, the new enlarged EU is changing especially its relationship with the rest of the world with a relevant variation on terms of trade and on the level of effective protection.

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