Analysis of impacts of the EU's export refunds on developing countries since 2003
Final Report

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Executive summary

1. The purpose of this report is to present the results of the project "Analysis of impacts of the EU's export refunds on developing countries since 2003" carried out between May and September 2010.

2. The modification of export refunds was not part of the so-called Mid-term Review of the Common Agricultural Policy (CAP). The proposal to abolish export refunds was actually made as part of the Doha Development Agenda discussion, which if agreement is reached, would involve the elimination of export subsidies by 2013. Nevertheless, the 2003 CAP reform moderated some of the sources of domestic imbalances in commodity markets within the EU by reducing the intervention price and the size of the intervention stocks. These imbalances would have been dealt with through the use of export subsidies.

3. The analysis undertaken for this study comprised three stages. First, a detailed literature review was undertaken. A particular focus for the review was to help understand the reasons for the conflicting results that have been published with respect to the impact of export subsidies on the economies of developing countries. The second stage involved a quantitative analysis using a modified version of the Global Trade Analysis Project (GTAP) general equilibrium model. A global model of trade flows was needed due to the fact that export refunds effect world prices and therefore their impacts are felt around the world. The final stage involved the use of selected case studies which enabled the analysis to go beyond the results from the GTAP model to provide a fuller understanding of the effects of export subsidies on selected domestic economies.

Results from the literature review

4. Assessment of the relevant literature on whether export refunds distort the world economy and the economies of developing countries in particular, lead to a number of conclusions and these are summarised below.

5. The main empirical tools for these assessments have been: spatial and non-spatial partial equilibrium models; gravity equations and; single and multi-country partial and general equilibrium models. Almost all studies make use of the GTAP database.

6. Most studies analysing the impacts of the elimination of export refunds focus on the following agricultural commodities: dairy, beef, poultry and pigmeat, sugar and fruits and vegetables.

7. The majority of studies found that elimination of export subsidies would lead to an increase in world prices, but would have a limited impact on the trade volumes and welfare of developing countries. Specifically, the impacts on different sections of the population in developing countries (e.g. producers and consumers) will differ in sign and magnitude depending on whether the

country is a net importer or net exporter of the product under consideration or whether it has the potential to become a net exporter (through appropriate infrastructure, marketing policies, etc.).

8. Overall, eliminating export support alone is expected to have a limited economic impact (in part due to fact that there has been a sharp decrease in the use of export refunds during the past decade). However, this impact will still be significant if combined with the reduction/elimination of tariffs and domestic support.

9. The review of 'micro-level' studies leads to similar conclusions as to the variation in impacts from one developing country to another. In some countries where domestic production does not compete with imported production (because they serve different markets), or where the dometic market is isolated from the international market through government regulations, elimination of export refunds will have limited impacts on the welfare of producers, at least in the short term. It may though be the case that this could change in the longer term due to changes in policies, investment in infrastructure, etc. On the other hand, countries with export potential will benefit from the elimination of export refunds.

10. Observed differences in the findings of various studies as to the impact of export refunds arise in part due to the differences in the underlying assumptions upon which the models are built (e.g., paramaters, model structure etc.). In addition, it should be noted that part of the variation in results may be explained by the fact that there is actually a lack of accurate data on export refunds. This is due to a range of factors including the fact that the WTO notification procedure does not function particularly well. This means that there is no clear trend on the use of export subsidies and there is a lack of accurate information on the extent to which notifications lead to actual subsidies being applied. There are also differences in the way information on export subsidies by product is reported by WTO members.

11. There appears to be little information on the specific gender impacts of the elimination of export refunds. However, based on studies focusing on gender and exports in developing countries, it may be reasonable to assume that the impacts on the welfare of women in developing countries will differ from one country to another. For example, in countries where women are successfully involved in export activities, elimination of export refunds might have a positive gender impact.

Results from the quantitative analysis using the GTAP model

12. In order to analyse a range of possible situations, the empirical analysis comprised three sets of model runs (experiments). Within **experiment A**, two alternative scenarios were estimated using a 2004-2013 time horizon. These were a 'maximum damage' scenario based on the assumption of full permissable usage of Uruguay limits (Scenario A2) and an export refund elimination scenario (Scenario A3). These scenarios were compared with a *status quo* or business as usual baseline (known as Scenario A1). In

experiment C, a corresponding set of scenarios (C1, C2, C3) are conducted, but this time over a longer time frame (2004-2020). Thus, export refunds are evaluated by comparing scenarios C2 (maximum damage) and C3 (export refund elimination) with C1 (long run baseline). Finally, in **experiment B** (for the period 2013-2020), the contribution of EU export refund elimination within the context of a hypothetical package of Doha trade reforms is examined.

13. Comparing scenario A2 with A1 (baseline), the medium term (2004-2013) maximum potential damage from full employment of the Uruguay export refund limits was examined. Whilst the largest subsidy expenditure accrues to the dairy sector, the two cereals sectors have the most flexibility for increases in export refunds, followed by 'red meat'. Consequently, EU27 output rises and world price falls are more notable in these three sectors (particularly for wheat). In developing countries, wheat production is hard hit, particularly on the African continent (in Senegal, wheat production is practically eliminated altogether), Latin America and the Caribbean. A similar story, albeit more moderated, occurs for red and white meat markets in developing countries, particularly for key producers such as Latin America and Asia. In 'other grains', the principal loser from export subsidy driven EU output gains, is the Rest of the Developing World

14. Elsewhere, there is greater specialisation in other non-subsidised export commodities ('other crops') in sub-Saharan Africa resulting in small agro-food trade balance gains. Notwithstanding, aggregating over all developing regions, net agro-food export revenues decline €1,997 million, with wheat accounting for €1,576 million. Developing country real income effects are largely determined by terms of trade (ToT) changes from 'wheat' (where the largest world price reductions have occurred). With the exception of Latin America and Rest of Asia, all developing countries are net importers of cheaper wheat commodities, resulting in ToT improvements. Similarly, allocative efficiency increases due to increases import quantities of tariffed imports. In general, the economy wide impacts from full usage of EU export refunds are small. The largest real income gains, in per capita terms, are recorded by net food importers such as Senegal (1.55 per cent), the Rest of North Africa (0.37 per cent) and the Rest of West Africa (0.35 per cent). As net food exporters, Latin America and the Asian regional composites witness small real income losses.

15. Comparing scenario A3 with A1 (baseline), we examine the medium run impacts of EU export refund eliminations. As a large exporter of heavily subsidised dairy products, world price rises are most notable in this sector. EU27 'red meat' exports are protected to a lesser extent than dairy, although EU exports of this commodity are reasonably large. In 'other food', whilst export refund protection is much lower, EU export volumes from this large aggregate sector are considerably larger than those of dairy. In general, output changes are consistently positive across all developing regions for these three commodity groupings, although the real significance is illustrated within the net trade balance results. Of the €2,714 million net export revenue gain to the developing regions, dairy, (€1,971 million), 'other food' (€537

million) and 'red meat' (€333 million) see the largest improvements. Decomposing by developing region, large net exporters such a Latin America (€757 million) and East and South East Asia (€587 million) witness the largest net agro-food export revenue gains, whilst with large gains on dairy trade, the West Asia and Middle East region makes net agro-food trade revenue gains of €527 million.

16. The impact of export refund elimination on economy wide per capita real incomes is marginal, whilst perhaps surprisingly, a majority of the developing countries lose from export refund elimination. As in scenario A2, real income results are driven by ToT effects and allocative efficiency. Despite improving net trade balances, the majority of the developing regions remain net importers of one or more of dairy, 'other food' and 'red meat' commodities. Thus, compared with the baseline, the terms of trade (ToT) is negative for the majority of the developing countries given increases in world prices. As a large net exporter of most commodities, Latin America witnesses a notable ToT gain. With reductions in (more expensive) agro-food trade imports, allocative efficiency also falls.

17. In experiment C, a second set of corresponding long run experiments are run over the time period 2004-2020. The baseline shocks are broadly the same, although modulation rates are increased, pillar 1 funding is reduced, production quotas are eliminated and larger Armington trade elasticities are employed.[1] As expected, the underlying trends are the same as the corresponding medium run scenarios. With a change in the trade elasticities for all regions, price changes are relatively unaffected compared with the medium run, whilst output changes (positive and negative) are more elastic, reflecting reductions in pillar 1 payments and greater supply responsiveness from the usage of larger trade elasticities in all regions in the longer run scenario to 2020.

18. Consequently, when comparing scenario C2 with C1 (long run baseline), increased EU dumping of cereals, meat, sugar and rice has an even more detrimental impact on developing country net export trade revenues. In the medium run, it was estimated that the net trade balance deteriorates €1,997 million compared with the baseline, whilst in the long run, the corresponding deterioration in developing country net trade revenues is €3,273 million. The largest loser, Latin America, faces a rising trade balance deterioration of €1080 million in the long run (compared with €681 million in the medium term). In real income terms, the pattern of gainers and losers is similar to the medium run, although swings in (ToT) and allocative efficiency effects are more marked owing to greater volumes of import driven trade (higher trade elasticities). As net food importers, a number of developing countries make small real income gains from cheaper food imports from the EU. The most notable per capita income gains occur in Senegal (2.03 per cent), the Rest of North Africa (0.51 per cent) and the Rest of West Africa (0.44 per cent). The main losers are in Latin America and Asia.

[1] It is assumed that the trade elasticities are 30 per cent larger than in the medium run.

19. The long run impacts of EU export refund eliminations in scenario C3, were similar to the medium run experiment A in that the three commodity aggregates of 'dairy', 'other food' and 'red meat' commodities have most influence over the results. World and market price rises are similar to the medium run, whilst developing country output improvements from the loss of EU export competition are more notable, particularly in dairy sectors throughout sub-Saharan Africa. In terms of the trade balances, the collective long run net export revenue gain for the developing countries is €3,561 million (compared with €2,641 million in the medium run), with Latin America enjoying an improvement in its net trade revenues of €1,062 million (largely from dairy and sugar trade). Real income results are very similar to the corresponding medium run simulation although Ethiopia and Tanzania witness marginally larger losses, whilst Latin America and the large Asian composite regions record very slight real income improvements.

20. Examining the importance of the EU's export refunds within the Doha Package (2013-2020) (experiment B), we discover the EU export refund eliminations have a relatively important impact in the dairy sector. Examining the contribution to output, market prices and trade balances for dairy in the developing regions, most of the (percentage) change is explained by the elimination of the EU's export refunds (vis-à-vis market access). In the 'other food' processing sector, export refund rates are much lower than dairy, although as noted above, 'other food' trade flows are considerably larger. The results show that for 'other food' processing, export refunds have a similar degree of importance as they do for 'dairy', although with relatively small 'other food' tariff reduction shocks, this result is conditioned more by the higher tariff binding overhangs and sensitive product exceptions on 'other food' trade, rather than the importance of the 'other food' export refund *per se*. In other key sectors (i.e., red meat, processed rice and sugar), export refund elimination has a reduced influence within the overall Doha package, although this varies as a function of each developing region's trade relations with the EU27. For example, in 'processed sugar' eliminating EU export refunds impacts much more importantly in Latin America, the Caribbean, West Asia and the Middle East and North Africa, whilst in 'processed rice', EU export policy is relatively more marked in the Asian composite regions and West Asia and the Middle East.

21. Turning to the real income results, with the exception of Ethiopia and Tanzania, the overall importance of the Doha round (and therefore EU export refund eliminations) is negligible in per capita real income terms. In a number of developing countries (Central America, East and South East Asia, Bangladesh, Rest of South Asia, Ethiopia, Tanzania, Rest of East and Central Africa, Southern Africa), market access (vis-à-vis export competition) dominates the EV gains. Indeed, as the largest gainers in per capita income terms, market access dominates the equivalent variation gains in both Ethiopia and Tanzania. On the other hand, in remaining developing country regions, EV gains are more attributed to EU export refund elimination.[2] For

[2] This in part may reflect stronger EU trade ties as well as the limited degree of market access owing to high tariff binding overhangs and sensitive product exceptions.

example, as one of the largest net losers from the Doha package in per capita terms, 141 per cent of the Rest of West Africa's losses are due to EU export refund elimination.

Results from the case studies

22. The purpose of this stage of the research was to study in further detail the potential effect of export refunds by considering selected case studies based on the results from the GTAP analysis. Two commodities were chosen: dairy and wheat for seven countries Bangladesh, Egypt, Ethiopia, Nigeria, Senegal, Tanzania and Uganda.

23. The logic behind the case studies was that the effect that export refunds (through imports) have on different economic agents within countries depends on how their markets are structured.

24. The work on the cases studies consisted of: (1) Description of the dairy and wheat markets in the selected countries, and (2) clustering the cases according to their characteristics for further analysis.

25. The analyses from the case studies indicated that the impact of export subsidies depend on the characteristics of the particular commodity market. In this sense, four situations were identified: (1) when the market is unregulated and imports compete with domestic production; (2) when most of the domestic production is destined to the rural market and the imported product is used to serve the urban market; (3) when the market is very regulated and the government isolates both producers and consumers from the international markets and; (4) the case when, in addition to imports, the country is a recipient of food aid.

26. The first case (**unregulated market**) represents the dairy sector of Bangladesh and Egypt, and the wheat sector in Nigeria, Tanzania and Uganda. In this case, the effect of changes in import prices on the domestic economy is quite clear because they depress domestic prices, which benefits consumers and damages production, and can trigger stronger negative effects in the long term.

27. The second case (**segmented market**) represents the dairy sector in Nigeria, Ethiopia, Senegal, Tanzania and Uganda. In these countries the impact of changes in export subsidies on domestic production is relatively small, because competition between the domestic production and imports is limited (nevertheless, a small negative effect would be expected as some of the marketed milk finds its way to the formal market). Furthermore, an export subsidy would reduce the price of an input for the formal market and reduce the price of the processed products benefiting both processors and urban consumers. If the segmented market situation is maintained, one should not expect any difference between the short and the long term. However, despite the fact that export subsidies might not explicitly harm the domestic markets of these countries, it is clear that they reinforce the disincentives for

dealing with the high transaction costs created by the peculiar production structure.

28. The third case (**regulated markets**) can be found in the wheat market in Egypt and Senegal. Under this structure, the government might intervene, importing part of the required commodity in the international market or granting licenses. In addition, it might set producers' prices (minimum or guaranteed prices) and also consumers' prices. Given that the particular conformation of the market (*i.e.*, the protection) remains in place, the only effect of an export subsidy that reduces the price of the imported product is to change the budgetary outlay of the government.

29. Examples of the fourth situation (**imports and food aid**), are the wheat sector in Bangladesh and Ethiopia. The effect of export subsidies, whilst advantageous for consumers, is damaging for the domestic production as they reduce the prices received by farmers. This may create incentives in the long term for the country to cease producing the commodity.

Final remarks

30. Overall, whilst the different analyses show that export refunds may have the possibility to create distortions in developing countries, the results from the literature review indicate that their elimination may have a relatively small impact in terms of prices, production and welfare.

31. The presence of export refunds may create in developing countries disincentives either to produce domestically or export. In addition they may help to create and maintain industrial sectors that are import dependent and do not invest in integrating domestic resources into the supply chains.

32. It is also important to note that the GTAP analysis suggests that the presence of export refunds may benefit net food importers (per capita largest in Senegal, Rest of North Africa, Rest of West Africa) and damage net food exporters (Latin America, East and South East Asia, Rest of Southern Asia) and their elimination would generate the opposite effect.

33. Certainly, the level and characteristics of the damage inflicted by export refunds depend on the particularities of the commodity markets in developing countries, which are complex arrangements as exemplified by the case studies.

I. Introduction

The purpose of the project has been to assess the effect of the European Union (EU) export refunds on developing countries since the 2003 reform of the Common Agricultural Policy (CAP). This is because it is widely argued that export refunds are highly trade distortive instruments and have a detrimental effect on developing countries. Furthermore, there is a general research gap on the impacts of the post-2003 CAP on developing countries, including the effect of export refunds. Box 1 presents the main changes introduced by the 2003 CAP reform.

Key elements of the reformed CAP

- A single farm payment for EU farmers, independent from production; limited coupled elements may be maintained to avoid abandonment of production,
- this payment will be linked to the respect of environmental, food safety, animal and plant health and animal welfare standards, as well as the requirement to keep all farmland in good agricultural and environmental condition ("cross-compliance"),
- a strengthened rural development policy with more EU money, new measures to promote the environment, quality and animal welfare and to help farmers to meet EU production standards starting in 2005,
- a reduction in direct payments ("modulation") for bigger farms to finance the new rural development policy,
- a mechanism for financial discipline to ensure that the farm budget fixed until 2013 is not overshot,
- revisions to the market policy of the CAP:
  - asymmetric price cuts in the milk sector: The intervention price for butter will be reduced by 25 per cent over four years, which is an additional price cut of 10 per cent compared to Agenda 2000, for skimmed milk powder a 15 per cent reduction over three years, as agreed in Agenda 2000, is retained,
  - reduction of the monthly increments in the cereals sector by half, the current intervention price will be maintained,
  - reforms in the rice, durum wheat, nuts, starch potatoes and dried fodder sectors.

Source: CAP reform - a long-term perspective for sustainable agriculture

The negative effect of the trade refunds on developing countries occurs because they either depress international prices and therefore affect competing exports from developing countries or they affect the domestic supply in developing countries by reducing domestic prices and therefore harm farmers in these countries.

As pointed out by FAS-USDA (2003), export refunds or subsidies induce two distinct market distortions, in the domestic market for importers as well as in the export market for competitors. Theoretically, export subsidies increase the excess supply on the world market causing the world price to decrease. As a result of the decrease in the world price, the price in the import market (*e.g.*, a developing country) declines as well. At the same time, the price paid to the producer in the exporting country increases (e.g., EU). The resulting higher price to the exporter decreases consumption in the domestic market (e.g., EU) and increases supply, therefore increasing exports from that country.

As a result, the lower price in the importing country (e.g., developing country) causes consumption to increase and domestic supply to decrease; therefore, increased imports are necessary. Two effects result from the lower price in the importing country. The first effect is the resulting decrease in local production and the second is the lower price received by those who continue to produce, which can be devastating to their livelihood.

In addition to pushing existing producers out of the market, export subsidies can inhibit market development of infant industries, particularly in developing countries. The artificially low prices provide disincentives for producers to enter the market and government programs to improve infrastructure and encourage production are often unsuccessful. The result is that the country becomes dependent on the imports.

Furthermore, the increased exports from the subsidising country and the lower price that can be received for these exports allow the exporter to capture increased market share in import markets. The increased market share comes at the expense of other exporters, often displacing exports from developing countries in the import market. Exporters from developing countries face increased competition, being forced to lower their prices or get out of the market. Exporters looking to diversify into new markets can also have difficulty in penetrating a new market where the price is artificially low due to export subsidies.

Traditionally, under the CAP, the EU set minimum price levels for certain farm products in order to encourage farmers to continue food production. These minimum price levels in many cases were higher than the world price level for the same products and import restrictions were used to protect these prices from the depressing effects of foreign competition. When farmed products had to be exported to third countries (i.e., outside the EU), it was necessary to bridge the price between the EU price level and the world market price level. This bridging was done by paying export refunds to exporters. Export refunds vary in time, by product sector and by the products made thereof.

Export refunds may differ per country of destination (i.e., differentiated refunds). In order to get differentiated refunds paid, it is necessary that the exporter proves in which third country the products were imported. Such proof is given by copies of duly stamped customs import documents of the third country concerned.

It is important to note that while economic theory suggests that export refunds can have a distortive effect on prices and production, the empirical evidence as regards their importance is unclear and also in terms of welfare. That is because on the one hand, farmers' livelihoods in developing countries are threatened as export earnings and domestic supply prices are depressed; and on the other hand, export refunds benefit net importers of agricultural products by allowing access to agricultural commodities at more affordable prices (Hoekman and Messerlin, 2005). Consequently, any welfare analysis examining the impacts of export refunds on world markets should account for detailed gross trade flows in order to provide a credible quantitative assessment on a

region-by-region basis. Thus, the focus of the project has been to answer whether the EU post-2003 export refunds affected:

- World prices for the affected goods.
- Domestic prices and production in the developing country markets to which they have been directed.
- Producers and consumers in these markets through changes in prices and production.

The aforementioned questions has been answered through a combination of literature review, general equilibrium modelling and case studies.

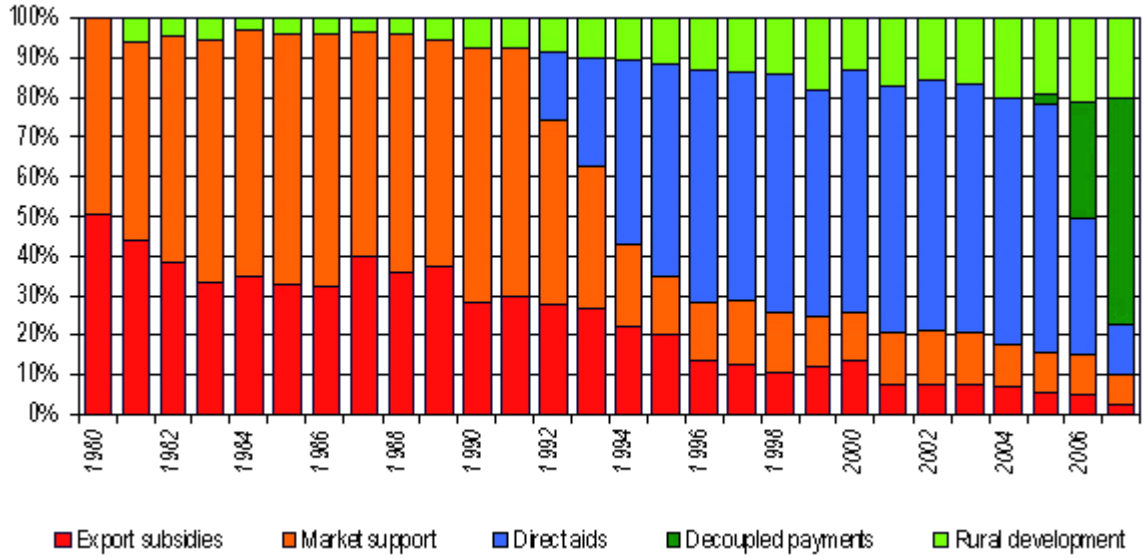
The structure of this report is as follows: it starts with a literature review aiming to point out the main effects of exports refunds on developing countries and the reasons behind the discrepancies in terms of measurements. This is followed by a quantitative general equilibrium analysis performed with the Global Trade Analysis Project (GTAP) model, which is used to assess the impact of the EU's agricultural export trade policy. As part of this analysis, a series of carefully designed scenarios are implemented to examine the impacts on world prices, market prices and quantities in third country markets. The next section presents several case studies focused on the effect of imports on domestic developing economies. Whilst the choice of the case studies (countries and commodities) was based on the results obtained from the GTAP model, their purpose is to go beyond the GTAP results and analyse the industrial organisation of two commodities, wheat and dairy, within each country to understand how the domestic economy interacts with imports. The final section presents conclusions and recommendations.

II. Literature review

This section makes an assessment of the relevant literature as regards whether export refunds are distortive for the world economy and particularly for developing countries with emphasis on the period after 2003.

There are different views about how distortive the EU exports refunds are. The official version from the European Union (European Commission, 2008) considers that they are no longer distorting and they are something from the past, when the EU used to overproduce commodities at high prices and then export them with the help of generous export subsidies. Thus, 15 years ago, the EU spent €10 billion a year on export subsidies. In 2009, the budget was for a maximum of €350 million. Whilst the main destinations concerned by export subsidies are the Mediterranean Basin and the rest of Europe, only a minimal proportion of subsidised goods find their way to Africa. Figure 1 show that export refunds have shown a steady decreasing trend during the last thirty years.

Figure 1. Development of funds allocated to export subsidies, market support, direct aids, decoupled payments and rural development



Source: European Commission (2010)
http://ec.europa.eu/agriculture/external/dev/foodaid/index_en.htm

In 2008 the EU claimed that there were no export refunds for cereals, rice, dairy products or fruit and vegetables and that they have pledged to phase out export subsidies entirely by 2013. However, in November 2008, export subsidies on exports of **pig carcases, cuts and bellies** were given as a temporary solution to solve an acute market crisis in Europe. Of this, only 8,000 tonnes went to Africa.

Furthermore, in January 2009 the EU reintroduced export refunds for **dairy products** (within the limits on subsidised exports set by the World Trade Organisation) for the first time since June 2007. The decision was taken in response to the serious situation on the EU dairy market, caused by a recent sharp fall in producer prices. Export refunds can be paid to allow EU exporters to continue to be present on the world market. The measure applies only for as long as market conditions so dictate.

For skimmed milk powder (SMP), bids were accepted for a total of 5,612 tonnes at a maximum refund of €200 per tonne (out of total bids for 15,172 tonnes). For butter (82 per cent fat), bids were accepted for 2,299 tonnes at a maximum refund of €500 per tonne (out of total bids for 9,566 tonnes). For butteroil, bids were accepted for 80 tonnes at a maximum refund of €580 per tonne (out of total bids for 980 tonnes). At the same time, lower rates were fixed for the standing refunds (the refund rates at which exports can be carried between regular tenders). The rates were €170 per tonne for SMP, €450 per tonne for butter, €260 per tonne for whole milk powder, and €220 per tonne for cheeses.

In contrast with the European Commission (2008) position, there are a number of studies that consider EU exports subsidies distortive and harmful particularly for developing countries (e.g., USDA-FAS, 2003; Anderson and Martin, 2006; Koning and Pinstrup-Andersen, 2007; Boulanger, 2009).

In what follows we review studies on the impact of partial/ complete phasing-out of export refunds as regards: methodologies used, products analysed, impacts on the trade volumes of developing countries, impacts on the welfare of developing countries (producers, consumers, gender aspects), data issues, geographical spread (world, regional, country level and more 'micro-level' case studies dealing with specific impacts on regions of developing countries).

Methodologies. The main empirical tools for these assessments have been the use of spatial and non-spatial partial equilibrium models, gravity equations, single- and multi-country partial and general equilibrium models. Almost all studies use the GTAP database.

Products. As regards the agricultural products analysed, most studies focus on dairy, beef, poultry and pigmeat, sugar and fruits and vegetables European Agriculture Guarantee and Guidance Fund (EAGGF) data on subsidies by product categories show that export subsidies do constitute a large share of total EAGGF funds and hence are important, particularly for those EU farmers who produce sugar, rice, milk and dairy products, pig meat, eggs, and poultry. Beef was also important until 2000, when the emergence of "mad cow" disease in several EU countries triggered bans on imports of EU beef in the rest of the world).

Price effects. Many studies found that the elimination of export subsidies will trigger a slight increase in world prices. Fabiosa *et al*. (2005) use a partial equilibrium (PE) model and find that a global elimination of subsidies has little upward impact on world prices in the hypothetical situation that all tariff distortions have first been removed, at least for meat, dairy and oilseeds. Diao *et al*. (2001) suggest that the elimination of export subsidies would lead to higher world prices (increase by roughly 2 per cent on average as a result of the elimination of export subsidies). The price effects are greatest for commodities that are most heavily protected in developed countries, such as livestock products, wheat and other grains, sugar, oilseeds and rice. Diao *et al*. (2001) suggest that developing countries that are net importers of food would be negatively affected by the increase in prices. On the other hand, some of these commodities are major exports for LDCs.

Trade volumes effects. Bouet *et al*. (2005) use a computable general equilibrium model (CGE) model and find that the suppression of export subsidies only has a limited effect on trade volumes. One reason is that EU export subsidies have already decreased dramatically since the late 1990s, and this was taken into account in the baseline. Sub Saharan Africa countries experience a smaller increase in exports than most other developing countries due mainly to the erosion of preferences on the EU's market. Overall, exports of the poorest countries (sub-Saharan Africa and South Asia) increase significantly less than the average exports of the rest of the world.

Welfare effects. Bouet's (2008) review of a number of recent studies found that the associated increase in world welfare from full trade liberalisation (which includes more than the elimination of the export refunds) ranged from 0.2 to 3.1

per cent (with a proportionally lower impact of export refunds elimination alone). According to the GTAP global economy wide model and protection database, only 2 per cent of the global welfare cost of government interventions in agricultural markets as of 2001 was due to export subsidies (Anderson *et al*., 2006).

In their CGE analysis, Bouet *et al*. (2005) found that, as regards impact on global welfare, the impact of the elimination of the export subsidies was quite small, again reflecting that the recent changes in the CAP have already led to a decrease in domestic price and a decrease in production. Sub-Saharan African countries would experience a welfare loss as a consequence of a Doha agreement (scenario which assumes reduction in tariffs, elimination of export subsidies and the reduction in trade distorting domestic support), in spite of a slight improvement in their terms-of-trade. This results from the combined effect of higher prices for food imports, and from the extra competition faced by their exports due to preference erosion. Compared with the reduction in tariffs and domestic support, the elimination of EU export subsidies was the major force driving welfare losses, however still small (e.g., less than 1 per cent decrease in the welfare of Sub-Saharan countries was the strongest impact).

Elimination of domestic support and export subsidies raises world prices of food and affects negatively net food-importing countries, which represent the large majority of low-income countries (Panagarya, 2005). According to Valdes and McCalla (1999) cited in Panagarya (2005), 48 out of 63 low-income countries are net food importers. Even if the removal of these distortions would lead to an increase in the welfare of the countries where they are applied (which may be a minor effect as price elasticities of agricultural supplies are small) and in the food-exporting developing countries (such as Argentina and Brazil), it will reduce considerably the welfare of the low-income net food importers (Bouet, 2008). Bouet (2008) states that elimination of domestic support and export subsidies is not a first best policy and its global effects may be minor.

Bureau and Matthews (2005) state that “developing countries which are net importers of food benefit from more favorable terms of trade when the EU taxpayer subsidises their imports.” (p. 17), that “the scheduled elimination of EU export subsidies is unlikely to alter significantly the market conditions for developing countries” (p. 27) and that “the removal of such subsidies is desirable to end unfair competition, but the overall negative effect of export subsidies on developing countries has been overestimated by non governmental organizations, at least as far as their impact on poorest countries is concerned” (p. 27-28). However, they do note that there is little evidence of the impact of EU export subsidies on the economies of developing countries.

Gallezot and Bernard (2004) found a considerable variation in the amount and destinations of European export subsidies, the main subsidies being granted to dairy products. They stated that subsidies were mostly aimed at net food importing countries, which may suggest that, while they will compete with local production and create unfair competition, they reduce the imports bill.

Hoekman *et al*. (2004) used a partial equilibrium model on a set of 227 agricultural commodities that benefit from domestic support or export subsidies in OECD or developing countries. Trade reform simulations involving 50 per cent reduction of various instruments showed that the increase in trade and welfare across developing countries was much larger for a 50 per cent tariff reduction than for a similar reduction in export subsidies, and even less for similar cuts in domestic support. They found that, expanding developing countries face positive effects on welfare and exports due to global tariff cuts while, as a group, they are neutral to reductions in export subsidies and domestic support (Hoekman *et al*., 2004).

Similarly, Hoekman and Messerlin (2006) found that eliminating export subsidies will have a limited economic impact and **only make a difference if combined with reducing tariffs and domestic support**. They give the example of the late 1940s situation without export subsidies but with high tariffs and domestic support. Various other studies using computable equilibrium models concluded that developing countries have a much bigger interest in reduced border protection on agricultural markets than in the reform of support policies (Anderson *et al*., 2006; Decreux and Fontagné, 2006).

Herzfeld (2005) uses a fixed-effects model to analyse the effects of EU's export subsidies for beef exports on its market share in 27 African countries between 1988 and 2000. The analysis gives no information on which countries and population groups are affected by the export subventions, however the author discusses the issues further looking at data on trade patterns as well as results from other studies. Herzfeld (2005) concludes that African producers could only partially profit by reduced EU exports as they have to compete with Asian exporters and the relatively insignificant intra-African trade with frozen beef points to a lack of relevant infrastructure. Overall, the results show that export subsidies have a direct impact on market shares, acting as a trade distorting instrument and that in general, net exporting countries will gain from a European trade liberalisation.

Brandt (1995), Williams (1993), and Wellmer (1998) (as cited in Herzfeld, 2005) found that the export policy of the EU was an important reason for a decreased demand for domestic beef and lowered imports of beef and cattle from the neighbours of the developing countries studied. Koester and Loy (1998) (as cited in Herzfeld, 2005) showed that the subsidised imports from the EU had no statistically significant impact on wholesale prices of beef carcasses in Namibia. Basler (1988) (as cited in Herzfeld, 2005) argues that the export refund at the time of the analysis was too low to completely capture the price difference between the EU and the Cote d'Ivoire. It is important to note that the studies reviewed by Herzfeld (2005) analysed the situation before 2000 when the EU used more export subsidies than at present.

Hertel and Keeney (2006) use GTAP-Agriculture, a special-purpose variant of GTAP tailored to analysis of global agricultural trade policy issues. They found that elimination of export subsidies in the high-income economies negatively affects the other regions, as numerous countries in those regions have come to

depend on cheap food imports and are now net importers of the subsidised products (particularly grains and dairy).

AGRA CEAS (2005) use a partial equilibrium model (CAPSIM) to assess the impact of export refunds elimination on third country export volumes and find relatively small impacts. The use of export refunds in the pig meat sector has primarily served to counterbalance cyclical volatility resulting from the pig production cycle, *i.e.* stabilising the market; in the poultry meat sector the aim has been to maintain a market presence for a particular type of products (frozen whole birds) in an established third country market; and, in the egg sector, refunds for processed egg products have primarily been used counter-cyclically to stabilise the market or maintaining established third country outlets.

FAO (2007) analyses factors determining dairy import surges in developing countries. Export subsidies are one of the policy instruments most often blamed for import surges and disruptive impacts on dairy product trade. In recent periods of excess dairy product supplies, or weak demand, export subsidies have exacerbated price depression as export subsidies/tonne increase substantially when markets turn down; consequently, it is at such times that the potential for import surges is the highest (FAO, 2007). The largest provider of dairy export subsidies has been the EU, however, policy reforms and higher world prices have led to reductions in 2005 and particularly in 2006. The dairy sectors of many developing countries are presently underdeveloped, often with a high percentage of informal markets, poor infrastructure and inefficient processing and marketing systems. Therefore the implementation of import restraint measures without adequate programmes to strengthen domestic production sectors may simply disrupt trade and have adverse effects on domestic consumers (FAO, 2007).

Zepeda *et al*. (2009) use two dynamic computable general equilibrium models to analyse the effects on Kenya of a Doha negotiation package that came close to being agreed in July 2008. The study finds that Kenya will see small gains in agricultural products and processed food due to the reduction of export subsidies to agriculture by developed countries. The reduction of export subsidies to agriculture will lead to an increase in GDP to the end of the simulation horizon, however only if investments have been made and resources have been reallocated from declining to growing activities. Other impacts are an increase in the demand for low skilled workers in both rural and urban areas, a reduction in the incidence of poverty and an improvement in the income distribution in rural areas (Zepeda *et al*., 2009).

In a study on dairy markets in Senegal and Tanzania, Sharma *et al*. (2005) found that processors of locally produced milk (and to a lesser extent farmers, the government, NGOs and researchers) consider that trade liberalisation have harmed domestic markets. Wholesalers (importers), retailers and processors of dairy products prefer a continuation of the liberal trade environment, first, because imported quantities are small relative to domestic production and therefore have a negligible effect on domestic prices and, second, because the markets for imported and domestic products are segmented and there is no overlapping either geographically, seasonally or by population segment

(Sharma *et al*., 2005). Imported dairy products target either low-season for domestic production, urban markets with insufficient supply from distant/remote production areas, and high income consumers with a preference for speciality products not readily available locally such as cheese and butter (Sharma *et al*., 2005).

Data issues. One of the reasons results of the different studies are very different or even contradictory (besides different assumptions, etc.) might be related with the quality of available data on export refunds, issue discussed in Hoekman and Messerlin (2006). They note that, while the URAA requires the main 25 countries using export subsidies to notify the extent to which they actually use subsidies, the WTO notification procedure does not work well. There is no consolidated information on the actual use of subsidies after 2000, and almost none for 2002 and after (Hoekman and Messerlin, 2006). There are differences between figures reported to WTO and those on European Agriculture Guarantee and Guidance Fund (EAGGF), the body responsible for providing all the EU-level farm subsidies[3].

There is no clear trend on the use of export subsidies (Hoekman and Messerlin, 2006). Governments do not define or apply export subsidies on an *ad valorem* or percentage basis, but rather as an amount of money that is necessary to offset the gap between domestic and world prices. The low level of export subsidies will reflect high world prices (relative to domestic prices) in key farm products. Data on producer support estimates suggests that although export subsidies have been falling, protection has not, and that a significant decline in world prices could lead to a subsequent rise in export subsidies (Hoekman and Messerlin, 2006).

As regards utilisation rates (defined as actually used subsidies as a percentage of the maximum permitted), it is not known to what extent notifications lead to actual subsidies being applied (Hoekman and Messerlin, 2006).

The information reported to the WTO on export subsidies by product differs between WTO members - some define their commitments by broad product categories, while others use narrowly specified product groups. Assessing the effects of export support on world markets requires information on the level of subsidies for a given product category, as the overall or aggregate amount of subsidies by country is not very informative. Reporting by broad category allows for potentially substantial discretion in reallocating subsidies across products within an aggregate category (Hoekman and Messerlin, 2006).

Gender issues. We could not find information on the specific gender impacts of export refunds elimination. Based on studies focusing on gender and exports in developing countries (see, for instance, the report of ITC, 2007 showing how Cambodia, Egypt and Uganda have embraced approaches to improve women's access to the resources and opportunities necessary to trade), we can assume

[3] In EAGGF parlance, export subsidies are recorded as “refunds.” Other sources refer to export subsidies as inclusive of export refunds (direct export subsidies) and others (indirect export subsidies).

that the impacts on women welfare in developing countries will differ from one country to another (*e.g.*, in countries where women are successfully involved in export activities, elimination of export refunds might have a positive impact on gender).

Conclusions from the literature review

Based on the assessment of the relevant literature as regards whether export refunds have been distortive for the world economy and particularly for developing countries, the following conclusions have been derived:

The main empirical tools for these assessments have been the use of spatial and non-spatial partial equilibrium models, gravity equations, single and multi-country partial and general equilibrium models. Almost all studies use the GTAP database. As regards the agricultural products analysed, most studies analysing the impacts of export refunds elimination focus on dairy, beef, poultry and pigmeat, sugar and fruits and vegetables.

Most studies found that elimination of export subsidies would lead to an increase in world prices and would have a limited impact on the trade volumes and welfare of developing countries. Specifically, the impacts on the different developing countries (producers and consumers) will differ in sign and magnitude depending on the country being net importer of the product analysed or net exporter or having the potential to become net exporter (appropriate infrastructure, marketing policies, etc.).

Overall, eliminating export support alone is expected to have a limited economic impact (also due to the sharp decrease in export refunds during the past decade), however, this impact will be noteworthy if combined with reducing/eliminating tariffs and domestic support.

Similar conclusions as regards the different impacts from one developing country to another can be drawn based on the 'micro-level' studies reviewed. Namely, in some countries where domestic production does not compete with the imported production because they are destined to serve different markets, where the dometic market is isolated from the international markets through government regulations there will be limited impacts of export refunds elimination on the welfare of producers, at least in the short term. Whether this will change in the longer term due to changes in policies, investment in infrastructure, etc. remains to be seen. Countries with export potential will benefit from the elimination of export refunds.

In addition to differences in terms of models assumptions (e.g., paramaters, model structure) to explain the observed differences, there is a lack of accurate data on export refunds (e.g., the WTO notification procedure does not work well, there is no clear trend on the use of export subsidies, there is no accurate information on the extent to which notifications lead to actual subsidies being applied, there are differences in the way information on export subsidies by product is reported by WTO members).

III. Global analysis using the GTAP model

III.1 CGE model and data

This study employs the Global Trade Analysis Project (GTAP) CGE model (Hertel, 1997) and accompanying version 7.1 database benchmarked to 2004 (Narayanan and Walmsley, 2008). Version 7.1 data represents a significant advance on version 6 in terms of (*inter alia*) broader regional coverage (112 regions), improved trade and demand elasticity estimates and significant refinements to the support and protection data. Moreover, in comparison with version 7 data, 7.1 introduces updated versions of the EU27 input-output (IO) tables, revised estimates of domestic support in the USA, and improved IO contributions for China and Vietnam.

The 'standard' comparative static GTAP model employs neo-classical optimising behaviour to derive Hicksian consumer and intermediate demands. Regional utility is aggregated over private demands (non-homothetic), public demands and savings (investment demand). Production, which is 'demand driven' through a series of accounting conventions and market clearing balances, is characterised employing a perfectly competitive, constant-returns-to-scale technology, and bilateral imports are differentiated by region of origin using the Armington (1969) specification. The model incorporates five factors of production, where skilled/unskilled labour and capital are perfectly mobile, whilst land and natural resources are both sector specific with the former moving 'sluggishly' between productive sectors. In all factor markets, full employment is assumed (long run). Finally, investment behaviour functions through the creation of a fictitious 'global bank'. This entity collects investment funds (savings) from each region and disburses them across regions according to a rate of return *or* a fixed investment share mechanism.

Given the focus of this study, we employ a heavily modified version of the standard GTAP. This model variant (Renwick et al., 2007) is superior to the standard GTAP model from the perspective of agricultural policy modelling in that it better captures the nuances of agricultural markets. The main modelling refinements are:

a. Rigidities on the movement of mobile factors between agricultural and non-agricultural sectors to capture wage and capital differentials between different factor uses. This also reduces agricultural supply responsiveness in the model.
b. Improved detail on substitution possibilities between different land uses in agriculture. Compared with the standard GTAP model, this modelling feature also reduces the ease with which land moves between non-compatible competing agricultural uses (i.e., for example, land usage between intensive livestock and cereals).
c. Improved substitutability between feed inputs in the livestock sectors
d. An econometrically estimated endogenous land supply function for each region.
e. Varying degrees of land substitutability between competing primary agricultural sectors.

f. Explicit modelling of the CAP budget (including UK rebate and EU enlargement 'dummies').
g. Explicit modelling of CAP Support Mechanisms: Single farm payment; milk and sugar quotas, set-aside; Uruguay Round (UR) export refund limits, intervention prices and stock purchases.
h. Improved characterisation of 'coupled' and 'decoupled' support for the single farm payment.

In an attempt to maintain the model within manageable proportions, whilst taking into consideration the developing country focus of the study, a 22 sector by 23 region aggregation was agreed (Figure 1).[4] Annex I provides a full GTAP concordance between the 112 GTAP regions and the 23 aggregated regions selected in this study.

Box 2: Sectors and regions in the model aggregation
(GTAP sector and region codes in brackets)

22 Sectors: rice (Rice); wheat (Wheat); other grains (Ograins); vegetables fruits and nuts (Vegfrunuts); oilseeds (Oilseeds); raw sugar (Sugar); plant based fibres (Plant fibres); other crops (Ocrops); cattle and sheep (Catshp); pigs and poultry (Pigspoultry); raw milk (Milk); wool (Wool); red meat processing (Red Meat); other meat processing (White Meat); vegetable oils and fats (Vegoilsfats); dairy (Dairy), processed rice (Ricepro); processed sugar (Sugarpro); other food processing (Ofoodpro); beverages and tobacco (BevsTobac); manufacturing (Manu); services (Svces).

23 Regions: United Kingdom (UK); European Union 4 (EU4); Rest of EU25 (RoEU25); Bulgaria/Romania (AC2); Developing Europe (EurDvping); Central America (CentAme); Latin America (LatAme); Caribbean (Caribbean); East & South East Asia (ESEAsia); Bangladesh (Bangladesh); Rest of Southern Asia (RoSAsia); West Asia and the Middle East (WAsiaMEast); Egypt (Egypt); Rest of North Africa (RoNAfr); Nigeria (Nigeria); Senegal (Senegal); Rest of West Africa (RoWAfr); Ethiopia (Ethiopia); Tanzania (Tanzania); Uganda (Uganda); Rest of Central and East Africa (CentEAfr); Southern Africa (SouAfr); Rest of Developed World (RoDevWld).

For the choice of sectors, all agricultural commodities and food products are disaggregated, with remaining non agro-food sectors aggregated into 'manufacturing' and 'services' sector composites. In the case of the regions, there are four EU27 regions. In order to capture the UK rebate mechanism within the CAP budget, it is necessary to disaggregate the UK. Moreover, the EU4 (e.g., Austria, Germany, Netherlands and Sweden) contribute less to the UK's rebate and therefore must be separated from the rest of the EU25. Finally, in 2004, the AC2 are not EU members, so do not contribute to the CAP budget in the benchmark data. This requires the disaggregation of an additional 'accession 2' region (AC2) to allow gradual incorporation into the EU27 CAP budget (post 2004).

[4] The terms in brackets are the identifiers employed in the results tables.

Box 3: Concordance between 112 GTAP regions and 23 Aggregated regions

Aggregated region (23)	GTAP Region (112)
United Kingdom	United Kingdom
EU4	Austria, Germany, Netherlands, Sweden
Rest of EU25	Belgium, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Poland, Portugal, Slovakia, Slovenia, Spain
Accession 2	Bulgaria, Romania
Developing Europe	Albania, Belarus, Croatia, Russian Federation, Ukraine, Rest of Eastern Europe, Kazakhstan, Kyrgyzstan, Rest of Former Soviet Union
Central America	Costa Rica, Guatemala, Nicaragua, Panama, Rest of Central America
Latin America	Argentina, Bolivia, Brazil, Chile, Colombia, Ecuador, Paraguay, Peru, Uruguay, Venezuela, Rest of South America
Caribbean	Caribbean
East & South East Asia	China, Rest of East Asia, Cambodia, Indonesia, Lao People's Democratic Republic, Malaysia, Philippines, Thailand, Vietnam, Rest of Southeast Asia
Bangladesh	Bangladesh
Rest of Southern Asia	India, Pakistan, Sri Lanka, Rest of South Asia
West Asia & Middle East	Armenia, Azerbaijan, Georgia, Iran, Turkey, Rest of West Asia
Egypt	Egypt
Rest of North Africa	Morocco, Tunisia, Rest of North Africa
Nigeria	Nigeria
Senegal	Senegal
Rest of West Africa	Rest of Western Africa
Ethiopia	Ethiopia
Tanzania	Tanzania
Uganda	Uganda
Rest of Central & East Africa	Central Africa, South Central Africa, Madagascar, Malawi, Mauritius, Mozambique, Zambia, Zimbabwe, Rest of Eastern Africa
Southern Africa	Botswana, South Africa, Rest of South African Customs Union
Rest of Developed World	Australia, New Zealand, Rest of Oceania, Hong Kong, Japan, Korea, Taiwan, Singapore, Rest of Europe

The developing regions have been disaggregated by geographical subcontinents, whilst representative single countries from those subcontinents of interest have been chosen (e.g., Bangladesh, Egypt, Nigeria, Senegal, Ethiopia, Tanzania and Uganda) subject to availability within the GTAP version 7.1 database. With its deep trade links within the NAFTA agreement, Mexico's trade pattern is not compatible with that of the Latin American countries. Consequently, it was decided to aggregate all NAFTA regions together within the 'Rest of the Developed World' composite region.

III.2 Scenario designs and model closure

For the purposes of our study three time periods are chosen and three sets of experiments (designated 'A', 'B' and 'C') are designed.

- **Experiment A employs a 2004-2013 time horizon to examine the impacts of export subsidies in the medium run.**
- **Experiment B employs a 2004-2013 time horizon to contextualise the impacts of export refund elimination within the Doha Round package**
- **Experiment C employs a 2004-2020 time horizon to examine the impacts of export subsidies in the long run.**

Further details underlying each time period are provided below.

III.2.1 2004-2013 Horizon – Experiment 'A'

In experiment A, we have three scenarios **labelled A1, A2 and A3**. These are detailed as follows:

2004-2013: A1 ('baseline')

- EU enlargement to 27 members (remove all trade protection on intra-EU27 trade)
- Impose common external tariff for the two new EU member states
- Decouple support payments in agricultural sectors with SFP totals in 2013 incorporated
- Introduce modulation into the CAP budget – 10 per cent for EU15, 3 per cent for AC10 and 0 per cent for Bulgaria and Romania
- Planned reductions in intervention prices between 2004-2013
- In accordance with the Health Check, implement milk quota shocks to 2013 to capture the 1 per cent increase annually between 2009 and 2013
- Elimination of all set-aside
- Everything But Arms (EBA) agreement between the EU27 and the Less Developed Countries (LDCs)
- Export refunds respect Uruguay Round limits – "business as usual"

2004-2013: A2 ('maximum damage scenario')

- As scenario A1, except that export subsidies reach their permissible Uruguay Round (UR) ceiling limits. **By comparing scenario A2 with scenario A1**, we examine the potential maximum damage caused by export subsidies up to 2013.

2004-2013: A3 ('export refund elimination scenario')

- As scenario A1, but takes a purely hypothetical position of eliminating all export subsidies (along with intervention prices and stock purchases) by

2013. **By comparing scenario A3 with scenario A1**, we are measuring the impact of 'business as usual' export subsidies on world markets.

III.2.2 2013-2020 Horizon – Experiment B

In experiment B we contextualise the impacts of export refund elimination within a hypothetical Doha Package. As a benchmark, we employ the updated data from scenario A1 (2004-2013 baseline experiment), which gives us a 2013 database where export subsidies have been allowed to roam freely within their Uruguay Round limits. By the same token, we also assume that no potential Doha reforms will take place prior to 2013, whilst the period of implementation for Doha will not exceed the 2020 time horizon.

A description of scenario 'B' is provided below:

2013-2020: Scenario B

- SFP totals are reduced with assumed increases in pillar II modulation to 20 per cent
- Elimination of all sugar and milk quotas
- Doha Round tariff shocks reductions employing the latest modalities for agriculture (WTO, 2008a) and non-agriculture (WTO, 2008b)[5], differentiated between developed and developing countries, small vulnerable economies (SVEs) and recently acceded members (RAMs). Tariff formulae are applied at the HS6 level before aggregating to the GTAP sector concordances. Tariff reductions account for the difference between the bound and applied rates (i.e., binding overhang). Moreover, we assume 100% Duty-Free Quota Free access for less developed countries (LDCs).
- Doha tariff reductions also include 'sensitive' concessions on four per cent (five and one third per cent) of HS6 product lines for developed countries (developing countries; small vulnerable economies (SVEs); recently acceding member (RAMs)), based on the criterion of tariff revenue forgone (Jean et al. 2005).[6]

The GEMPACK software allows us to perform side calculations to assess the contribution of the EU's export refund elimination within the multilateral agreement. It is assumed that tariff liberalisation only applies to merchandise trade. No non tariff barrier estimates for services trade liberalisation are

[5] For AMA a four tiered tariff formula is applied by HS6 tariff line (WTO, 2008a). For NAMA, a Swiss formula variant is applied (WTO, 2008b).

[6] This criterion has become an accepted 'default' hypothesis for identifying sensitive products, although it is hampered by assuming invariant tariff quantities, and those cases where prohibitive tariff barriers have a zero weighting. Nevertheless, it still 'largely' accounts for the (political) importance of the commodity (i.e., size of the tariff revenue), the height of the applied tariff compared with the c.i.f. import price, and the distance between the binding and applied tariff rates (i.e. the revenue fall under each formula is a function of this 'distance').

incorporated into this scenario. To enumerate the Doha tariff shocks, specialist utility software developed by Horridge and Laborde (2008) is employed; with data on 5113 disaggregated HS6 applied and bound tariff lines across 227 countries in 2004. By entering the relevant tariff reduction formulae, this facility calculates necessary applied tariff reductions (accounting for tariff binding overhangs) and aggregates to a GTAP concordance consistent with the user's chosen aggregation.

III.2.3 2004-2020 Horizon – Experiment C

In this third period, we examine the longer run impacts of export subsidies in the same manner as scenarios A1-A3. To further characterise the long run, we assume that the Armington trade elasticities are 30 per cent larger than the corresponding medium run simulations. The policy shocks are the same as in experiment A, with the exception that further increases in modulation are implemented with concurrent reductions in pillar 1 support, whilst EU27 production quotas are eliminated.

2004-2020: Scenario C1 ('baseline')

- EU enlargement to 27 members (remove all trade protection on intra-EU27 trade)
- Impose common external tariff for the two new EU member states
- Decouple support payments in agricultural sectors with SFP totals in 2013 incorporated
- Introduce modulation into the CAP budget – 20 per cent for EU15, 10 per cent for AC10 and 5 per cent for Bulgaria and Romania
- Planned reductions in intervention prices between 2004-2013
- Elimination of all sugar and milk quotas
- Elimination of all set-aside
- Everything But Arms (EBA) agreement between the EU27 and the Less Developed Countries (LDCs)
- No Doha agreement – 'business as usual' with the export subsidies respecting UR ceiling limits

2004-2020: Scenario C2 ('maximum damage scenario' – long run)

- As scenario C1, except that export subsidies are allowed to reach their permissible Uruguay Round (UR) ceiling limits. **By comparing scenario C2 with scenario C1**, we examine the potential maximum damage in the long run caused by export subsidies up to 2020.

2004-2020: C3 ('export refund elimination scenario' – long run)

- As scenario C1, but takes a purely hypothetical position of eliminating all export subsidies (along with intervention prices and stock purchases) by 2020. **By comparing scenario C3 with scenario C1**, we determine the impact of 'business as usual' export subsidies on world markets up to 2020.

III.2.4 Model closure

A standard medium to long run neoclassical model closure is employed (i.e., flexible wages, long run employment fixed). Moreover, given the importance of investment flows on potential trade led gains, a medium to long run closure swap permits an 'endogenous' treatment of the interaction between changes in investment and the capital stock (i.e., capital accumulation). Moreover, investment moves in tandem with fixed savings rates respecting the long run empirical observation that domestic saving finances domestic investment (Francois et al., 1996).

III.3 Results regarding output, prices and trade balance

Owing to the size of the CGE model, a full discussion of all regions' model results in all sectors would be unwieldy. Consequently, we focus on the key variables of interest with emphasis on those commodities affected by export subsidies.

III.3.1 2004-2013 Experiment 'A'

Scenario A1

In our baseline for experiment A, the 'drivers' for the changes in prices and outputs principally originate from changes in EU agricultural policy. A decomposition of the numerous baseline shocks, reveals that EU27 output and market changes (Tables 1 and 2) are principally driven by the enlargement of the EU to 27 members, and the reforms of the CAP (i.e., decoupling of sectorally targeted subsidy measures). In those sectors where Agenda 2000 targeted support payments were proportionally larger, decoupling will inflict greater competitive pressures. Thus, the removal of large coupled subsidies from agricultural sector 'j' will not be compensated by a uniform single farm payment (SFP) rate for all agricultural activities, resulting in output falls as resources (primarily land) are diverted into other activities.[7]

[7] Expressed in another way, prior to the 2003 Mid Term Review (MTR) reforms, the farmer would react to the market price and the support received. Under the MTR reforms, domestic support is granted independently of production. Thus, if the market price received no longer covers the variable costs of production, 'marginal' farmers in those sectors will cease activity and simply maintain the land in good agricultural and environmental condition (GAEC), or they will diversify into another crop/livestock activity.

Table 1: Percentage changes in output in scenario A1 vs. 2004 benchmark

	EU27	Eurdvping	Cent Ame	Lat Ame	Carib bean	ESE Asia	Bangla desh	RoS Asia	WAsia MEast	Egypt	Ro NAfr	Nige ria	Sene gal	Ro WAfr	Ethio pia	Tanza nia	Ugan da	Cent EAfr	Sou Afr	RoDvW ld
Land	0.0	-0.1	-0.1	0.0	0.0	0.0	0.6	0.0	-0.1	-0.3	-0.1	0.0	0.8	-0.1	0.2	2.5	0.0	0.1	-0.2	-0.1
UnskLab	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SkLab	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Capital	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Natres	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Paddy rice	-8.8	-0.1	0.2	-0.3	0.0	0.0	2.1	-0.3	0.0	-1.7	-1.8	0.0	39.9	9.6	25.1	22.3	4.0	6.8	0.6	-0.1
Wheat	1.0	-0.3	0.4	-1.1	0.4	-0.1	-2.2	0.0	0.1	0.6	-0.1	0.0	-1.7	-0.2	-2.6	-12.9	0.9	-0.3	0.2	0.0
Ograins	-0.3	-0.1	0.1	0.1	0.1	0.0	-1.2	0.0	0.2	0.1	0.3	0.0	0.0	0.0	0.3	-0.3	0.2	0.0	0.2	0.1
Vegfrunuts	2.3	-0.2	-0.8	-1.1	-0.5	-0.1	-0.6	0.0	-0.4	-0.3	-0.3	0.0	-2.5	-0.2	-0.2	-3.6	0.0	-0.9	-2.0	-0.3
Oilseeds	-9.6	2.8	1.5	2.7	1.1	0.8	-1.6	0.1	1.1	1.3	3.3	0.4	0.4	1.4	-4.7	-4.5	0.5	0.7	1.1	1.5
Raw Sugar	-36.1	-0.9	-0.5	-0.5	-1.1	0.0	22.8	0.1	0.1	-0.1	0.0	0.0	0.0	0.4	119.2	75.8	7.2	7.1	-0.5	-0.3
Plant fibres	6.5	-0.7	0.2	-0.4	0.0	-0.1	-2.0	0.0	-0.3	-0.5	-0.5	0.1	-5.4	-0.1	-2.0	-12.4	-1.4	-0.8	0.0	-0.3
Ocrops	2.0	-0.9	-0.4	-1.1	-0.2	-0.4	-0.7	-0.2	-0.5	0.0	-0.8	-1.8	-3.7	-1.5	-5.8	-5.4	-2.9	-0.8	-0.1	-0.4
Catshp	-4.8	1.0	0.3	0.9	0.4	0.0	0.4	0.0	1.7	0.3	1.6	0.0	0.2	0.5	1.6	2.9	0.2	1.3	0.8	0.7
Pigspoultry	1.7	-0.2	0.0	-0.4	-0.2	-0.1	-0.2	0.0	-0.2	-0.2	-0.1	0.0	-0.2	0.0	-1.2	0.4	-0.4	-0.2	-0.2	-0.1
Milk	4.9	-0.3	-0.4	-0.5	-0.9	-1.0	0.4	0.0	-0.8	-0.3	-1.7	-0.4	-6.2	-4.2	0.5	2.9	-0.3	-0.3	-0.4	-0.6
Wool	8.8	-0.1	0.1	-0.5	0.3	-0.2	-2.3	-0.1	-0.1	0.4	0.0	0.3	2.3	0.2	-2.8	-11.6	-0.8	0.1	-0.1	-0.4
Red meat	-5.4	1.0	0.2	1.3	0.4	0.3	0.7	1.0	0.3	0.3	0.3	0.6	0.2	1.2	-2.8	1.1	0.3	0.7	0.8	0.3
White meat	0.3	-0.2	0.0	-0.6	0.0	-0.1	0.4	-0.1	-0.1	0.0	0.0	0.0	-1.1	-0.4	-1.2	0.6	-0.2	-0.3	0.0	0.0
Vegoilsfats	-5.2	2.0	1.0	2.1	0.8	0.7	-0.9	0.4	1.2	3.0	7.9	1.0	1.7	2.4	-6.1	-13.6	0.9	0.6	0.7	0.9
Dairy	5.8	-1.2	-0.6	-0.8	-1.1	-1.0	-2.2	-0.2	-1.2	-1.3	-3.5	-12.2	-7.9	-6.8	-3.5	-15.9	-2.0	-4.9	-0.9	-0.8
Ricepro	-4.7	0.1	-0.1	0.0	-0.1	0.0	0.1	0.1	0.1	-0.8	0.1	0.1	8.3	5.5	2160.4	25.1	8.9	6.8	0.2	0.0
Sugarpro	-19.0	0.0	-0.8	-0.8	-1.8	0.0	25.4	0.2	0.2	-0.1	-0.2	1.0	-0.8	15.3	237.3	2090.1	29.7	12.3	-1.1	-0.4
Ofoodpro	0.5	-0.1	0.0	-0.1	0.0	-0.1	-0.5	0.0	-0.1	0.0	-0.1	-0.2	-0.8	-0.2	-1.0	-1.7	-1.3	-0.1	0.0	0.0
BevsTobac	0.2	0.2	0.0	0.0	-0.1	0.0	0.0	0.0	0.0	0.0	0.0	-0.1	0.3	-0.1	-0.4	0.6	0.0	0.1	0.0	0.0
Manu	0.0	0.0	0.1	-0.1	0.0	0.0	-1.0	0.0	0.0	0.1	0.0	0.0	-1.0	-0.1	-5.8	-4.5	-0.4	-0.1	0.0	0.0
Svces	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-2.1	0.6	-0.1	0.0	0.0	0.0
QGDP	0.06	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.3	0.3	0.0	0.0	0.0	0.0

Table 2: Percentage changes in market prices in scenario A1 vs. 2004 benchmark

	EU27	Eurdvping	Cent Ame	Lat Ame	Carib bean	ESE Asia	Bangla desh	RoS Asia	WAsia MEast	Egypt	Ro NAfr	Nige ria	Sene gal	Ro WAfr	Ethio pia	Tanzan ia	Ugan da	Cent EAfr	Sou Afr	RoDvWld	World prices
Land	30.6	-0.1	-0.7	0.0	-0.7	-0.1	3.8	-0.1	-0.3	-0.4	-0.2	-0.3	1.5	-0.2	1.7	7.1	0.3	0.1	-0.5	-0.1	
UnskLab	-0.8	-0.1	-0.2	0.0	-0.1	-0.1	0.8	-0.1	-0.1	-0.2	-0.1	-0.2	1.3	-0.2	1.7	6.2	0.4	0.1	-0.1	-0.1	
SkLab	-0.4	-0.1	-0.1	0.0	-0.1	0.0	0.5	-0.1	-0.1	-0.1	0.0	0.0	0.6	0.0	2.2	4.6	0.4	0.1	-0.1	0.0	
Capital	-0.4	0.0	-0.1	0.0	0.0	0.0	0.5	0.0	-0.1	-0.1	0.0	0.0	0.6	0.0	5.1	5.3	0.3	0.1	-0.1	0.0	
Natres	0.1	-0.1	0.0	-0.1	0.0	-0.1	-0.9	-0.1	-0.1	0.0	-0.1	-0.1	-0.6	-0.2	-7.8	-6.1	-1.0	-0.3	0.0	-0.1	
Paddy rice	-2.5	-0.1	-0.3	0.0	-0.3	-0.1	2.4	-0.2	-0.3	-0.6	-0.1	-0.2	6.8	1.0	0.9	10.3	0.9	1.0	-0.3	-0.1	0.1
Wheat	-2.5	-0.1	-0.2	0.1	-0.2	-0.1	1.1	-0.1	-0.2	-0.4	-0.2	-0.1	0.8	-0.4	1.5	3.5	0.4	0.1	-0.2	0.0	-0.2
Ograins	-3.4	-0.1	-0.3	0.2	-0.3	0.0	1.8	-0.1	-0.2	-0.4	-0.1	-0.2	1.7	-0.2	1.7	7.2	0.4	0.1	-0.2	0.0	0.7
Vegfrunuts	-3.7	-0.1	-0.5	-0.2	-0.4	-0.1	1.5	-0.1	-0.3	-0.5	-0.2	-0.2	1.4	-0.3	1.8	6.9	0.3	0.0	-0.4	-0.1	-0.6
Oilseeds	9.2	0.3	-0.2	0.3	-0.2	0.1	1.3	0.0	-0.2	-0.4	0.0	-0.2	1.7	-0.1	1.6	7.6	0.4	0.2	-0.2	0.1	1.4
Raw Sugar	-24.0	-0.2	-0.4	0.1	-0.5	-0.1	6.6	-0.1	-0.2	-0.4	-0.1	-0.2	1.7	-0.2	10.0	5.9	0.8	0.7	-0.2	-0.1	
Plant fibres	-3.8	-0.2	-0.2	0.0	-0.2	-0.1	0.9	-0.1	-0.2	-0.4	-0.2	-0.2	0.9	-0.2	1.6	3.5	0.1	0.0	-0.2	-0.1	-0.2
Ocrops	-1.8	-0.4	-0.5	-0.2	-0.4	-0.3	1.4	-0.2	-0.3	-0.5	-0.2	-0.5	1.2	-0.5	1.1	6.3	-0.1	0.0	-0.3	-0.2	-0.8
Catshp	15.0	0.0	-0.3	0.2	-0.2	-0.1	1.8	-0.1	-0.1	-0.4	-0.1	-0.2	1.7	-0.2	2.1	8.1	0.4	0.2	-0.2	0.0	3.2
Pigspoultry	-3.8	-0.2	-0.3	0.1	-0.3	-0.1	1.7	-0.1	-0.2	-0.4	-0.2	-0.2	1.6	-0.2	1.9	7.8	0.3	0.1	-0.2	-0.1	-0.8
Milk	-17.2	-0.2	-0.4	0.0	-0.3	-0.2	1.8	-0.1	-0.2	-0.4	-0.2	-0.3	1.1	-0.6	2.0	8.1	0.3	0.1	-0.2	-0.1	
Wool	-1.3	-0.1	-0.3	-0.1	-0.2	-0.1	0.0	-0.1	-0.2	-0.2	-0.1	-0.2	0.4	-0.1	1.2	2.3	0.2	0.1	-0.2	-0.1	-0.1
Red meat	5.6	0.0	-0.2	0.1	-0.1	0.0	0.1	0.0	0.2	-0.1	0.2	-0.1	0.7	-0.1	2.3	3.9	0.3	0.1	-0.1	0.0	1.0
White meat	-0.5	-0.1	-0.2	0.0	-0.2	-0.1	-0.2	0.0	0.0	-0.1	-0.2	-0.1	1.4	-0.2	2.2	3.9	0.3	0.1	-0.1	0.0	-0.2
Vegoilsfats	3.8	0.1	-0.1	0.2	-0.1	0.0	0.6	0.0	0.0	-0.4	0.0	0.0	0.9	0.0	1.6	5.8	0.3	0.1	0.0	0.0	0.6
Dairy	-5.4	-0.1	-0.2	0.0	-0.2	-0.1	0.7	-0.1	-0.2	-0.1	-0.5	-0.1	0.9	-0.4	2.5	4.6	0.1	-0.2	-0.1	-0.1	-2.0
Ricepro	-1.3	-0.1	-0.2	0.0	-0.2	-0.1	1.6	-0.1	-0.1	-0.6	0.0	-0.1	0.2	-0.1	0.4	10.1	0.1	0.6	-0.1	-0.1	0.1
Sugarpro	-7.5	-0.2	-0.2	0.0	-0.2	-0.1	2.9	0.0	-0.1	-0.3	-0.1	0.0	0.4	0.0	5.4	5.9	0.6	0.3	-0.1	-0.1	0.5
Ofoodpro	-0.4	-0.1	-0.1	0.0	-0.1	-0.1	0.5	-0.1	-0.1	-0.2	-0.1	-0.1	0.4	0.0	2.3	4.8	0.4	0.0	-0.1	0.0	-0.2
BevsTobac	-0.4	-0.1	-0.1	0.0	-0.1	-0.1	0.6	0.0	-0.1	0.0	-0.1	0.0	0.3	0.0	2.8	4.5	0.3	0.1	-0.1	-0.1	-0.2
Manu	-0.1	-0.1	-0.1	0.0	-0.1	0.0	0.3	0.0	-0.1	-0.1	0.0	0.0	0.2	0.0	2.2	2.8	0.1	0.0	-0.1	0.0	0.0
Svces	0.0	0.0	-0.1	0.0	-0.1	0.0	0.4	0.0	-0.1	-0.1	0.0	0.0	0.4	0.0	2.6	3.8	0.3	0.0	-0.1	0.0	0.0
PGDP	-0.3	-0.1	-0.1	0.0	-0.1	0.0	0.7	-0.1	-0.1	-0.1	-0.1	-0.1	0.7	-0.1	2.7	5.3	0.3	0.0	-0.1	0.0	

In the EU27, production falls most notably in subsidised activities such as 'paddy rice';[8] 'oilseeds' due to the removal of coupled olive oil subsidies; 'cattle and sheep' from the decoupling of headage payments and raw sugar from reductions in intervention prices. As a result, output in the corresponding downstream food industries of 'processed rice', 'vegetable oils and fats', 'red meat' and 'sugar processing' all fall. In contrast, increases in the milk quota to 2013 are matched by endogenous increases in raw milk production, despite slight falls in dairy intervention prices. Indeed, with the reduction of quota rents, raw milk prices and dairy prices fall compared with 2004 resulting in significant purchases of dairy stocks (€1,791 million – see Table 4 below) and accompanying dairy export refund increases (€218 million – Table 4). Thus, the increase in dairy output is related to EU policy intervention rather than increases in competitiveness.

In terms of EU27 market prices (Table 2), 'cattle and sheep' and 'oilseeds' prices rise from significant net removals of (targeted) support payments. These price increases are passed onto the corresponding downstream sectors ('red meat' and 'vegoilsfats') Elsewhere, dairy prices fall from quota rent reductions and the uptake of excess land from contracting 'catshp' activity, whilst market prices for sugar decline due to intervention price reductions. In the remaining agricultural sectors, we see a general equilibrium price effect from the release of primary factor resources (particularly land) from contracting industries (i.e., 'paddy rice', 'other grains', 'oilseeds', 'raw sugar', 'catshp') to other agricultural sectors.[9] These smaller price falls in primary agricultural activities are passed onto downstream food industries.

In the developing regions, output and price changes reflects the elimination of EU tariffs under the Everything But Arms (EBA) deal in concert with the decoupling of EU agricultural support payments. Reductions in EU27 production of 'rice', 'oilseeds', 'sugar' and 'catshp', presents an economic opportunity for competitive net exporting developing countries. In Africa, notable examples of upstream and downstream rice and sugar output gains are in Ethiopia,[10] Tanzania,[11] Uganda, Rest of Central and Eastern Africa and Rest of Western Africa. Similarly, Senegal witnesses an 8 per cent increase in its processed rice sector (with an accompanying 40 per cent increase in paddy rice production).

In Latin America, important output gains (calculated from large bases) occur in 'red meat' and 'oilseeds'/'vegetable oils and fats' sectors (Table 1). On the Asian continent specific sectors in Bangladesh ('paddy rice', sugar sectors), East and South East Asia and the Rest of Southern Asia ('vegetable oils and fats' in both regions) all benefit. In contrast, trade benefits are mitigated by enlargement of the single market to 27 members with associated trade

[8] The percentage changes reported are calculated from very small bases.
[9] Despite labour and capital price falls, the recapitalised value of the SFP increases EU land prices by 31 per cent (see Table 2).
[10] The significant per centage gain in the Ethiopian processed rice sector is calculated from a very small base.
[11] Both Ethiopia and Tanzania have large sugar sectors as a proportion of total agro-food production.

diversion flows away from third countries. Thus, in other agro-food sectors (e.g., 'vegetables, fruits and nuts' 'pigspoultry' 'white meat') output contracts. Consequently, developing country value added costs (i.e., capital, labour and land) and by implication, market prices, are a function of these push and pull factors.

For example, in Bangladesh, the index of general prices rises 0.7 per cent (Table 2) as rice and sugar production draw competing resources from other agricultural activities. Output rises in rice and sugar activities also lead to even stronger price effects in Ethiopia and Tanzania, with retail price index increases of 2.7 per cent and 5.3 per cent respectively (Table 2).[12] Finally, in Senegal, increased rice activity leads to a retail price index rise of 0.7 per cent (with associated real growth of 0.1 per cent). In remaining developing regions, the retail price index remains relatively static or falls very slightly.

Table 3 shows the changes in the trade balances in the baseline. The EU27 agro-food trade balance declines by €1,264 million in the baseline scenario, largely due to deteriorations in 'oilseeds', 'cattle and sheep', 'red meat', 'vegetable oils and fats' and 'processed sugar'. The largest EU27 trade balance improvements occur in 'dairy' and 'vegetables fruits and nuts', which in the former case are aided by export refund increases (€218 million) in concert with increases in stock purchases (€1,791 million). In the developing regions, Latin America benefits from the EU27 contraction in 'oilseeds', 'vegetable oils and fats' and 'red meat' production, whilst in Asia, the most notable trade balance improvements occur in Bangladesh from 'paddy rice' and 'processed sugar' and East and South East Asia from 'vegetable oils and fats'. On the African continent, the opening of EU27 sugar markets largely explains improvements in net agro-food export revenues to Ethiopia (€110 million), Tanzania (€336 million), Uganda (€9 million) and the Rest of Central and Eastern Africa (€96 million).

[12] Real GDP growth in Ethiopia and Tanzania from the policy changes in the baseline increases by 3.3 per cent and 2.7 per cent, respectively.

Table 3: Changes in trade balances (€ millions) in scenario A1 vs. 2004 benchmark

	EU27	Eurdvping	Cent Ame	Lat Ame	Carib bean	ESE Asia	Bangla desh	RoS Asia	WAsia MEast	Egypt	Ro NAfr	Nige ria	Sene gal	Ro WAfr	Ethio pia	Tanzani a	Ugan da	Cent EAfr	Sou Afr	RoDvW ld
Paddy rice	-127	0	1	-7	0	3	89	-38	0	-14	0	0	13	44	0	43	1	6	0	-16
Wheat	2	-11	0	-35	1	2	-3	3	9	6	-4	0	-2	-1	-3	-3	-1	-3	1	8
Ograins	-45	-7	1	11	2	2	0	1	3	1	1	0	0	0	0	-4	0	1	2	19
Vegfrunuts	836	-13	-42	-177	-8	-64	-7	-14	-98	-8	-40	0	-3	-18	-3	-16	-1	-27	-51	-161
Oilseeds	-724	22	4	306	3	8	-1	16	11	4	-2	1	0	5	-3	-5	0	3	1	191
Plants	82	-13	0	-6	0	2	-4	0	-11	-2	-1	0	-1	-3	-1	-9	0	-8	0	-24
Ocrops	567	7	-12	-144	-2	-50	-5	-32	-19	0	-1	-6	-1	-48	-18	-54	-8	-70	-1	-85
Catshp	-383	13	1	8	3	4	0	0	73	1	11	0	0	1	0	0	0	13	3	147
Pigspoultry	141	-10	0	-11	0	-30	-1	-4	-9	-1	-2	0	0	0	-3	-3	0	-3	-3	-64
Wool	15	-1	0	-1	0	-2	0	-1	0	0	0	0	0	0	0	0	0	-1	-1	-9
Red meat	-706	79	4	228	5	8	0	16	3	1	4	0	0	1	-2	0	0	4	22	327
White meat	26	-5	1	-77	1	-17	0	0	-9	0	0	0	-1	0	0	-3	0	-4	0	30
Vegoilsfats	-950	45	7	360	3	206	-5	30	24	1	50	0	0	4	0	-7	0	4	4	183
Dairy	1072	-103	-7	-84	-13	-69	-2	-18	-167	-12	-12	5	-2	-2	-1	-1	-1	-7	-13	-748
Ricepro	-134	0	0	-1	0	7	8	15	1	-9	0	0	14	21	0	15	2	60	0	-1
Sugarpro	-1084	-5	-11	-59	-21	5	188	17	4	-1	-3	0	0	11	147	415	18	136	-15	-66
Ofoodpro	168	-3	1	-32	2	-38	-7	-7	-8	2	-1	1	-5	-6	-4	-29	-2	-7	-1	-58
BevsTobac	-18	18	0	-5	-2	-4	0	0	0	0	0	0	0	0	0	-3	0	-1	-1	-4
Manu	360	-102	44	-253	32	-67	-212	24	39	20	-6	-9	-10	-2	-73	-246	-5	-71	41	401
Svces	396	66	13	1	8	74	-19	23	121	10	5	-1	-9	0	-72	-106	-3	-20	8	489
Total	**-507**	**-22**	**4**	**18**	**12**	**-18**	**17**	**30**	**-33**	**0**	**-1**	**-9**	**-9**	**7**	**-35**	**-15**	**0**	**6**	**-4**	**558**
AgFood	**-1264**	**13**	**-52**	**270**	**-28**	**-25**	**247**	**-17**	**-193**	**-31**	**0**	**1**	**10**	**9**	**110**	**336**	**9**	**96**	**-53**	**-331**

Tables 4 and 5 show equivalent variation (EV) real income effects for the EU and non-EU country groupings respectively.[13] With EU enlargement to 27 members, Table 4 shows real income gains to the EU27 (UK) of €3,713 million (€191 million). This is dominated by allocative efficiency (Alloc) gains from enlargement of the single market and the decoupling of the CAP. Notwithstanding, model estimates show a large accumulation of stock purchases (€1,818 million), principally from the dairy sector.[14] The marginal CAP budget effect (€107 million) is negative for the UK despite the rebate (€208 million) due to the increased costs of financing an enlarged budget. For the EU27, it is assumed that the CAP budget nets to zero. Examining the breakdown of the CAP budget, net UK export refund expenditure falls due to their elimination on exports to accession 2 members, whilst in the EU27, there is a small net increase, due to increased expenditures of €218 million on dairy exports. With a larger CAP budget from EU enlargement, the increased GDP contribution (GDP cont) from the EU27 (UK) is €1,400 million (€183 million).

Table 4: Changes in EU real income, CAP budget and stock purchase impacts (€ millions) in scenario A1 vs. 2004 benchmark

	REAL INCOME			CAPBUDGET			STOCKS	
	UK	EU27		UK	EU27		UK	EU27
EV	191	3713	**CAP budget**[1]	-107	0			
ToT	54	-598	**1.CAP expen**	198	5170			
Alloc	481	6382	**Exp refunds:**	-9	37			
Endw	-54	-253	**Cereals**	0	-4	**Cereals**	0	18
Stocks	-183	-1818	**Oilseeds**	0	0	**Oilseeds**	0	0
CAP bud	-107	0	**Othcrops**	0	1	**Othcrops**	0	0
U (per cent)	0.01	0.03	**Sugar**	-15	-113	**Sugar**	9	9
			Red meat	-5	-69	**Red meat**	0	0
			White meat	0	5	**Whitemeat**	0	0
			Dairy	11	218	**Dairy**	174	1791
			Other	0	-2	**Other**	0	0
			2.Tariff rev	330	3770	**Total**	183	1818
			3.GDP Cont	183	1400			
			4.UK Rebate	208	0			

1 CAP budget equals 1-2-3+4.

In the developing countries (Table 5), the main gainers in per capita real income terms are Tanzania (1.61 per cent), Ethiopia (1.32 per cent), Senegal (0.34 per

[13] A note on consumer and producer surplus: In the GTAP model where there are no sluggish factors of production (i.e., all mobile), supply curves are perfectly elastic and therefore producer surplus (PS) cannot exist. In addition, the regional household (as a 'representative' consumer) purchases goods and services, but is also the owner of the factors of production, so the two concepts of producer and consumer surplus (CS) become mixed up. Finally, if one considers, that during a simulation, 'partial' supply and demand curves are shifting upwards and downwards, then the idea of CS and PS becomes incoherent. As a result, we cannot calculate a theoretically valid figure for CS and PS.

[14] We have assumed that stock purchases are allowed to increase up to 1 per cent of the value of production, before allowing the market price to fall further.

cent) and Bangladesh (0.20 per cent), which corresponds to real income gains of €139 million, €72 million, €18 million and €80 million, respectively. The largest loser in per capita real income terms is Central America (-0.06 per cent; -€38 million), owing to contractions in its large domestic 'vegetables, fruits and nuts' sector, whilst in value terms the largest real income loser is East and South East Asia (-€262 million).

Table 5: Changes in Non-EU real income effects (€ millions) in scenario A1 vs. 2004 benchmark

	EV	ToT	Alloc	Endw	U
Eurdvping	-63	25	-16	-72	-0.01
CentAme	-38	-23	-5	-10	-0.06
LatAme	-15	66	-8	-73	0.00
Caribbean	-9	0	-1	-7	-0.01
ESEAsia	-262	37	-9	-289	-0.02
Bangladesh	80	45	26	8	0.20
RoSAsia	-91	-4	-11	-76	-0.02
WAsiaMEast	-154	-26	-14	-114	-0.02
Egypt	-8	2	-1	-10	-0.01
RoNAfr	11	27	-6	-10	0.01
Nigeria	1	10	0	-8	0.00
Senegal	18	13	5	0	0.34
RoWAfr	-6	-2	1	-5	-0.02
Ethiopia	72	53	19	0	1.32
Tanzania	139	111	19	9	1.61
Uganda	2	3	0	-1	0.04
CentEAfr	24	29	2	-7	0.02
SouAfr	-30	-12	-1	-17	-0.02
RoDevWld	-814	238	-116	-936	-0.01

Scenario A2 (Maximum damage) vs. Scenario A1 (Baseline)

In scenario A2, the full Uruguay Round (UR) export refund allocations are employed. Table 6 shows the fill rates assumed in 2004 for each of the relevant GTAP commodity aggregates (USDA, 2010). Examining the table, the highest 'rates' of export refund protection are on 'processed sugar', 'dairy', 'red meat' and 'other grains'. Moreover, at 72 per cent of its allowable Uruguay Round limit, the largest export refund expenditure in 2004 was on dairy products. Interestingly, in cereals sectors and to a lesser extent red meat, export refunds in 2004 were small, whilst allowable ceiling limits are considerable (particularly for wheat).

Table 6: Uruguay Round limits calibrated in the model benchmark and export refund protection rates in 2004

	1. € million Used	2. € million Limit	1 ÷ 2 (per cent)	Refund rate (per cent of fob price)
Wheat	0	1290	0.1	0.1
Ograins	82	1047	7.8	24.5
VegFruNuts	16	53	29.7	0.7
Oilseeds	0	82	0.1	0.5
Red meat	274	1254	21.9	28.8
White meat	132	282	46.7	3.6
Dairy	1632	2263	72.1	27.9
RicePro	22	37	59.2	24.3
SugarPro	326	499	65.3	30.6
OFoodPro	415	423	98.0	2.4
BevsTobac	61	176	34.5	0.4

Source: USDA, 2010 and GTAP Database v7.1

In Tables 7 and 8 are the changes in output and market prices compared with scenario A1 (baseline). EU27 production in the affected subsidised sectors (e.g., 'wheat', 'ograins', 'vegfrunuts', 'oilseeds', 'red meat', 'white meat', 'dairy', 'ricepro', 'sugarpro', 'ofoodpro', 'bevstobac') is a function of the export refund UR limit fill rate in 2004, the absolute size of the each EU27 industry's refund limit and export revenues as a proportion of total production revenues.[15] Moreover, trade led gains to EU27 exporting regions are also dependent on the elasticity of substitution in each importing region in response to world price falls and the relative import trade share of each EU27 export good in third markets.

In cereals production, subsidy fill rates were particularly low in 2004, with the result that output in 'wheat' (22.7 per cent) and 'other grains' (6.6 per cent) sectors rises significantly. EU27 'paddy rice', 'oilseeds' and 'vegetables, fruits and nuts' production is stifled as significant agricultural sector specific land is diverted into cereals activities. Elsewhere, EU27 'red meat' (5.9 per cent), sugar processing (4.2 per cent) and rice processing (2.4 per cent) also benefit, whilst 'white meat' production also increases slightly from a large base. The fact that 'dairy' production increases by a lesser proportion (0.2 per cent) is largely due to the relatively high UR refund fill rate in 2004, whilst the percentage changes in output are calculated from a larger base value. With increases in downstream meat, rice and sugar processing, corresponding upstream sector outputs also rise ('cattle and sheep' (3.0 per cent), 'paddy rice' (2.1 per cent) and 'raw sugar' (3.4 per cent)). The expansion in agro-food industrial activity bids up factor prices resulting in small market price and retail price increases in the EU27 (Table 8).

[15] For example, if a sector is more highly export orientated with significant potential for increasing its export refunds, there is greater potential benefit for trade led gains.

With increases in EU27 exports, world prices (Table 8, last column) are depressed for almost all commodities, although with the exception of 'wheat' (-3.9 per cent), 'other grains' (-1.8 per cent), and to a lesser extent, 'red meat' (-0.9 per cent) and 'processed sugar' (-0.8 per cent), the magnitude of these price falls are slight. In the majority of the developing regions, market prices fall (Table 8) owing to cheaper world prices and factor price falls from contracting agricultural sector output.

A closer examination of Table 7 shows that reduced export competition has important negative impacts on specific agro-food sector's output, particularly, wheat. In the Rest of North Africa, wheat output falls by up to 25 per cent, whilst in the West African countries, Ethiopia and Central and East Africa, wheat output reductions are between 10 per cent 20 per cent (in Senegal, wheat output is wiped out). Elsewhere, wheat output reductions in Latin America and the Caribbean are close to 10 per cent, and 6 per cent in West Asia and the Middle East. In the case of 'other grains', the principal loser from the EU27 trade gains is the Rest of the Developed World (rather than the developing countries).

Increases in EU27 dumped exports of red and white meat also result in consistent output reductions across all developing countries, most notably, Latin America and the Asian regional composites, which are the largest net exporters of red and white meat, respectively. Interestingly, white and red meat production in Senegal picks up slightly (from a small base value), suggesting that its trade pattern is more intra-regional than with third countries such as the EU.

Increases in EU27 dairy dumping most directly affect Western Africa in percentage terms, with output reductions of up to 16 per cent in Nigeria, compared with the baseline. Finally, increases in EU sugar exports impact on Latin America, West Asia and the Middle East and Western Africa, whilst in the Caribbean, production only falls 1 per cent, suggesting that imports from the EU to this region are less important.

Turning to the trade balances in Table 9, as expected the agro-food EU27 trade balance improves with notable increases in wheat (€2,348 million), red meat (€1,249 million) and white meat (€432 million), although the contraction in non agro-food activities results in a small aggregate trade balance deterioration of €166 million.

Table 7: Percentage changes in output in scenario A2 vs. scenario A1

	EU27	Eurdvping	Cent Ame	Lat Ame	Carib bean	ESE Asia	Bangladesh	RoS Asia	WAsia MEast	Egypt	Ro NAfr	Nige ria	Sene gal	Ro WAfr	Ethio pia	Tanzania	Ugan da	Cent EAfr	Sou Afr	RoDvWld
Land	0.0	-1.0	0.0	-0.3	0.0	-0.1	0.0	0.0	-0.4	-0.2	-2.9	0.0	0.5	0.1	-0.2	0.0	0.0	-0.1	-0.1	-0.4
UnskLab	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SkLab	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Capital	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Natres	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Paddy rice	2.1	-0.2	-0.2	0.0	0.0	-0.1	0.1	0.0	0.2	0.0	3.4	0.0	-2.7	0.0	0.0	0.3	0.1	0.4	0.0	0.0
Wheat	22.7	-6.8	-2.3	-9.6	-9.6	-1.0	-1.1	-0.5	-6.4	-2.2	-24.6	-9.5	-99.6	-6.2	-11.4	-3.9	-1.2	-18.4	-9.3	-10.7
Ograins	6.6	-2.7	-0.1	-0.9	-0.3	-0.3	0.0	-0.1	-1.4	0.0	1.8	0.0	0.2	0.0	0.0	-0.1	-0.8	0.0	-0.7	-1.3
Vegfrunuts	-0.8	0.1	0.0	0.2	0.2	0.0	0.0	0.0	0.3	0.1	-0.1	0.0	-0.6	0.2	0.1	-0.1	0.0	0.3	0.3	0.1
Oilseeds	-1.6	1.1	-0.3	0.4	-0.1	-0.2	-0.3	-0.1	0.3	0.1	8.4	-0.5	-0.2	-0.1	0.2	-0.3	-0.2	0.1	-0.3	0.2
Raw Sugar	3.4	-0.7	-0.6	-1.2	-0.7	-0.4	-0.1	-0.1	-2.4	-0.3	1.3	-0.1	0.9	0.1	0.4	0.3	-0.1	0.1	-0.2	-0.2
Plant fibres	-2.5	0.8	-0.2	0.2	0.2	-0.1	-0.2	0.0	0.1	0.3	2.3	-0.4	-5.2	-0.8	0.5	-0.4	-0.3	0.2	-0.1	0.2
Ocrops	-0.6	1.6	0.4	0.9	0.4	0.2	0.0	0.1	0.8	1.2	4.7	0.8	3.4	0.3	1.8	0.1	0.7	0.6	0.2	0.3
Catshp	3.0	-3.4	-0.3	-1.0	-0.4	-0.3	0.0	-0.1	-0.1	0.1	0.4	0.0	2.2	-0.9	0.2	0.0	0.0	-0.8	-0.2	-0.6
Pigspoulty	-0.1	-0.2	0.0	-0.3	-0.1	0.0	0.0	0.0	0.2	0.4	0.3	0.0	2.4	-0.1	0.6	0.0	0.0	-0.1	-0.1	-0.2
Milk	0.0	-0.1	-0.1	-0.2	-0.2	-0.3	0.0	0.0	-0.2	0.0	-0.5	-0.5	0.8	-3.6	0.1	0.0	0.1	0.0	-0.1	-0.1
Wool	-3.9	0.3	0.0	0.3	0.0	-0.2	-2.3	-0.1	0.1	0.1	0.4	-1.3	7.2	2.1	0.1	-2.0	-0.6	-0.5	-0.2	0.5
Red meat	5.9	-5.0	-0.3	-1.5	-0.9	-1.2	-3.6	-4.3	-1.9	-0.3	-0.2	-2.9	1.1	-6.8	-3.1	-0.3	-0.4	-4.1	-0.3	-0.7
White meat	0.4	-0.9	-0.1	-0.3	-0.4	-0.2	-2.5	-0.5	0.0	-0.1	1.7	-0.9	1.4	-2.8	-0.2	-0.1	-0.2	-0.6	-0.3	-0.6
Vegoilsfats	-1.1	0.7	-0.2	0.4	0.0	-0.1	0.0	0.0	0.1	0.7	9.3	-0.1	-3.8	-0.3	1.5	-0.4	-0.9	0.4	-0.2	0.2
Dairy	0.2	-0.3	-0.2	-0.3	-0.3	-0.3	-0.4	-0.1	-0.4	-0.7	-0.2	-15.8	-0.8	-6.3	-1.4	-1.5	-0.8	-2.7	-0.3	-0.2
Ricepro	2.4	-0.1	0.0	0.0	0.1	-0.1	0.0	-0.1	-0.1	-0.1	-1.6	-0.3	25.0	3.7	27.5	-0.6	0.6	0.4	-0.1	0.0
Sugarpro	4.2	-1.2	-1.2	-2.4	-1.3	-0.5	-0.1	-0.2	-2.5	-1.0	-0.1	-2.9	-4.0	-2.5	0.5	0.6	0.0	0.1	-0.7	-0.3
Ofoodpro	-0.1	0.5	0.0	0.0	0.1	0.0	0.1	0.0	0.2	0.1	3.7	0.0	-1.5	-0.1	0.1	0.0	-0.2	0.5	0.0	0.0
BevsTobac	0.0	0.0	-0.1	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.4	-0.2	2.9	0.4	0.0	0.0	0.0	0.0	0.0	0.0
Manu	-0.1	0.1	0.1	0.1	0.0	0.0	0.0	0.1	0.0	0.0	0.3	0.0	-2.7	-0.3	0.1	0.0	-0.1	0.0	0.0	0.0
Svces	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.3	0.1	0.0	0.0	0.0	0.0	0.0	0.0
QGDP	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Table 8: Percentage changes in market prices in scenario A2 vs. scenario A1

	EU27	Eurdvping	Cent Ame	Lat Ame	Carib bean	ESE Asia	Bangladesh	RoS Asia	WAsia MEast	Egypt	Ro NAfr	Nige ria	Sene gal	Ro WAfr	Ethio pia	Tanzania	Ugan da	Cent EAfr	Sou Afr	RoDvWld	World prices
Land	1.6	-1.1	-0.1	-0.7	-0.6	-0.2	0.0	-0.1	-0.7	-0.2	-4.2	-0.2	0.9	0.0	-0.5	0.0	0.0	-0.3	-0.3	-0.5	
UnskLab	0.1	-0.3	0.0	-0.1	0.0	0.0	0.0	-0.1	-0.2	-0.1	-1.4	-0.1	2.0	-0.2	-0.4	0.0	0.0	-0.1	0.0	0.0	
SkLab	0.0	0.0	0.0	-0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.2	-0.3	0.0	0.0	0.1	0.0	0.0	0.0	
Capital	0.1	-0.1	0.0	-0.1	0.0	0.0	0.0	0.0	0.0	0.0	-0.3	0.0	1.9	-0.2	0.0	0.1	0.1	0.0	0.0	0.0	
Natres	0.0	0.2	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.6	0.1	-1.5	-0.4	0.2	0.0	-0.1	0.0	0.0	0.0	
Paddy rice	1.4	-0.8	-0.1	-0.4	-0.3	-0.1	0.1	-0.1	-0.6	-0.3	-3.2	-0.2	1.2	0.2	-0.4	0.1	0.1	-0.2	-0.2	-0.3	-0.2
Wheat	3.8	-2.2	-0.3	-1.3	-1.1	-0.2	-0.1	-0.2	-1.1	-0.5	-6.6	-2.2	-13.0	-35.6	-1.0	-0.3	-0.1	-1.4	-0.3	-1.3	-3.9
Ograins	1.7	-1.7	-0.1	-0.5	-0.4	-0.2	-0.1	-0.2	-0.7	-0.3	-4.3	-0.2	1.7	-0.1	-0.5	-0.1	-0.1	-0.3	-0.2	-0.6	-1.8
Vegfrunuts	1.2	-0.8	-0.1	-0.3	-0.3	-0.1	0.0	-0.1	-0.5	-0.3	-4.1	-0.1	1.6	-0.2	-0.5	0.0	0.0	-0.2	-0.1	-0.3	-0.2
Oilseeds	1.3	-1.1	-0.1	-0.4	-0.3	-0.2	-0.1	-0.2	-0.7	-0.3	-4.4	-0.1	1.7	-0.1	-0.6	0.0	0.0	-0.4	-0.2	-0.5	-0.3
Raw Sugar	1.5	-1.0	-0.2	-0.5	-0.4	-0.2	0.0	-0.1	-0.6	-0.3	-4.2	-0.1	1.5	-0.1	-0.5	0.0	0.0	-0.2	-0.1	-0.5	
Plant fibres	1.2	-0.3	-0.1	-0.3	-0.4	-0.1	0.0	-0.1	-0.3	-0.2	-3.3	-0.1	0.9	0.0	-0.5	0.0	0.0	-0.2	-0.1	-0.2	-0.2
Ocrops	1.2	-0.2	0.0	-0.2	-0.2	0.0	0.0	-0.1	-0.5	-0.1	-3.7	-0.3	1.7	-0.2	-0.3	0.1	0.1	-0.2	-0.1	-0.3	0.3
Catshp	0.8	-1.2	-0.1	-0.6	-0.4	-0.2	0.0	-0.1	-0.9	-0.3	-4.6	-0.1	1.0	0.0	-0.5	0.1	0.0	-0.3	-0.2	-0.4	-0.2
Pigspoultry	1.3	-1.0	-0.1	-0.5	-0.3	-0.1	0.0	-0.1	-0.9	-0.3	-4.5	-0.1	-0.7	-0.1	-0.5	0.0	0.0	-0.3	-0.1	-0.3	0.0
Milk	3.6	-1.0	-0.1	-0.5	-0.4	-0.2	0.0	-0.1	-0.8	-0.3	-3.9	-0.1	-2.7	-0.8	-0.5	0.0	0.0	-0.3	-0.1	-0.4	
Wool	0.3	-0.5	-0.1	-0.3	-0.3	-0.1	0.0	-0.1	-0.6	-0.2	-2.0	0.2	0.5	-0.8	-0.4	-0.1	-0.3	-0.3	-0.1	-0.3	-0.5
Red meat	0.4	-0.9	-0.1	-0.3	-0.2	-0.3	-0.1	-0.1	-0.6	0.0	-2.1	0.0	1.0	-0.1	-0.1	0.0	0.0	-0.2	-0.1	-0.2	-0.9
White meat	0.6	-0.3	-0.1	-0.3	-0.2	-0.1	-0.1	-0.1	-0.3	0.0	-3.5	-0.1	-0.4	0.0	-0.1	0.0	0.0	-0.2	-0.1	-0.2	-0.1
Vegoilsfats	0.4	-0.4	-0.1	-0.3	-0.2	-0.1	-0.1	-0.1	-0.2	-0.3	-1.7	0.0	1.2	-0.1	-0.6	0.0	0.0	-0.3	-0.1	-0.2	-0.1
Dairy	0.9	-0.4	0.0	-0.2	-0.4	-0.1	0.0	-0.1	-0.4	-0.1	-1.6	0.0	-1.5	-0.5	-0.1	0.0	-0.1	-0.3	0.0	-0.2	-0.1
Ricepro	0.2	-0.4	-0.1	-0.3	-0.2	-0.1	0.0	-0.1	-0.3	-0.3	-0.3	-0.1	-10.4	-2.2	-6.0	0.1	-0.5	-0.4	-0.1	-0.2	-0.2
Sugarpro	0.5	-0.7	-0.1	-0.2	-0.1	-0.1	0.0	-0.1	-0.3	-0.4	-2.2	0.0	1.3	-0.1	-0.1	0.0	0.0	-0.2	0.0	-0.2	-0.8
Ofoodpro	0.2	-0.5	-0.1	-0.2	-0.2	-0.1	-0.1	-0.1	-0.3	-0.4	-2.3	0.0	1.2	-0.1	-0.2	0.0	0.0	-0.5	-0.1	-0.1	0.0
BevsTobac	0.2	-0.3	0.0	-0.1	-0.1	0.0	0.0	0.0	-0.4	0.0	-0.6	0.0	-2.4	-0.4	-0.1	0.0	0.0	-0.2	0.0	0.0	-0.1
Manu	0.0	0.0	0.0	-0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.9	-0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Svces	0.0	-0.1	0.0	-0.1	0.0	0.0	0.0	0.0	0.0	0.0	-0.2	0.0	1.4	-0.2	-0.1	0.0	0.0	0.0	0.0	0.0	0.0
PGDP	0.1	-0.1	0.0	-0.1	0.0	0.0	0.0	-0.1	-0.1	0.0	-0.6	0.0	1.6	-0.1	-0.2	0.0	0.0	-0.1	0.0	0.0	

Summing over all developing regions, net agro-food export revenue falls by €1,997 million compared with the baseline (not shown). Of this total, the largest hit is taken by Latin America (€681 million), principally due to wheat (€320 million), red meat (€271 million) and sugar processing (€178 million) losses. Notable agrofood trade balance deteriorations are also apparent in East and South East Asia (€231 million) and the Rest of South Asia (€182 million), whilst in Africa, the largest losses (principally due to wheat trade) are incurred in the North of the continent (€173 million). In the Rest of Central and Eastern Africa, the agro-food trade balance is positive due to the improved change for 'other crops' (€43 million) and 'other food' processing (€24 million).[16] Indeed, where EU net exports have fallen (i.e., 'vegetables, fruits and nuts'[17]; 'other crops', 'other food' processing) owing to greater diversification into marginally more heavily subsidised export activities, a number of developing countries have benefited.[18]

Finally, turning to the real income effects, the EU27 incurs losses of €4,302 million (Table 10), largely due to negative allocative efficiency (greater employment of subsidised resources in agriculture), a negative ToT effect from cheaper subsidised EU exports and reduced capital accumulation compared with the baseline. Examining the CAP budget effects (Table 10), increases in export refund expenditure cost the EU taxpayer an additional €4,409 million (notably, €2,259 million from cereals and €1,049 million from red meat), which is mainly picked up by an increase in member states' GDP contributions (€4,394 million). Note, that EU stock purchases are more or less the same as the baseline (€9 million less). For the UK, increases in GDP contributions (€839 million) outweigh the rebate and additional CAP funding from export refunds, resulting in a deteriorating net CAP budgetary position of €210 million.

[16] The 'other crops' sector principally includes ornamental plants, beverage and spice crops, raw tobacco, cereal straw and husks, plants etc employed for pharmaceutical or perfumery purposes.

[17] Although 'vegetables, fruits and nuts' receive export refunds, as a proportion of total export revenue, they are negligible. Consequently, imposing ceiling limits in this sector has no discernible effect on EU exports.

[18] For example in 'vegetables, fruits and nuts' (Rest of North Africa, Middle East and West Asia); 'other crops' (Latin America, West Asia and Middle East, Rest of North Africa, Rest of Central and East Africa); 'other food' (Rest of North Africa, Rest of Central and East Africa).

Table 9: Changes in trade balances (€ millions) in scenario A2 vs. scenario A1

	EU27	Eurdvping	Cent Ame	Lat Ame	Carib bean	ESE Asia	Bangladesh	RoS Asia	WAsia MEast	Egypt	Ro NAfr	Nige ria	Sene gal	Ro WAfr	Ethio pia	Tanzania	Ugan da	Cent EAfr	Sou Afr	RoDvWld
Paddy rice	-16	0	0	1	0	1	5	2	1	0	0	0	-1	-1	0	1	0	1	0	5
Wheat	2348	-294	2	-320	-6	-16	-2	-79	-231	-4	-524	-7	-33	-16	-8	-1	0	-21	-16	-1109
Ograins	290	-82	0	-54	-1	-17	0	-5	15	1	19	0	-1	-1	0	-1	-1	-2	-5	-221
Vegfrunuts	-277	42	-2	19	3	-18	0	-3	34	0	84	0	-2	-1	0	0	0	5	4	65
Oilseeds	-69	9	-1	4	1	10	0	-7	16	0	7	-1	0	-1	0	0	0	-2	0	10
Plants	-30	9	0	3	0	3	-1	-1	6	1	7	0	-1	-6	0	0	0	1	0	10
Ocrops	-469	1	8	108	4	19	0	15	48	1	30	3	-4	10	5	2	2	43	3	149
Catshp	-49	6	0	0	0	2	0	0	24	0	7	0	0	0	0	0	0	-3	0	8
Pigspoultry	-85	11	0	7	1	9	0	1	13	1	11	0	0	0	0	0	0	1	1	29
Wool	-7	2	0	1	0	-2	0	-1	2	0	2	0	0	0	0	0	0	0	-2	6
Red meat	1249	-400	-6	-271	-6	-26	0	-66	-6	-1	5	1	-1	-8	-2	0	0	-23	-8	-507
White meat	432	-18	-1	-46	-1	-63	0	-1	-14	0	9	0	-1	-5	0	0	0	-9	-5	-287
Vegoilsfats	-144	15	-1	52	0	-28	0	0	4	1	62	0	-3	-1	0	0	0	4	-1	37
Dairy	332	-23	-2	-33	-1	-22	0	-5	-52	-6	7	7	-1	-2	0	0	0	-3	-4	-217
Ricepro	16	0	0	-1	1	-38	-1	-18	7	-1	0	0	31	11	0	0	0	3	0	-5
Sugarpro	293	-17	-15	-178	-10	-25	0	-11	-44	-1	3	2	0	4	1	3	0	3	-9	-55
Ofoodpro	-344	75	0	30	4	-14	0	-2	36	3	102	0	-12	-5	0	0	0	24	2	97
BevsTobac	20	2	0	-2	-1	-4	0	0	6	0	1	0	1	0	0	0	0	0	-2	-26
Manu	-3211	496	14	498	16	171	-1	149	74	2	51	-9	-37	-40	3	-1	-1	-21	34	1719
Svces	-444	108	5	94	2	59	-1	39	68	4	79	-6	-28	-22	2	0	0	-2	5	576
Total	**-166**	**-58**	**2**	**-88**	**7**	**0**	**1**	**7**	**9**	**0**	**-37**	**5**	**-27**	**-13**	**1**	**0**	**0**	**0**	**-1**	**285**
AgFood	**3490**	**-662**	**-18**	**-681**	**-11**	**-231**	**3**	**-182**	**-133**	**-6**	**-167**	**5**	**-28**	**-33**	**-4**	**2**	**2**	**23**	**-40**	**-2010**

Table 10: Changes in EU real income, CAP budget and stock purchase impacts (€ millions) in scenario A2 vs. scenario A1

	REAL INCOME			CAPBUDGET			STOCKS	
	UK	EU27		UK	EU27		UK	EU27
EV	-505	-4302	**CAP budget**[1]	-210	0			
ToT	-95	-973	**1.CAP expen**	227	4479			
Alloc	-134	-2883	**Exp refunds:**	222	4409			
Endw	-57	-437	**Cereals**	37	2259	**Cereals**	0	0
Stocks	-9	-9	**Oilseeds**	12	82	**Oilseeds**	0	0
CAP bud	-210	0	**Othcrops**	1	36	**Othcrops**	0	0
U (per cent)	-0.03	-0.04	**Sugar**	41	286	**Sugar**	9	9
			Red meat	48	1049	**Red meat**	0	0
			White meat	4	145	**Whitemeat**	0	0
			Dairy	18	413	**Dairy**	0	0
			Other	62	140	**Other**	0	0
			2.Tariff rev	5	85	**Total**	9	9
			3.GDP Cont	839	4394			
			4.UK Rebate	407	0			

1 CAP budget equals 1-2-3+4.

Developing country EV results (Table 11) are largely influenced by the terms of trade (ToT) effects from the wheat sector. Whilst market prices fall in the developing regions, the majority witness ToT gains due to large net imports of cheaper agro-food commodities (in particular, wheat). The largest ToT gains accrue in West Asia and the Middle East (€247 million) and Northern and Western African subcontinents (€433 million and €204 million, respectively). In the Rest of Western Africa, there are considerable net exports of 'other crops'. Since the world price of other crops has risen, this also plays an important role in the aggregate ToT result for this region. Latin America and the Rest of South Asia are not large net importers of wheat, although both regions (particularly Latin America) have considerable net exports of (cheaper) red meat. Consequently, in each region, the ToT loss is €170 million (Latin America) and €25 million (Rest of South Asia). The allocative efficiency gains largely stem from increased imports of tariffed agro-food goods.[19]

In relative terms, the largest per capita income gains accrue in Senegal (1.55 per cent), the Rest of North Africa (0.37 per cent) and the Rest of West Africa (0.35 per cent). It is interesting to note that Egypt and Nigeria, respectively, gain much less in per capita terms, largely explained by the relatively small net imports of wheat to both single country regions in the 2004 database.

[19] Allocative efficiency is measured as the real income value of changes in resource or product usage from reduction/elimination in a given market distortion (e.g., import tariff), where those activities which are taxed (subsidised) have a positive (negative) marginal social value (Huff and Hertel, 2001). In GTAP, welfare *changes* in efficiency are based on the quantity usage of a product multiplied by its tax/subsidy distortion in real income terms. By this logic, increases in tariffs on a bilateral import route, or large import increases on a bilateral route with falling tariffs implies an efficiency welfare gain.

Table 11: Changes in Non-EU real income effects (€ millions) in scenario A2 vs. scenario A1

	EV	ToT	Alloc	Endw	U
Eurdvping	326	224	236	-134	0.06
CentAme	-3	3	0	-5	0.00
LatAme	-282	-170	-24	-88	-0.03
Caribbean	21	19	7	-5	0.02
ESEAsia	-142	68	8	-218	-0.01
Bangladesh	3	5	1	-3	0.01
RoSAsia	-80	-25	9	-63	-0.01
WAsiaMEast	274	247	119	-92	0.03
Egypt	13	20	0	-6	0.02
RoNAfr	475	413	105	-43	0.37
Nigeria	18	21	2	-5	0.04
Senegal	81	70	11	0	1.55
RoWAfr	127	113	14	-1	0.35
Ethiopia	4	3	1	-1	0.07
Tanzania	2	2	0	-1	0.02
Uganda	3	3	0	0	0.05
CentEAfr	88	78	17	-8	0.09
SouAfr	-8	4	-1	-11	-0.01
RoDevWld	-339	-120	573	-792	0.00

Scenario A3 (export refund elimination) vs. Scenario A1 (Baseline)

In scenario A3, all export refunds are eliminated, where ***in the GTAP database, over 90% of export refund expenditure in the GTAP database originates from the EU27.*** In 2004, the largest EU export refund 'rates' (see Table 6) are applied to 'processed sugar' (31 per cent), 'red meat' (29 per cent), 'dairy' (28 per cent), 'processed rice' (24 per cent) and 'other grains' (24 per cent), although only extra-EU exports of 'other food',[20] 'dairy' and 'red meat' are in notable quantities. For each region, Tables 12 and 13 show the changes in output and market prices, respectively. Compared with the baseline, EU27 production (Table 12) contracts in the subsidised agrofood sector, with the largest per centage falls occurring in the dairy sector (5.1 per cent) and consequently, upstream raw milk production (3.6 per cent). In the EU27 'red meat' and 'other food' sectors, production also declines 1.8 per cent and 0.5 per cent,[21] whilst falls in cereals and sugar production are relatively modest. With

[20] The EU27 'other food' sector also benefits from export subsidies. As broad sector, 'other food' includes (*inter alia*) preparations for fish, vegetables, fruits, nuts and cereals; confectionary, cocoa, bakery and pasta products; animal feeds; starches and syrups.

[21] This is calculated from a large base – 'other food' constitutes around 28 per cent of EU27 agro-food production.

reductions in EU export demands from elimination of the subsidy wedge, there are moderate reductions in EU market prices compared with the baseline.

As expected, world prices rise (Table 13) for agro-food commodities, although aside from dairy (where EU export refunds are considerably more pervasive), these increases are relatively moderate since in some commodities, export trade volumes are small (i.e., rice), or because the export refund rate is low (i.e., cereals).[22] In the non-EU developing countries, the key output and market price rises (Tables 12 and 13 respectively) occur in the dairy sector (with concomitant rises in upstream raw milk. Compared with the baseline, dairy output in Nigeria, Senegal and the Rest of Western Africa increases 68 per cent, 26 per cent and 35 per cent, respectively, whilst in Tanzania and the Rest of Central and Eastern Africa, dairy output rises 18 per cent.[23] With the exception of the Rest of South Asia, dairy output increases in the remaining regions are between 3 per cent and 6 per cent. Market price rises in dairy are small, with the largest increases occurring in Senegal (2 per cent). In 'other food' processing and 'red meat', the general trend in the developing countries is that of light output improvements compared to the baseline. As the most protected EU export sector (in terms of the subsidy rate), the main beneficiaries from elimination of export refunds for processed sugar are Senegal (4 per cent), Nigeria (2 per cent) (both from very small bases), West Asia and the Middle East (2 per cent), Latin America (2 per cent) and the Rest of Northern Africa (2 per cent). In the East African countries and the Rest of West Africa, sugar production falls (from a small base) partly owing to increased production in Latin America, and also increased specialisation in other agro-food activities in these countries.

[22] It should be noted that this result is conditional of the relatively small size and distribution of export subsidies in 2004. Indeed, it has been noted by Hoekman and Messerlin (2005) that export subsidies are on a declining trend and likened the EU's pledge to eliminate them to the sale of a 'rapidly depreciating asset' (pp208).

[23] These rises are calculated from small bases.

Table 12: Percentage changes in output in scenario A3 vs. scenario A1

	EU27	Eurdvping	Cent Ame	Lat Ame	Carib bean	ESE Asia	Bangladesh	RoS Asia	WAsia MEast	Egypt	Ro NAfr	Nige ria	Sene gal	Ro WAfr	Ethio pia	Tanzania	Ugan da	Cent EAfr	Sou Afr	RoDvWld
Land	0.0	0.4	0.0	0.2	0.0	0.1	0.0	0.0	0.3	0.1	0.1	0.0	0.4	0.0	-0.1	-0.1	0.0	-0.1	0.1	0.1
UnskLab	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SkLab	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Capital	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Natres	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Paddy rice	0.6	0.6	0.1	0.2	0.0	0.1	0.0	0.0	-0.1	0.1	-0.4	0.0	-2.7	-0.2	1.0	0.4	-0.1	-0.2	0.1	0.1
Wheat	-0.1	-0.1	0.2	-0.1	-0.8	0.2	0.8	0.1	0.3	0.1	-0.2	0.0	-5.0	0.1	0.6	1.4	0.0	0.5	0.3	-0.1
Ograins	-1.5	1.0	0.1	0.3	0.3	0.3	0.1	0.0	0.7	0.1	0.3	0.0	-0.1	0.0	0.0	0.1	0.1	0.0	0.2	0.6
Vegfrunuts	0.3	0.2	0.0	0.0	-0.2	0.1	0.1	0.0	-0.1	0.1	0.0	-0.1	-0.9	-0.1	0.1	0.6	0.0	0.1	0.0	-0.1
Oilseeds	0.6	-0.3	0.1	-0.3	-0.1	0.1	0.4	0.0	-0.1	0.0	0.0	0.3	-0.5	-0.1	2.1	0.4	0.2	0.4	0.2	0.0
Raw Sugar	-0.5	0.8	0.4	1.0	-0.2	0.4	-3.4	0.0	2.3	0.2	1.3	0.0	-0.1	-0.3	-9.7	-4.0	-0.6	-3.6	0.0	0.3
Plant fibres	1.1	-0.3	0.0	-0.2	-0.2	0.0	0.3	0.0	0.2	-0.2	-0.2	0.3	-2.5	-0.1	0.3	1.0	0.3	0.2	0.1	0.0
Ocrops	-0.1	-0.5	-0.2	-0.4	-0.3	-0.1	0.1	0.0	0.0	-0.7	-0.4	0.0	-3.0	-0.8	0.7	0.2	-0.1	0.0	0.0	-0.1
Catshp	-1.0	1.3	-0.4	0.6	1.0	0.4	0.0	0.0	0.1	0.0	0.4	-0.1	-0.5	0.4	-0.2	-0.2	0.1	0.4	0.1	0.3
Pigspoulty	-0.4	0.2	-0.1	0.5	0.6	0.1	0.0	0.0	-0.1	-0.3	-0.1	-0.1	-0.2	0.4	-0.1	-0.1	0.1	0.4	0.1	0.4
Milk	-3.6	0.9	1.5	2.2	3.4	3.8	0.0	0.1	2.7	0.0	7.2	2.0	21.9	21.4	0.0	0.2	0.0	1.0	1.3	1.6
Wool	1.9	-0.2	-0.1	-0.2	-0.6	0.0	1.0	0.0	-0.1	-0.6	0.0	-0.3	-1.7	-3.4	0.5	1.4	0.4	0.3	0.1	-0.2
Red meat	-1.8	1.9	-0.5	0.7	0.6	0.4	1.5	1.9	0.7	0.2	0.5	0.6	-0.2	2.3	2.1	0.1	0.2	1.6	0.1	0.3
White meat	-0.7	1.6	-0.3	0.8	0.4	0.3	3.6	0.7	0.1	0.2	0.0	0.9	0.4	3.2	0.5	0.0	0.3	1.0	0.3	0.8
Vegoilsfats	0.2	-0.2	0.1	-0.4	0.0	0.1	0.2	0.1	0.0	-0.3	-0.7	0.0	-1.4	0.0	1.4	1.2	0.6	0.1	0.2	0.0
Dairy	-5.1	5.6	2.9	3.2	4.6	4.1	4.6	0.6	4.5	5.3	14.7	67.8	26.4	34.9	13.7	18.0	6.3	17.9	3.3	2.1
Ricepro	-0.1	0.5	0.0	0.0	-0.3	0.1	0.0	0.1	0.5	0.1	1.7	0.3	-0.9	-0.5	-6.5	-0.8	-0.4	-0.3	0.1	0.0
Sugarpro	-1.1	1.2	0.8	1.9	-0.7	0.5	-3.7	-0.1	2.3	0.6	1.7	2.1	3.5	-6.0	-12.5	-8.8	-3.9	-6.1	0.1	0.2
Ofoodpro	-0.5	0.6	0.2	0.3	0.2	0.3	0.4	0.2	0.6	0.4	0.5	1.2	0.7	1.1	0.5	0.3	1.1	0.3	0.3	0.0
BevsTobc	0.0	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-0.1	0.1	-0.1	0.0	0.1	-0.1	0.0	-0.1	0.0	0.0
Manu	0.1	-0.1	-0.1	-0.1	-0.1	0.0	0.1	0.0	-0.1	-0.1	-0.1	0.0	-0.3	-0.1	1.0	0.3	0.1	0.0	-0.1	0.0
Svces	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-0.1	-0.1	0.0	-0.1	-0.1	0.4	-0.1	0.0	0.0	0.0	0.0
QGDP	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-0.1	0.0	0.0	0.0	0.0	0.0

Table 13: Percentage changes in market prices in scenario A3 vs. scenario A1

	EU27	Eurdvping	Cent Ame	Lat Ame	Carib bean	ESE Asia	Bangladesh	RoS Asia	WAsia MEast	Egypt	Ro NAfr	Nige ria	Sene gal	Ro WAfr	Ethio pia	Tanzania	Ugan da	Cent EAfr	Sou Afr	RoDvWld	World prices
Land	-0.5	0.5	0.2	0.4	0.9	0.2	-0.3	0.1	0.5	0.2	0.3	-0.2	1.0	0.2	-0.3	-0.4	-0.1	0.0	0.2	0.2	
UnskLab	-0.1	0.2	0.1	0.1	0.0	0.1	-0.1	0.1	0.2	0.2	0.1	-0.2	0.7	0.1	-0.3	-0.4	-0.1	0.0	0.0	0.0	
SkLab	0.0	0.1	0.0	0.1	0.0	0.0	-0.1	0.0	0.1	0.1	0.0	-0.1	0.1	0.0	-0.3	-0.4	-0.1	0.0	0.0	0.0	
Capital	-0.1	0.1	0.0	0.1	0.0	0.0	-0.1	0.0	0.1	0.0	0.0	0.0	0.1	0.0	-0.9	-0.4	-0.1	0.0	0.0	0.0	
Natres	0.1	-0.2	-0.1	-0.1	-0.1	0.0	0.1	0.0	-0.1	-0.1	-0.1	0.1	-0.2	-0.1	1.4	0.4	0.2	0.0	0.0	0.0	
Paddy rice	-0.6	0.5	0.1	0.3	0.4	0.2	-0.2	0.1	0.5	0.2	0.2	-0.2	0.7	0.1	-0.1	-0.3	-0.1	-0.1	0.1	0.2	0.1
Wheat	-0.5	0.4	0.1	0.2	0.3	0.1	-0.1	0.1	0.4	0.2	0.2	0.1	0.9	-0.1	-0.3	-0.2	-0.1	0.0	0.1	0.2	0.0
Ograins	-0.5	0.6	0.1	0.3	0.5	0.2	-0.2	0.1	0.4	0.2	0.2	-0.2	1.1	0.2	-0.3	-0.4	-0.1	0.0	0.1	0.2	0.4
Vegfrunuts	-0.5	0.4	0.1	0.2	0.4	0.2	-0.1	0.1	0.4	0.2	0.2	-0.2	1.0	0.1	-0.3	-0.3	-0.1	0.0	0.1	0.1	0.2
Oilseeds	-0.5	0.4	0.1	0.2	0.3	0.2	-0.1	0.1	0.5	0.2	0.2	-0.1	1.1	0.2	-0.2	-0.4	-0.1	0.0	0.1	0.2	0.1
Raw Sugar	-0.3	0.5	0.2	0.3	0.4	0.3	-1.0	0.1	0.5	0.2	0.3	-0.2	1.1	0.1	-1.5	-0.4	-0.1	-0.3	0.1	0.3	
Plant fibres	-0.6	0.2	0.1	0.2	0.4	0.1	-0.1	0.0	0.2	0.1	0.2	-0.1	0.7	0.1	-0.3	-0.2	0.0	0.0	0.1	0.1	0.1
Ocrops	-0.5	0.2	0.0	0.2	0.3	0.1	-0.1	0.1	0.4	0.1	0.2	-0.2	0.7	0.0	-0.2	-0.4	-0.1	-0.1	0.1	0.1	-0.1
Catshp	-0.3	0.5	0.1	0.4	0.5	0.3	-0.1	0.1	0.5	0.2	0.3	-0.2	1.1	0.2	-0.4	-0.5	-0.1	0.0	0.1	0.2	0.4
Pigspoultry	-0.6	0.4	0.1	0.3	0.5	0.2	-0.2	0.1	0.5	0.2	0.2	-0.2	1.1	0.2	-0.4	-0.5	-0.1	0.0	0.1	0.2	0.0
Milk	-4.9	0.5	0.3	0.5	0.7	0.7	-0.1	0.1	0.6	0.2	0.5	0.1	2.8	1.9	-0.4	-0.5	-0.1	0.0	0.2	0.3	
Wool	-0.2	0.2	0.1	0.2	0.3	0.1	0.0	0.1	0.3	0.1	0.1	0.2	1.3	0.9	-0.2	-0.1	0.0	0.0	0.1	0.1	0.1
Red meat	-0.2	0.4	0.1	0.2	0.3	0.2	0.1	0.0	0.3	0.1	0.1	0.0	0.4	0.1	-0.4	-0.3	-0.1	0.0	0.1	0.1	0.4
White meat	-0.3	0.2	0.1	0.2	0.3	0.1	0.2	0.1	0.3	0.1	0.2	-0.1	0.9	0.2	-0.4	-0.3	-0.1	0.0	0.1	0.1	0.3
Vegoilsfats	-0.3	0.2	0.1	0.2	0.2	0.1	0.0	0.1	0.1	0.2	0.1	0.0	0.4	0.1	-0.2	-0.4	0.0	0.0	0.0	0.1	0.0
Dairy	-1.3	0.3	0.1	0.3	0.6	0.4	-0.1	0.0	0.5	0.2	1.8	0.0	2.0	1.2	-0.4	-0.3	0.7	1.0	0.1	0.3	2.3
Ricepro	-0.2	0.2	0.1	0.2	0.2	0.1	-0.1	0.0	0.2	0.3	0.0	-0.1	0.3	0.2	0.0	-0.3	0.1	0.0	0.1	0.1	0.1
Sugarpro	-0.4	0.3	0.1	0.2	0.1	0.1	-0.4	0.0	0.2	0.3	0.3	0.0	0.1	0.0	-0.9	-0.4	-0.1	-0.1	0.0	0.1	0.5
Ofoodpro	-0.1	0.3	0.1	0.1	0.2	0.1	0.0	0.0	0.2	0.4	0.2	0.0	0.1	0.1	-0.4	-0.3	0.0	0.0	0.0	0.1	0.4
BevsTobac	-0.1	0.2	0.0	0.1	0.0	0.0	-0.1	0.0	0.1	0.0	0.1	0.0	0.1	0.0	-0.5	-0.3	-0.1	0.0	0.0	0.0	0.0
Manu	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	-0.4	-0.2	0.0	0.0	0.0	0.0	0.0
Svces	-0.1	0.1	0.0	0.1	0.0	0.0	-0.1	0.0	0.1	0.1	0.0	0.0	0.1	0.0	-0.4	-0.3	0.0	0.0	0.0	0.0	0.0
PGDP	-0.1	0.1	0.1	0.1	0.0	0.0	-0.1	0.0	0.1	0.1	0.1	0.0	0.3	0.1	-0.5	-0.4	-0.1	0.0	0.0	0.0	

(milk and raw sugar are non tradable)

Table 14: Changes in trade balances (€ millions) in scenario A3 vs. Scenario A1

	EU27	Eurdvping	Cent Ame	Lat Ame	Carib bean	ESE Asia	Bangladesh	RoS Asia	WAsia MEast	Egypt	Ro NAfr	Nige ria	Sene gal	Ro WAfr	Ethio pia	Tanzania	Ugan da	Cent EAfr	Sou Afr	RoDvWld
Paddy rice	4	0	0	0	-1	0	-1	0	-1	0	0	0	-1	0	0	1	0	0	0	0
Wheat	83	-17	-1	-12	-2	-8	0	4	-24	-4	-12	0	0	0	1	0	0	-1	0	-6
Ograins	-49	17	0	5	-3	3	0	1	-16	-1	-2	0	0	0	0	0	0	1	1	46
Vegfrunuts	141	-33	3	-4	-5	10	1	5	-20	0	-11	0	-1	0	1	2	0	0	1	-71
Oilseeds	57	-4	0	-6	-3	-18	0	1	-20	-1	-1	0	0	0	1	1	0	2	0	-3
Plants	14	-3	0	-3	0	-3	0	1	-6	-1	0	0	-1	0	0	1	0	2	0	-1
Ocrops	232	-6	-4	-59	-5	-14	0	-4	-40	-1	-2	0	0	-17	2	2	-1	-4	-2	-66
Catshp	32	1	0	1	0	-2	0	0	-8	0	0	0	0	0	0	0	0	3	0	-25
Pigspoultry	50	-6	0	-5	-1	-11	0	-1	-8	-1	-1	0	0	0	0	0	0	0	-1	-15
Wool	5	-1	0	-1	0	-1	0	0	-1	0	0	0	0	0	0	0	0	0	1	-2
Red meat	-498	159	-7	129	-3	9	0	29	-2	0	4	0	0	3	1	0	0	10	3	183
White meat	-609	35	-6	105	0	77	0	1	23	0	1	0	0	5	0	0	0	13	6	358
Vegoilsfats	97	-9	0	-54	-1	1	0	3	-8	-3	-5	0	-1	-1	0	1	0	0	0	-16
Dairy	-3646	448	31	361	45	277	3	61	583	45	46	-20	4	17	1	0	0	23	46	1875
Ricepro	-4	0	0	0	-1	6	0	11	-7	1	-1	0	-2	-2	0	-1	0	-3	0	7
Sugarpro	-227	10	10	212	-13	16	-37	-10	35	0	7	-2	0	-11	-27	-40	-3	-78	1	17
Ofoodpro	-420	36	8	88	-1	244	4	37	48	4	10	-3	2	14	1	5	2	18	20	-46
BevsTobac	-8	-2	0	0	0	2	0	0	-2	0	0	0	0	0	0	0	0	1	1	11
Manu	3824	-496	-25	-513	-27	-438	24	-117	-344	-16	-22	12	-2	-6	13	21	1	10	-64	-1853
Svces	694	-118	-10	-100	11	-97	2	-36	-170	-23	-18	9	-2	-2	12	8	0	2	-10	-664
Total	**-227**	**11**	**-2**	**143**	**-8**	**52**	**-3**	**-13**	**12**	**-1**	**-7**	**-3**	**-3**	**-3**	**6**	**1**	**0**	**-4**	**1**	**-271**
AgFood	**-4745**	**625**	**33**	**757**	**8**	**587**	**-29**	**140**	**527**	**38**	**33**	**-24**	**1**	**5**	**-18**	**-28**	**-1**	**-15**	**75**	**2246**

Examining the changes in trade balances (Table 14) gives an stronger indication of the relative importance of EU export refunds for developing countries, in terms of changes in net export earnings. Aggregating over all developing regions, the increase in net export earnings on agro-food trade from the elimination of all export refunds is €2,714 million. Of this total, the majority is due to dairy trade and, to a lesser extent, 'other food' and 'red meat' trade. An important proportion of the EU27's dairy trade balance deterioration (€3,646 million) in dairy is picked up by other developed countries (Rest of the Developed World - €1,875 million)), although notable net export earning improvements also occur in West Asia and the Middle East (€583 million), Latin America (€361 million) and East and South East Asia (€277 million). Summing over all of North Africa, net dairy export earnings improve by €91m in North Africa (approximately half of which accrues to Egypt), and €24 million and €46 million in all Central and Eastern African regions and all Southern African regions, respectively. In the case of 'other food', the largest proportion accrues to East and South East Asia (€245 million), whilst Latin America witnesses net export revenue gains of €129 million from 'red meat' trade. In the case of sugar, most of the EU's trade balance losses are picked up by the largest sugar net exporter, Latin America (€212 million).

In Table 15, real incomes (EV) in the EU27 (UK) rise €4,282 (€441) million compared with the baseline – an increase in per capita real income of 0.04 per cent (0.03 per cent). The ToT improves as export prices rise from the abolition of export refunds. EU27 allocative efficiency is also positive due to the removal of the export refund distortion and the diversion of resources into relatively more efficient (i.e., less subsidised) non agro-food sectors, whilst small improvements in macroeconomic growth result in positive capital accumulation effects compared with the baseline. Elsewhere, compared with the baseline, there are cost savings of €1,818 million as stock purchases in cereals and dairy are now zero (Table 15) due to elimination of the export refunds, whilst EU27 (UK) export refund savings (Table 15) total €3,001 million (€246 million) of which the majority is from the dairy sector. Thus, with a cheaper CAP budget owing to export refund elimination, UK real income gains €101 million.

Table 15: Changes in EU real income, CAP budget and stock purchase impacts (€ millions) in scenario A3 vs. scenario A1

	REAL INCOME			CAPBUDGET			STOCKS	
	UK	EU27		UK	EU27		UK	EU27
EV	441	4282	CAP budget[1]	101	0			
ToT	93	592	1.CAP expen	-253	-3073			
Alloc	17	1478	Exp refunds:	-246	-3001			
Endw	47	394	Cereals	-19	-78	Cereals	0	-18
Stocks	183	1818	Oilseeds	0	0	Oilseeds	0	0
CAP bud	101	0	Othcrops	-1	-16	Othcrops	0	0
U (per cent)	0.03	0.04	Sugar	-65	-213	Sugar	-9	-9
			Red meat	-17	-205	Red meat	0	0
			White meat	-9	-137	Whitemeat	0	0
			Dairy	-87	-1850	Dairy	-174	-1791
			Other	-48	-502	Other	0	0
			2.Tariff rev	-2	-31	Total	-183	-1818
			3.GDP Cont	-548	-3042			
			4.UK Rebate	-196	0			

1 CAP budget equals 1-2-3+4.

In the developing regions (Table 16), rising world prices impact on larger net importers of subsidised agro-food products from the EU27 resulting in ToT losses. The most notable ToT losses accrue to West Asia and the Middle East (€204 million). In contrast, Latin America, as a large net exporter of agro-food products realises a ToT gain of €115 million. Allocative efficiency falls for a number of developing countries due to reductions in imports (owing to higher world prices) of tariffed commodities, whilst endowment accumulation (land and capital) improves in developed countries relative to the baseline.

Table 16: Changes in Non-EU real income effects (€ millions) in scenario A3 vs. scenario A1

	EV	ToT	Alloc	Endw	U
Eurdvping	-331	-138	-263	69	-0.06
CentAme	4	2	-3	4	0.01
LatAme	171	115	-5	61	0.02
Caribbean	-78	-48	-34	4	-0.06
ESEAsia	120	-43	-31	194	0.01
Bangladesh	-15	-11	-6	1	-0.04
RoSAsia	38	13	-16	41	0.01
WAsiaMEast	-254	-204	-123	73	-0.03
Egypt	-13	-14	-3	4	-0.02
RoNAfr	-170	-116	-60	6	-0.13
Nigeria	-39	-40	-4	4	-0.08
Senegal	-11	-8	-3	1	-0.21
RoWAfr	-56	-45	-13	2	-0.16
Ethiopia	-14	-10	-4	0	-0.26
Tanzania	-13	-11	-2	0	-0.15
Uganda	-1	-1	0	0	-0.02
CentEAfr	-77	-55	-25	3	-0.08
SouAfr	-6	3	-18	9	0.00
RoDevWld	-175	23	-758	560	0.00

III.3.2 2013-2020 Experiment 'B'

Scenario B (Doha scenario for 2013-2020 period)

In the 2013-2020 period, an initial experiment is set up to examine the impacts of export refund eliminations as part of a 'Doha package' of trade liberalisation measures. In Tables 17 and 18 are presented changes in output and market prices in scenario B. In this model experiment, the changes in output and prices are driven by the magnitude of the tariff reductions under the hypothetical Doha agreement (i.e., market access), the elasticity of substitution effect on import price changes, and the relative trade share of each bilateral route. In agro-food markets, the majority of extra-EU trade occurs within the downstream food sectors, which in turn impacts on upstream agricultural activities via reductions in intermediate input purchases.

With its highly protected agro-food sector, there are expected contractions in EU agro-food outputs (Table 17) due to greater EU market access. The largest output reductions occur in 'processed sugar', 'processed rice', 'red meat' and 'dairy' activities. Consequently, there are output reductions in 'raw sugar', 'paddy rice', 'cattle and sheep' and 'raw milk'. Furthermore, EU market prices (Table 18) fall partly due to cheaper imports from tariff reductions and factor price falls from contractions in agro-food output.

In the developing regions, notable percentage output gains (Table 17) occur in the dairy and processed sugar sectors. In the former case, the Northern and Western African regions make significant output gains (although these changes are from smaller bases), whilst in volume terms, the dairy output improvements in the Caribbean and West Asia and the Middle East are much more significant.[24]

Amongst the developing regions, combined raw sugar and processed sugar activity in Tanzania is the largest as a proportion of agro-food production (18 per cent), whilst in Ethiopia, the corresponding statistic is 8 per cent. With 'further' liberalisation[25] in sugar markets, the percentage increases in both regions represent important trade led gains. Elsewhere, Central America, Bangladesh and the Caribbean, have relatively important sugar sectors (between 6-7 per cent of agrofood output). Thus, percentage increases for both upstream and downstream activities in each region are also significant (particularly in Bangladesh). Elsewhere, large percentage increases in sugar supply are recorded in the Rest of West Africa, although these are calculated from a small base.

[24] For the 'West Asia and Middle East' and 'Caribbean' regions, combined raw milk and dairy output constitutes 18 per cent and 14 per cent of domestic agro-food output, respectively.
[25] That is, above and beyond the 'Everything but Arms' deal in scenario 1.

Table 17: Percentage changes in output in scenario B vs. 2013 benchmark

	EU27	Eurdvping	Cent Ame	Lat Ame	Carib bean	ESE Asia	Bangladesh	RoS Asia	WAsia MEast	Egypt	Ro NAfr	Nige ria	Sene gal	Ro WAfr	Ethio pia	Tanzania	Ugan da	Cent EAfr	Sou Afr	RoDvWld
Land	-3.3	0.4	0.2	0.3	0.0	0.1	1.0	0.0	0.3	0.1	0.2	0.0	0.3	-0.1	0.5	2.1	0.0	3.1	0.2	-0.6
UnskLab	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SkLab	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Capital	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Natres	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Paddy rice	-12.0	0.8	-1.4	0.1	-0.9	1.0	2.6	-0.1	-0.3	0.8	-1.0	0.1	-6.7	-3.1	-3.9	-13.2	-1.0	-3.5	1.0	-3.6
Wheat	-0.8	-0.2	-1.4	-0.8	-1.6	-0.3	-4.4	0.0	0.3	-0.6	-0.5	0.0	-5.9	0.0	-2.6	-10.1	0.2	-12.2	-0.2	1.4
Ograins	0.1	1.0	-0.2	0.2	0.1	0.1	-1.9	0.1	0.0	-0.2	0.2	0.0	0.0	0.0	0.4	0.1	0.4	-0.7	0.8	0.9
Vegfrunuts	-0.2	0.2	2.4	0.6	-0.3	0.1	-0.9	-0.1	-0.1	0.0	0.0	0.0	-0.5	0.0	0.2	-0.4	0.0	-3.1	-1.0	0.0
Oilseeds	-0.7	-1.6	-6.3	-3.2	-3.0	-1.2	-3.7	-0.2	-0.4	0.0	7.8	-2.8	-0.8	-1.4	-13.7	-4.8	-1.1	181.1	1.7	-12.2
Raw Sugar	-8.6	1.2	2.5	2.0	1.7	3.5	37.6	-0.1	3.9	0.8	2.1	0.2	0.0	2.3	48.2	33.1	1.2	-4.3	1.5	-0.8
Plant fibres	1.3	0.1	-0.5	-0.4	0.0	0.0	-3.4	0.0	0.2	-0.1	0.0	0.7	-2.1	1.3	-1.1	-8.9	0.3	-6.7	0.6	0.7
Ocrops	0.2	-0.3	-1.5	-0.1	0.0	-0.5	-0.7	0.1	0.8	-0.4	-0.5	0.1	-3.1	-1.1	-5.1	1.3	-0.1	-4.6	0.5	0.4
Catshp	-2.9	1.3	-0.8	4.1	0.7	0.3	0.7	0.0	0.2	0.0	-0.1	0.0	-0.6	0.4	1.8	2.3	0.1	-1.8	1.3	0.1
Pigspoulty	0.0	0.1	-0.3	0.9	0.6	0.0	-0.1	0.0	-0.1	-0.1	0.1	0.0	-0.1	0.5	0.0	0.8	0.0	-1.1	0.0	0.4
Milk	-1.8	0.9	1.0	2.3	2.8	2.6	0.5	0.0	2.4	-0.8	7.0	0.7	21.9	21.3	0.9	-5.9	-0.5	-1.4	0.3	1.3
Wool	2.9	-0.3	-0.2	-0.3	-0.7	-2.6	4.0	0.0	0.0	-0.9	-0.1	2.0	-1.8	-1.7	-2.3	-8.4	0.9	-0.9	-0.2	2.7
Red meat	-5.8	1.8	-1.0	6.1	0.2	0.3	0.0	8.9	0.7	0.0	-0.1	0.7	-0.3	1.9	-1.8	0.5	0.3	-1.3	1.9	0.0
White meat	-0.5	1.0	-0.5	0.4	-0.2	-0.2	-6.0	0.3	0.0	0.0	-0.2	-0.1	0.3	3.5	-0.7	0.7	0.7	-0.6	0.2	0.6
Vegoilsfats	-1.0	-0.9	-2.4	-1.5	-1.2	-0.7	-1.4	-0.8	-0.8	-1.5	26.0	-2.9	-1.7	-0.9	-8.2	-9.7	2.9	-6.2	0.4	3.1
Dairy	-1.2	7.9	2.8	3.5	4.5	3.9	2.5	0.6	4.6	5.3	14.7	69.5	26.8	36.0	16.4	7.8	9.0	16.0	2.9	2.3
Ricepro	-9.5	0.7	0.0	0.2	-0.8	0.3	0.1	0.2	0.6	1.2	1.9	0.9	-2.3	-1.7	510.1	-16.9	-1.8	-2.5	1.0	-0.6
Sugarpro	-12.6	1.9	4.7	3.7	2.7	4.0	40.9	-0.1	4.0	2.1	2.3	5.9	4.4	62.6	62.2	72.2	2.4	-6.1	4.0	-1.4
Ofoodpro	-0.5	0.5	0.0	0.2	0.2	0.2	-0.5	0.2	0.8	0.4	0.2	0.5	0.3	0.8	-0.6	-0.5	0.6	-0.5	0.3	0.2
BevsTobc	0.0	0.7	0.0	0.2	-0.1	-0.1	1.9	-0.7	-0.2	-0.7	-0.1	-3.4	0.0	0.0	-0.3	0.6	0.1	-0.3	0.0	0.1
Manu	0.2	-0.2	-0.3	-0.3	-0.1	0.0	-2.0	0.0	-0.1	-0.1	-0.2	0.0	0.3	-0.2	-5.7	-3.7	-0.1	-0.9	-0.1	0.0
Svces	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	-0.1	-0.1	-1.9	0.4	0.0	0.1	0.0	0.0
QGDP	0.1	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.4	0.3	0.0	0.1	0.0	0.0

Table 18: Percentage changes in market prices in scenario B vs. 2013 benchmark

	EU27	Eurdvping	Cent Ame	Lat Ame	Carib bean	ESE Asia	Bangladesh	RoS Asia	WAsia MEast	Egypt	Ro NAfr	Nige ria	Sene gal	Ro WAfr	Ethio pia	Tanzania	Ugan da	Cent EAfr	Sou Afr	RoDvWld	World prices
Land	-5.3	0.4	0.9	0.7	0.6	0.3	7.2	0.0	0.5	0.2	0.3	-0.5	1.0	0.1	2.1	5.9	0.2	5.9	0.4	-0.7	
UnskLab	-0.3	0.2	0.3	0.2	0.0	0.1	2.0	0.1	0.2	0.2	0.2	-0.4	0.9	0.0	2.1	5.2	0.2	2.8	0.1	0.0	
SkLab	-0.1	0.1	0.2	0.1	0.0	0.1	1.4	0.1	0.1	0.1	0.1	0.0	0.4	0.2	2.6	3.9	0.1	0.7	0.1	0.0	
Capital	-0.2	0.1	0.2	0.1	0.0	0.1	1.2	0.1	0.1	0.1	0.1	0.0	0.5	0.2	5.3	4.4	0.1	0.7	0.0	0.0	
Natres	0.2	-0.3	0.0	-0.2	-0.1	0.1	-1.4	0.0	-0.1	-0.1	-0.3	0.1	1.0	-0.1	-7.2	-4.7	-0.2	-1.7	-0.1	0.0	
Paddy rice	-2.5	0.5	0.2	0.4	0.0	0.6	4.0	-0.1	0.4	0.3	0.1	-0.4	0.0	-0.5	1.0	3.4	0.1	4.5	0.3	-1.4	0.1
Wheat	-0.1	0.3	0.2	0.2	0.1	0.1	2.2	0.0	0.4	0.1	0.2	-0.3	0.9	-0.3	1.7	2.9	0.2	5.0	0.1	-0.4	0.1
Ograins	0.9	0.5	0.3	0.3	0.2	0.1	3.6	0.0	0.3	0.2	0.3	-0.5	1.1	0.0	1.9	5.8	0.2	5.0	0.2	-0.4	0.8
Vegfrunuts	-0.4	0.4	0.9	0.5	0.2	0.2	2.9	0.0	0.4	0.2	0.3	-0.4	1.0	0.0	2.1	6.1	0.2	4.5	0.1	-0.3	0.2
Oilseeds	-0.5	0.2	-0.2	0.1	-0.1	-0.1	2.6	0.0	0.4	0.2	0.6	-0.6	1.1	-0.1	1.3	6.1	0.1	13.5	0.3	-1.7	-0.1
Raw Sugar	-0.8	0.5	0.8	0.6	0.5	1.1	12.4	0.0	0.6	0.3	0.4	-0.4	1.1	0.2	7.2	4.4	0.3	4.0	0.2	-0.6	
Plant fibres	-0.1	0.2	0.3	0.3	0.1	0.1	1.9	0.0	0.2	0.1	0.2	-0.3	0.7	-0.1	2.0	3.0	0.3	2.9	0.1	-0.2	0.2
Ocrops	0.0	0.2	0.2	0.4	0.2	-0.1	3.0	0.0	0.5	0.2	0.2	-0.4	0.7	-0.2	1.5	6.0	0.2	3.8	0.3	-0.3	0.2
Catshp	-0.7	0.4	0.4	0.9	0.3	0.3	3.3	0.0	0.3	0.2	0.3	-0.4	1.1	0.1	2.4	6.5	0.2	3.8	0.3	-0.4	0.3
Pigspoultry	-0.8	0.3	0.4	0.5	0.3	0.2	3.4	0.0	0.3	0.2	0.2	-0.4	1.1	0.1	2.3	6.4	0.2	3.5	0.2	-0.3	-0.1
Milk	-13.3	0.5	0.5	0.7	0.4	0.5	3.3	0.0	0.4	0.2	0.5	-0.4	2.8	1.8	2.3	5.6	0.2	5.3	0.2	-0.5	
Wool	-0.1	0.2	0.4	0.3	0.1	-0.3	0.2	0.0	0.2	0.1	0.0	0.1	1.3	0.8	1.5	2.0	0.2	3.9	0.1	0.0	0.4
Red meat	-0.3	0.3	0.3	0.5	0.2	0.2	0.2	0.1	0.2	0.1	0.1	-0.2	0.5	0.1	2.4	3.3	0.1	2.6	0.2	-0.2	0.2
White meat	-0.3	0.1	0.3	0.3	0.1	0.1	0.3	0.1	0.2	0.2	0.2	-0.2	1.0	0.1	2.4	3.3	0.1	2.2	0.1	-0.2	0.2
Vegoilsfats	0.0	0.1	0.1	0.1	-0.1	0.0	1.1	0.0	0.1	0.2	0.1	-0.2	0.5	-0.1	1.4	4.6	0.1	4.5	0.2	-2.2	-0.4
Dairy	-3.0	0.3	0.3	0.3	0.4	0.3	1.6	0.1	0.4	0.2	1.8	-0.2	2.1	1.1	2.7	3.8	0.8	2.0	0.1	-0.1	2.0
Ricepro	-1.3	0.2	0.2	0.2	0.0	0.4	2.9	0.0	0.1	0.3	0.1	-0.2	0.4	0.2	0.5	3.4	0.0	3.2	0.2	-1.2	0.1
Sugarpro	0.4	0.3	0.4	0.2	0.1	0.4	5.8	0.0	0.2	0.3	0.4	-0.1	0.4	0.1	5.0	4.4	0.2	2.4	0.1	-0.6	1.3
Ofoodpro	-0.3	0.2	0.2	0.2	0.1	0.1	1.1	0.1	0.2	0.3	0.2	-0.2	0.4	0.1	2.5	3.6	0.3	1.2	0.1	-0.1	0.3
BevsTobac	-0.3	0.1	0.2	0.1	0.0	0.0	1.4	-0.1	0.1	0.0	0.1	-0.2	0.3	0.1	3.0	3.9	0.1	1.5	0.1	0.0	0.0
Manu	-0.1	0.0	0.1	0.1	0.0	0.0	0.8	0.0	0.0	0.0	-0.1	-0.1	0.2	0.0	2.4	2.4	0.0	0.2	0.0	0.0	0.0
Svces	-0.1	0.1	0.2	0.1	0.0	0.1	1.1	0.1	0.1	0.1	0.1	-0.1	0.4	0.1	2.8	3.2	0.1	0.5	0.0	0.0	0.0
PGDP	-0.2	0.1	0.3	0.1	0.0	0.1	1.6	0.0	0.1	0.1	0.0	-0.3	0.6	0.0	2.9	4.5	0.1	1.3	0.0	0.0	

Output rises for 'red meat' are most significant for Latin America, which with approximately 14 per cent of its 'domestic' agro-food output, is a large player on world markets. In the case of rice, the marginal production increase in Bangladeshi rice production (2.6 per cent and 0.1 per cent for 'paddy rice' and 'processed rice', respectively) is calculated from a large base.[26]

For many of the African countries (e.g., North African region; Nigeria; Rest of West Africa; Ethiopia, Uganda) and West Asia and the Middle East, the GTAP aggregate sector of 'vegetables, fruits and nuts' has an important role within agro-food production, although the Doha package has very little impact on this sector. Given that the EU27 constitutes a key trade partner for this broad product category, the disappointing output response in the developing countries is, in part, due to the EU's large tariff binding overhangs, rendering real market access as negligible.

In 'oilseeds' noticeable output rises occur in the Rest of Central and East Africa, and to a much lesser extent, the Rest of North Africa,[27] whilst output gains in cereals production mainly accrue to the 'Rest of the Developed World'. Examining changes in real growth (Table 17), the Doha round has a moderate impact for developing countries, where the largest improvements occur in Ethiopia (0.4 per cent) and Tanzania (0.3 per cent), owing to large increases in their sugar sectors. Similarly, Bangladesh records a moderate gain of 0.1 per cent, largely owing to increased rice production.

With the (partial) elimination of trade distortions, world prices rise slightly for most agro-food commodities (Table 18), with the largest increases occurring for dairy. Rising world prices and factor costs from increases in agro-food production, both increase the index of retail prices in the developing regions (particularly in Bangladesh, Ethiopia and Tanzania). Turning to the trade balances (Table 19), the EU27 agro-food net trade balance deteriorates by €7,546 million, of which €5,107 million is picked up by the developing regions (aggregate statistic, not shown).

Examining developing country changes more closely, improvements in dairy and (where appropriate) 'processed sugar' and 'red meat' trade balances explain much of the agro-food trade balance gains. With its large dairy sector, West Asia and the Middle East witnesses a dairy trade balance improvement of €567 million, with a corresponding improvement in Latin America of €380 million.

[26] Approximately 52 per cent of agro-food production in Bangladesh is attributed to rice (paddy and processed rice sectors).

[27] In the latter case, this output improvement is calculated from a small base value.

Table 19: Changes in trade balances (€ millions) in scenario B vs. 2013 benchmark

	EU27	Eurdvping	Cent Ame	Lat Ame	Carib bean	ESE Asia	Bangladesh	RoS Asia	WAsia MEast	Egypt	Ro NAfr	Nige ria	Sene gal	Ro WAfr	Ethio pia	Tanzania	Ugan da	Cent EAfr	Sou Afr	RoDvWld
Paddy rice	-55	0	-3	-5	-2	192	121	-28	-2	0	0	0	-3	-15	0	-27	0	-8	0	-190
Wheat	17	-20	0	-39	-2	-9	-8	0	-21	-7	-20	1	0	1	-4	-3	0	-48	-1	158
Ograins	-52	13	-1	-21	-3	-1	-1	2	-48	-1	-7	0	0	0	0	-2	1	-14	7	127
Vegfrunuts	-16	-33	120	97	-8	70	-12	-38	-45	-3	-40	0	0	1	-1	-2	0	-69	-24	-23
Oilseeds	54	-16	-18	-433	-10	-28	-3	-10	-23	-1	-9	-4	-1	-6	-10	-7	-1	1404	-1	-647
Plants	11	4	0	-5	0	-5	-6	3	-4	0	0	0	0	9	0	-5	0	-46	3	41
Ocrops	243	-8	-28	-9	-1	-27	-6	20	0	-3	-4	-1	0	-29	-14	15	0	-288	4	140
Catshp	70	0	0	1	0	-3	0	0	-7	0	-1	0	0	0	0	0	0	-11	1	-18
Pigspoultry	43	-6	0	-7	-1	-22	-1	0	-5	-1	-2	0	0	0	-1	-2	0	-7	-1	14
Wool	4	-1	0	-1	0	-43	0	0	-1	0	0	0	0	0	0	0	0	-5	-1	47
Red meat	-1185	146	-17	1052	-7	1	0	139	-3	-2	-14	0	0	2	-1	-1	0	-12	49	-180
White meat	-470	17	-10	53	-3	-71	0	0	-3	0	-3	0	0	6	0	-2	0	-17	2	457
Vegoilsfats	-9	-26	-16	-265	-4	-217	-11	-69	-19	-3	210	-1	-1	-1	0	-5	1	-72	2	507
Dairy	-4311	638	27	380	41	252	0	51	567	42	40	-21	4	17	0	-1	0	14	41	1794
Ricepro	-80	0	-1	3	0	137	-2	36	-6	12	-1	0	-5	-8	1	-12	-1	-19	-1	-87
Sugarpro	-1464	16	62	272	24	227	408	-21	76	4	9	-2	0	48	144	348	2	-63	52	-125
Ofoodpro	-317	11	-5	27	0	150	-10	34	102	5	-3	-1	1	9	-3	-15	1	-63	19	86
BevsTobac	-29	37	-1	40	-4	-51	5	-27	-12	1	-2	-1	0	0	-1	-2	0	-12	4	40
Manu	5444	-743	-69	-908	-36	-61	-400	-60	-379	-27	-124	-3	6	-21	-74	-200	-2	-411	-135	-1927
Svces	1916	-53	-46	-119	9	-229	-46	-53	-149	-15	-19	17	-8	-14	-74	-89	-1	-156	-17	-432
Total	**-187**	**-22**	**-5**	**112**	**-6**	**262**	**28**	**-22**	**18**	**0**	**11**	**-15**	**-7**	**-1**	**-40**	**-13**	**0**	**97**	**5**	**-219**
AgFood	**-7546**	**774**	**110**	**1139**	**21**	**551**	**474**	**91**	**546**	**42**	**153**	**-29**	**-6**	**34**	**108**	**276**	**3**	**664**	**156**	**2139**

In the case of sugar trade, the largest net export revenue gainers are the single country regions of Bangladesh (€408 million) and Tanzania (€348 million). In 'red meat' trade, almost all of the EU's trade balance deterioration is picked up by Latin America (€1,052 million), whilst 'East and South East Asia' and Bangladesh net export earnings from combined paddy and processed rice trade are noteworthy (€329 million and €119 million, respectively). Finally, net revenue gains of €1,404 million from 'oilseeds' trade constitute the main trade revenue gain in the Rest of Central and Eastern Africa.

In Tables 20 and 21, real incomes are presented for the EU27 and the non-EU regions, respectively. Under multilateral trade liberalisation, the EU27 (UK) real income gain is €4,688 million (€767 million) or 0.04 per cent (0.05 per cent) per capita real income gain (Table 20). Welfare gains are driven by allocative efficiency and capital accumulation gains, whilst the UK gains €209 million from a cheaper CAP budget (in part due to the elimination of the export subsidies). With the elimination of export subsidies, there is no accumulation of stock purchases.

Table 20: Changes in EU real income, CAP budget and stock purchase impacts (€ millions) in scenario B vs. 2013 benchmark

	REAL INCOME			CAPBUDGET			STOCKS	
	UK	EU27		UK	EU27		UK	EU27
EV	767	4688	CAP budget[1]	209	0			
ToT	-56	-217	1.CAP expen	-620	-6383			
Alloc	517	4626	Exp refunds:	-218	-2996			
Endw	97	279	Cereals	-2	-78	Cereals	0	0
Stocks	0	0	Oilseeds	0	0	Oilseeds	0	0
CAP bud	209	0	Othcrops	-1	-17	Othcrops	0	0
U (per cent)	0.05	0.04	Sugar	-35	-213	Livestock	0	0
			Red meat	-10	-205	Red meat	0	0
			White meat	-4	-137	Whitemeat	0	0
			Dairy	-105	-1850	Dairy	0	0
			Other	-61	-496	Other	0	0
			2.Tariff rev	239	2566	Total	0	0
			3.GDP Cont	-1473	-8949			
			4.UK Rebate	-405	0			

1 CAP budget equals 1-2-3+4

Whilst the global gain from the Doha package is estimated at €9,848 million, the share attributed to developing countries only amounts to €1,500 million (Table 21). In per capita income terms, real incomes rise the most in Ethiopia (1.50 per cent), Tanzania (1.38 per cent), Bangladesh (0.52 per cent) and the Rest of Central and East Africa (0.44 per cent). All developing regions realise capital accumulation improvements[28] and many realise allocative efficiency increases due to increases in (liberalised) trade flows. Moreover, with improved market access and higher world prices, there are ToT benefits for typically export orientated developing regions (e.g., Latin America, East and South East Asia). Moreover, as net exporters in sugar and oilseeds (Rest of Central and East Africa only), important ToT gains are recorded by Ethiopia, Tanzania and

[28] In general equilibrium theory (Heckscher-Ohlin), we are referring to a shift to the right of the production possibilities frontier.

Central and East Africa on increased exports of sugar and oilseeds, (both of which have higher world prices).

Table 21: Changes in Non-EU real income effects (€ millions) in scenario B vs. 2013 benchmark

	EV	ToT	Alloc	Endw	U
Eurdvping	-370	-153	-307	90	-0.06
CentAme	79	59	11	10	0.12
LatAme	308	192	13	103	0.04
Caribbean	-57	-38	-26	7	-0.04
ESEAsia	749	207	241	301	0.04
Bangladesh	215	112	77	27	0.52
RoSAsia	144	23	78	43	0.03
WAsiaMEast	-126	-183	-51	108	-0.01
Egypt	13	-16	21	7	0.02
RoNAfr	-84	-129	36	10	-0.06
Nigeria	17	-32	42	7	0.03
Senegal	-4	-4	-1	1	-0.08
RoWAfr	-45	-52	4	2	-0.13
Ethiopia	84	59	24	2	1.50
Tanzania	126	99	18	10	1.38
Uganda	1	0	0	1	0.02
CentEAfr	426	280	71	75	0.44
SouAfr	21	4	2	15	0.01
RoDevWld	3659	-217	3377	499	0.02

4.5 EU Export refund elimination within the Doha Package

To isolate the trade led effects from elimination of the export refund within the Doha package, the GEMPACK facility, 'subtotal' is employed. As observed in Table 6, the largest EU export refund 'rates' are applied to 'processed sugar', 'red meat', 'dairy', 'processed rice' and 'other grains', although the largest commodities in volume terms are extra-EU exports of 'dairy', 'other food' and 'red meat'. Tables 22 and 23 present output and market price changes for all these relevant sectors of interest. Note, that in each of Tables 22 to 25, **the values in bold and italics represent the contribution of EU export subsidy elimination (either in percentage points or value terms) to the Doha results presented in section 4.4.**

Table 22: Contribution of export eliminations within the Doha package to changes in output

	EU27	Eurdvping	Cent Ame	Lat Ame	Carib bean	ESE Asia	Bangla desh	RoS Asia	WAsia MEast	Egypt	Ro NAfr	Nige ria	Sene gal	Ro WAfr	Ethio pia	Tanzani a	Ugan da	Cent EAfr	Sou Afr	RoDvW ld
Land	-3.3	0.4	0.2	0.3	0.0	0.1	1.0	0.0	0.3	0.1	0.2	0.0	0.3	-0.1	0.5	2.1	0.0	3.1	0.2	-0.6
Land	***-0.5***	***0.4***	***0.0***	***0.2***	***0.0***	***0.1***	***0.0***	***0.0***	***0.3***	***0.1***	***0.1***	***0.0***	***0.4***	***0.0***	***0.0***	***0.0***	***0.0***	***0.0***	***0.1***	***0.2***
Ograins	0.1	1.0	-0.2	0.2	0.1	0.1	-1.9	0.1	0.0	-0.2	0.2	0.0	0.0	0.0	0.4	0.1	0.4	-0.7	0.8	0.9
Ograins	***-1.5***	***1.1***	***0.1***	***0.3***	***0.2***	***0.3***	***0.0***	***0.0***	***0.7***	***0.1***	***0.3***	***0.0***	***-0.2***	***0.0***	***0.0***	***0.0***	***0.1***	***0.0***	***0.2***	***0.8***
Red Meat	-5.8	1.8	-1.0	6.1	0.2	0.3	0.0	8.9	0.7	0.0	-0.1	0.7	-0.3	1.9	-1.8	0.5	0.3	-1.3	1.9	0.0
Red Meat	***-1.8***	***1.9***	***0.1***	***0.7***	***0.5***	***0.4***	***1.7***	***1.9***	***0.7***	***0.2***	***0.6***	***0.6***	***-0.2***	***2.3***	***1.4***	***0.1***	***0.2***	***1.6***	***0.1***	***0.4***
White Meat	-0.5	1.0	-0.5	0.4	-0.2	-0.2	-6.0	0.3	0.0	0.0	-0.2	-0.1	0.3	3.5	-0.7	0.7	0.7	-0.6	0.2	0.6
White Meat	***-0.8***	***1.5***	***0.1***	***0.8***	***0.4***	***0.3***	***3.1***	***0.7***	***0.1***	***0.2***	***0.0***	***0.9***	***0.3***	***3.3***	***0.3***	***0.1***	***0.2***	***0.9***	***0.3***	***0.9***
Dairy	-1.2	7.9	2.8	3.5	4.5	3.9	2.5	0.6	4.6	5.3	14.7	69.5	26.8	36.0	16.4	7.8	9.0	16.0	2.9	2.3
Dairy	***-5.2***	***5.8***	***2.0***	***3.1***	***3.8***	***3.7***	***4.5***	***0.6***	***4.7***	***5.3***	***15.4***	***74.0***	***28.0***	***37.3***	***15.9***	***16.1***	***6.8***	***18.9***	***3.4***	***2.9***
Ricepro	-9.5	0.7	0.0	0.2	-0.8	0.3	0.1	0.2	0.6	1.2	1.9	0.9	-2.4	-1.7	510.1	-16.9	-1.8	-2.5	1.0	-0.6
Ricepro	***-3.4***	***0.6***	***0.0***	***0.1***	***-0.1***	***0.1***	***0.0***	***0.1***	***0.6***	***0.2***	***2.0***	***0.3***	***-0.5***	***-0.2***	***-1.3***	***0.3***	***0.0***	***0.0***	***0.2***	***0.0***
Sugarpro	-12.6	1.9	4.7	3.7	2.7	4.0	40.9	-0.1	4.0	2.1	2.3	5.9	4.4	62.6	62.2	72.2	2.4	-6.2	4.0	-1.4
Sugarpro	***-5.2***	***2.1***	***1.4***	***3.1***	***1.5***	***0.8***	***0.0***	***0.2***	***3.5***	***1.5***	***2.5***	***1.3***	***1.2***	***2.5***	***-0.7***	***-0.2***	***-0.1***	***0.3***	***0.9***	***0.5***
Ofoodpro	-0.5	0.5	0.0	0.2	0.2	0.2	-0.5	0.2	0.8	0.4	0.2	0.5	0.3	0.8	-0.6	-0.5	0.6	-0.5	0.3	0.2
Ofoodpro	***-0.5***	***0.6***	***0.2***	***0.2***	***0.1***	***0.2***	***0.3***	***0.1***	***0.4***	***0.3***	***0.2***	***0.9***	***0.5***	***0.7***	***0.3***	***0.1***	***0.5***	***0.2***	***0.2***	***0.2***
QGDP	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.4	0.3	0.0	0.1	0.0	0.0
QGDP	***0.0***	***0.0***	***0.0***	***0.0***	***0.0***	***0.0***	***0.0***	***0.0***	***0.0***	***0.0***	***0.0***	***0.0***	***0.0***	***0.0***	***0.0***	***0.0***	***0.0***	***0.0***	***0.0***	***0.0***

Table 23: Contribution of export eliminations within the Doha package to changes in market prices

	EU27	Eurdvping	Cent Ame	Lat Ame	Carib bean	ESE Asia	Bangla desh	RoS Asia	WAsia MEast	Egypt	Ro NAfr	Nige ria	Sene gal	Ro WAfr	Ethio pia	Tanzan ia	Ugan da	Cent EAfr	Sou Afr	RoDvW ld	World prices
Land	-5.3	0.4	0.9	0.7	0.6	0.3	7.2	0.0	0.5	0.2	0.3	-0.5	1.0	0.1	2.1	5.9	0.2	5.9	0.4	-0.7	-
Land	***-0.8***	***0.5***	***0.2***	***0.4***	***0.9***	***0.2***	***-0.1***	***0.1***	***0.5***	***0.2***	***0.4***	***-0.2***	***1.1***	***0.2***	***0.0***	***0.0***	***0.0***	***0.1***	***0.2***	***0.3***	***-***
Ograins	0.9	0.5	0.3	0.3	0.2	0.1	3.6	0.0	0.3	0.2	0.3	-0.5	1.1	0.0	1.9	5.8	0.2	5.0	0.2	-0.4	0.8
Ograins	***-0.6***	***0.6***	***0.1***	***0.3***	***0.5***	***0.2***	***0.0***	***0.1***	***0.4***	***0.2***	***0.3***	***-0.2***	***1.1***	***0.1***	***0.0***	***0.0***	***0.0***	***0.1***	***0.1***	***0.3***	***0.4***
Red Meat	-0.3	0.3	0.3	0.5	0.2	0.2	0.2	0.1	0.2	0.1	0.1	-0.2	0.5	0.1	2.4	3.3	0.1	2.6	0.2	-0.2	0.2
Red Meat	***-0.2***	***0.4***	***0.1***	***0.2***	***0.3***	***0.2***	***0.1***	***0.0***	***0.3***	***0.1***	***0.2***	***0.0***	***0.4***	***0.1***	***0.0***	***0.0***	***0.0***	***0.1***	***0.1***	***0.1***	***0.3***
White Meat	-0.3	0.1	0.3	0.3	0.1	0.1	0.3	0.1	0.2	0.2	0.2	-0.2	1.0	0.1	2.4	3.3	0.1	2.2	0.1	-0.2	0.2
White Meat	***-0.3***	***0.2***	***0.1***	***0.2***	***0.3***	***0.1***	***0.1***	***0.1***	***0.3***	***0.1***	***0.2***	***-0.1***	***1.0***	***0.1***	***0.0***	***0.0***	***0.0***	***0.1***	***0.1***	***0.1***	***0.2***
Dairy	-3.0	0.3	*0.3*	0.3	0.4	0.3	1.6	0.1	0.4	0.2	1.8	-0.2	2.1	1.1	2.7	3.8	0.8	2.0	0.1	-0.1	2.0
Dairy	***-0.2***	***0.4***	***0.1***	***0.3***	***0.5***	***0.3***	***0.0***	***0.0***	***0.5***	***0.2***	***1.9***	***0.0***	***2.1***	***1.3***	***0.0***	***0.0***	***0.8***	***1.1***	***0.1***	***0.3***	***2.4***
Ricepro	-1.3	0.2	0.2	0.2	0.0	0.4	2.9	0.0	0.1	0.3	0.1	-0.2	0.5	0.2	0.5	3.4	0.0	3.2	0.2	-1.2	0.1
Ricepro	***-0.2***	***0.2***	***0.1***	***0.2***	***0.2***	***0.1***	***0.0***	***0.0***	***0.2***	***0.3***	***0.1***	***-0.1***	***0.3***	***0.3***	***0.1***	***-0.1***	***0.1***	***0.1***	***0.1***	***0.2***	***0.1***
Sugarpro	0.4	0.3	0.4	0.2	0.1	0.4	5.8	0.0	0.2	0.3	0.4	-0.1	0.4	0.1	5.0	4.4	0.2	2.4	0.1	-0.6	1.3
Sugarpro	***-0.3***	***0.4***	***0.1***	***0.2***	***0.2***	***0.1***	***0.0***	***0.1***	***0.2***	***0.3***	***0.4***	***0.0***	***0.1***	***0.0***	***0.0***	***0.0***	***0.0***	***0.1***	***0.0***	***0.2***	***1.3***
Ofoodpro	-0.3	0.2	0.2	0.2	0.1	0.1	1.1	0.1	0.2	0.3	0.2	-0.2	0.4	0.1	2.5	3.6	0.3	1.2	0.1	-0.1	0.3
Ofoodpro	***-0.1***	***0.3***	***0.1***	***0.1***	***0.2***	***0.1***	***0.0***	***0.1***	***0.2***	***0.4***	***0.3***	***0.0***	***0.1***	***0.1***	***0.0***	***0.0***	***0.0***	***0.1***	***0.0***	***0.1***	***0.2***
PGDP	-0.1	0.1	0.3	0.1	0.0	0.1	1.6	0.0	0.1	0.1	0.0	-0.3	0.6	0.0	2.9	4.5	0.1	1.3	0.0	0.0	-
PGDP	***-0.1***	***0.1***	***0.1***	***0.1***	***0.0***	***0.0***	***0.0***	***0.0***	***0.1***	***0.1***	***0.1***	***0.0***	***0.3***	***0.1***	***0.0***	***0.0***	***0.0***	***0.0***	***0.0***	***0.0***	***-***

In the EU27, dairy, 'other grains' and 'other food' output estimates in the Doha baseline (Table 22) are largely influenced by EU export refund eliminations. For example, of the 0.1 percentage point (pp%) increase in EU27 'other grains' output, the elimination of the export subsidy within the Doha package, results in a 1.5pp% output reduction. This implies that the remaining Doha measures account for a 1.6 pp% increase in 'other grains' output. In 'red meat', 'processed sugar' and 'processed rice', export refunds have less importance. Of the reduction in EU27 land usage of 3.3 pp% from the Doha reforms, 0.5 pp% of the reduction is attributed to the elimination of export subsidies.

As a proportion of the total EU market (support) price falls (Table 23) from the Doha package, the price deflating impact of export refund eliminations is consistent.[29] Examining world prices, 'dairy', 'processed sugar', 'other food', 'processed rice' and meat export refund eliminations have an important contribution to world price rises. The dairy result is most striking, because EU export refunds are considerably more pervasive in this sector[30] and in the absence of EU export refund eliminations, EU stock purchases of dairy products rise €642 million compared with the Doha baseline (not shown).

In the developing regions, the Doha package output gains (Table 22) accruing to the dairy sectors is heavily influenced by the elimination of EU27 export subsidies. A similar story is apparent in the 'other food' sector, although this may be more attributed to limited market access possibilities rather than the strength of the EU's export refunds. In 'red meat' sectors, market access constitutes a considerably more important source of output gains for Latin America, RoSAsia and Tanzania, although in other developing regions, EU27 export refund eliminations have a more pivotal role. With much improved market access on 'processed sugar' trade, the relative importance of the EU's export subsidies is more limited, although in Latin America, the Caribbean, West Asia and the Middle East and the North African regions, gains from EU refund eliminations have an important influence on Doha related output gains.

Turning to the trade balances (Table 24), it is perhaps surprising to note the important contribution of export refund elimination on agro-food trade balances in the EU27 and developing country regions. For example, of the €7,546 million net export revenue loss (€5,107 million net export revenue gain) in EU27 (developing region) agro-food trade in the baseline, €5,735 million (€2,775 million) is related to the usage of export refunds (Table 24).

[29] Domestic market price changes are also a function of factor prices from changes in comparative trade competitiveness (i.e., market access).
[30] Both in terms of the 'subsidy rates' applied and the size of the EU's dairy trade flows.

Table 24: Contribution of export eliminations within the Doha package to changes in trade balances

	EU27	Eurdvping	Cent Ame	Lat Ame	Caribbean	ESE Asia	Bangladesh	RoS Asia	WAsia MEast	Egypt	Ro NAfr	Nigeria	Senegal	Ro WAfr	Ethiopia	Tanzania	Uganda	Cent EAfr	Sou Afr	RoDv Wld	Devping
Ograins	-52	13	-1	-21	-3	-1	-1	2	-48	-1	-7	0	0	0	0	-2	1	-14	7	127	-75
Ograins	***-48***	***18***	***0***	***8***	***-2***	***5***	***0***	***2***	***-17***	***-2***	***-2***	***0***	***0***	***0***	***0***	***0***	***0***	***0***	***1***	***42***	***10***
Red Meat	-1185	146	-17	1052	-7	1	0	139	-3	-2	-14	0	0	2	-1	-1	0	-12	49	-180	1332
Red Meat	***-507***	***158***	***2***	***120***	***-3***	***9***	***0***	***30***	***-1***	***0***	***5***	***0***	***0***	***3***	***1***	***0***	***0***	***9***	***3***	***191***	***335***
White Meat	-470	17	-10	53	-3	-71	0	0	-3	0	-3	0	0	6	0	-2	0	-17	2	457	-31
White Meat	***-676***	***34***	***1***	***97***	***0***	***76***	***0***	***1***	***23***	***0***	***1***	***0***	***0***	***5***	***0***	***0***	***0***	***12***	***6***	***429***	***257***
Dairy	-4611	698	30	389	44	265	0	59	594	45	43	-20	4	18	1	-1	1	16	44	1954	2231
Dairy	***-4332***	***465***	***22***	***351***	***36***	***249***	***3***	***58***	***607***	***45***	***47***	***-21***	***4***	***18***	***1***	***0***	***0***	***23***	***48***	***2583***	***1958***
Ricepro	-80	0	-1	3	0	137	-2	36	-6	12	-1	0	-5	-8	1	-12	-1	-19	-1	-87	133
Ricepro	***-37***	***1***	***0***	***1***	***-1***	***21***	***0***	***18***	***-8***	***2***	***-1***	***0***	***-1***	***-1***	***0***	***0***	***0***	***0***	***0***	***8***	***31***
Sugarpro	-1464	17	62	272	24	228	408	-21	76	4	9	-2	0	48	144	349	2	-63	52	-125	1608
Sugarpro	***-404***	***26***	***18***	***225***	***10***	***32***	***-2***	***13***	***59***	***2***	***14***	***-2***	***0***	***-6***	***-2***	***-1***	***0***	***0***	***11***	***59***	***398***
Ofoodpro	-317	11	-5	27	0	150	-10	34	102	5	-3	-1	1	9	-3	-15	1	-63	19	86	260
Ofoodpro	***-563***	***23***	***7***	***47***	***-3***	***184***	***2***	***26***	***21***	***2***	***1***	***-3***	***0***	***5***	***1***	***1***	***1***	***8***	***14***	***284***	***338***
AGFOOD	-7546	774	110	1139	21	551	474	91	546	42	153	-29	-6	34	108	276	3	664	156	2139	5107
AGFOOD	***-5735***	***640***	***43***	***696***	***20***	***535***	***-2***	***154***	***528***	***38***	***33***	***-27***	***0***	***2***	***1***	***0***	***0***	***34***	***79***	***3358***	***2775***

Much of this trend is explained by trade balance changes in the dairy sector, where €1,958 million of the €2,231 million net export revenue gain to all developing countries from the Doha package, is due to export refund eliminations. A similar trend is evident for 'other food' trade balances in the developing countries, with the majority of EU export refund gains accruing to East and South East Asia. Notwithstanding, the magnitude of the 'other food' gains are moderate compared with the dairy sector since EU export refund protection is much smaller. Elsewhere, total 'red meat' trade balance changes in a number of developing countries are largely explained by EU export refund eliminations, although in the case of Latin America (the largest developing region red meat net exporter), the vast majority of the net trade revenue gains is due to market access improvements. In sugar trade, despite high EU export refund protection rates, market access is the dominant factor for the majority of developing countries. The most notable exception is in Latin America, where €225 million of the €272 million gain is EU export refund related.

Examining the real income effects, €3,714 million of the EU27's baseline EV gain is due to EU export refund elimination (EU27 EV results are not shown). Decomposing this result, this is due to €732 million in savings from stocks purchases, improved EU27 allocative efficiency gains of €2,795 and ToT improvements of €956 million owing to higher export prices. As a net contributor, the UK also gains €173 million, largely from the reduced burden on the CAP budget owing to export refund elimination.

As shown in Table 25, the Doha Round package yields relatively small per capita real income gains to most developing countries. World price rises induced by EU export refund elimination benefit the net agro-food exporters (Latin America, Rest of South Asia). Thus, in the case of Latin America, strong ToT gains lead to the result that €163 million of the total Doha package gain of €308 million is due to EU export refund elimination.[31] Elsewhere, rising world prices for net agro-food importers of those relevant commodities has an important negative impact on aggregate EV gains. For example, EU export refund elimination reduces real income improvements from market access by €293 million in West Asia and the Middle East, €206 million across North Africa, €120 million across the whole of West Africa and €72 million in the Caribbean. Finally, for the two largest gainers (in per capita real income terms) from the Doha package, Ethiopia and Tanzania, improved market access is the dominant factor, rather than EU export refund eliminations. Market access also dominates EV gains in Central America, East and South East Asia, Bangladesh, Rest of Eastern and Central Africa and Southern Africa.

[31] Given the preceding discussion, much of this gain is based on the improved terms of trade for 'Red Meat'.

Table 25: Contribution of export eliminations within the Doha package to changes in Developing country real incomes

	EV	***EV***	TOT	***TOT***	Alloc	***Alloc***	ENW	***ENDW***	U	***U***
Eurdvping	-370	***-354***	-153	***-142***	-307	***-275***	90	***63***	-0.06	***-0.06***
CentAme	79	***5***	59	***2***	11	***-2***	10	***4***	0.12	***0.01***
LatAme	308	***163***	192	***117***	13	***-6***	103	***52***	0.04	***0.02***
Caribbean	-57	***-72***	-38	***-39***	-26	***-36***	7	***4***	-0.04	***-0.05***
ESEAsia	749	***75***	207	***-59***	241	***-30***	301	***164***	0.04	***0.00***
Bangladesh	215	***-8***	112	***-6***	77	***-3***	27	***2***	0.52	***-0.02***
RoSAsia	144	***35***	23	***15***	78	***-16***	43	***37***	0.03	***0.01***
WAsiaMEast	-126	***-293***	-183	***-221***	-51	***-134***	108	***62***	-0.02	***-0.04***
Egypt	13	***-15***	-16	***-15***	21	***-3***	7	***4***	0.02	***-0.03***
RoNAfr	-84	***-191***	-129	***-129***	36	***-67***	10	***5***	-0.06	***-0.15***
Nigeria	17	***-44***	-32	***-43***	42	***-4***	7	***3***	0.03	***-0.09***
Senegal	-4	***-12***	-4	***-9***	-1	***-4***	1	***1***	-0.08	***-0.23***
RoWAfr	-45	***-64***	-52	***-51***	4	***-14***	2	***1***	-0.13	***-0.18***
Ethiopia	84	***-1***	59	***-1***	24	***-1***	2	***0***	1.50	***-0.02***
Tanzania	126	***-2***	99	***-2***	18	***0***	10	***0***	1.38	***-0.02***
Uganda	1	***-1***	0	***-1***	0	***0***	1	***0***	0.02	***-0.02***
CentEAfr	426	***-67***	280	***-46***	71	***-25***	75	***4***	0.44	***-0.07***
SouAfr	21	***-8***	4	***4***	2	***-20***	15	***7***	0.01	***-0.01***
RoDevWld	3659	***-415***	-217	***-119***	3377	***-800***	499	***503***	0.02	***0.00***

III.2.3 2004-2020 Experiment 'C'

In this third and final set of experiments, it is assumed that the multilateral Doha negotiations fail. Consequently, in scenario C1, we simply extend the 'business as usual' baseline employed in scenario A1 from 2004 to 2020. To reflect the longer time scale in comparison with experiment A, a digression rate of 2 per cent per annum in nominal euros is applied to the EU27 single farm payment (SFP) (pillar I) from the 2013 ceiling limits (Oskam et al., 2004),[32] modulation rates are raised, all production quotas are eliminated, whilst the Armington trade elasticities are assumed to be 30 per cent larger than the standard values to capture greater responsiveness in the long run. Since the underlying drivers for the results are more or less the same, no attempt is made to discuss the results in this section in the same depth as section III.3.1.[33]

Scenario C1 (Baseline for 2004-2020 period)

With reductions in pillar 1 support and higher armington trade elasticities, agriculture in the EU27 contracts more markedly in scenario C1. Thus, outputs of heavily supported agro-food commodities fall more sharply (not shown) from decoupling (i.e., paddy rice (-13.8 per cent), oilseeds (-11.1 per cent), cattle and sheep (-5.5 per cent), raw sugar (-44.7 per cent)), implying concurrent falls in

[32] The 2 per cent per annum reductions on the SFP ceiling limits in 2013 to EU27 members are calculated over 7 years.

[33] Given the similarities with scenario 1, tables of results are not presented for scenario C1.

knock on effects in the downstream sectors (vegoilsfats (-6.0 per cent), red meat (-6.0 per cent), processed sugar (-23.1 per cent). In the raw milk sector, the elimination of the quota (and associated rent) leads to larger market price falls (vs. scenario A1), with the effect that downstream dairy output increases by 9.3 per cent (larger than in scenario A1). With a shift of resources (particularly land) into less supported primary agricultural sectors, the important EU sector of 'vegetables, fruit and nuts' increases by 2.7 per cent (calculated from a large base). Owing to larger import substitution effects, the EU27 agro-food trade balance falls by €1,647 million (compared with €1,264 million in scenario A1), with the largest trade balance deteriorations occurring in 'processed sugar' (€1,532 million), 'vegetable oils and fats' (€1,121 million) and 'red meat' (€878 million). In contrast, notable trade balance improvements occur in 'dairy' (€1,456 million) and 'vegetables fruits and nuts' (€997 million).

In the developing countries, primary agricultural output gains are larger, supported by the larger increases in agricultural land usage. With larger increases in agro-food production in the developing regions, the aggregate trade balance improvement for all developing countries is €788 million. Mirroring the trends in the EU27 trade balances, the largest net export revenue gains to the developing regions are on 'processed sugar' (€1,101 million) and 'vegetable oils and fats' (€855 million), whilst the largest losses accrue on 'dairy' (€850 million) and 'vegetables, fruits and nuts' (€707 million).

On a regional level, Latin America benefits from the EU27 contraction in 'oilseeds' (€352 million), 'vegetable oils and fats' (€413 million) and 'red meat' production (€286 million), whilst Bangladesh witnesses trade balance improvements in 'paddy rice' (€136 million) and 'processed sugar' (€301 million). With the opening of EU sugar markets under the EBA, the African nations of Tanzania and Ethiopia make net revenue gains from sugar trade of €648 million and €204 million, respectively. Aggregating over all agro-food trade, the biggest net export revenue improvements occur in Tanzania (€514 million) and Bangladesh (€387 million).

Examining real income changes, the EU27 gains €4,555 million from enlargement of the single market and reform of the CAP. In the developing countries, the main gainers in per capita real income terms are Tanzania (2.20 per cent), Ethiopia (1.58 per cent), Senegal (0.44 per cent) and Bangladesh (0.28 per cent), which correspond to real income gains of €191 million, €86 million, €23 million and €115 million, respectively. The largest loser in per capita real income terms is Central America (-0.08 per cent; -€48 million).

Scenario C2 (Maximum damage) vs. Scenario C1 (Baseline)

In scenario C2, we examine the long run (2004-2020) impacts of full usage of the Uruguay Round agreed ceiling limits for EU27 export refunds. Examining the export refund ceiling limits calibrated within the 2004 database (Table 6), the greatest potential for export refund increases occurs in the cereals, meat (red and white), 'vegetables, fruits and nuts' and 'beverages and tobacco' and to a lesser extent, 'processed rice' and 'processed sugar' sectors. Notwithstanding, as a proportion of EU export values, the nominal value of

export refunds is most significant in cereals activities, 'red meat', 'dairy' and 'sugarpro'.

Comparing the long run results of scenario C2 vs. scenario C1 (baseline), with the corresponding medium run results (scenario A2 vs. scenario A1), the 'general trends' for prices and outputs are the same, as expected. More specifically, relative world price and market price changes compared with respective baselines are very similar,[34] whilst output changes (positive and negative) are more elastic, reflecting reductions in pillar 1 payments and greater supply responsiveness from the usage of larger trade elasticities in all regions in the longer run scenario to 2020.

The most notable EU27 agro-food output gain increases (Table 26) compared with the corresponding medium run scenario, are in wheat (28.3 per cent), 'other grains' (9.4 per cent), which diverts even greater land away from other cropping activities. Meanwhile, there are also slightly larger output gains in 'red meat' (6.7 per cent) and sugar processing (5.2 per cent) which benefit corresponding upstream sectors. The improvement in EU27 dairy production is slightly smaller in the long run, because dairy output increases in the long run baseline (scenario C1) are larger than in the medium run baseline (scenario A1) owing to the elimination of the raw milk quota.

[34] Given that this is a relative price model, such a result is to be expected given that the trade elasticities are assumed to rise for all regions. For this reason, market price results are not shown.

Table 26: Per centage changes in output in scenario C2 vs. scenario C1

	EU27	Eurdvping	Cent Ame	Lat Ame	Carib bean	ESE Asia	Bangladesh	RoS Asia	WAsia MEast	Egypt	Ro NAfr	Nigeria	Senegal	Ro WAfr	Ethiopia	Tanzania	Uganda	Cent EAfr	Sou Afr	RoDvWld
Land	0.0	-1.1	0.0	-0.3	0.0	-0.1	0.0	-0.1	-0.4	-0.2	-3.1	0.0	0.5	0.1	-0.2	0.0	0.0	-0.1	-0.2	-0.4
UnskLab	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SkLab	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Capital	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Natres	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Paddy rice	2.5	-0.2	-0.3	0.0	0.0	-0.1	0.1	0.0	0.3	0.0	4.7	0.0	-3.4	0.0	0.0	0.3	0.2	0.2	0.0	0.0
Wheat	28.3	-8.5	-3.1	-12.6	-11.7	-1.8	-1.7	-0.9	-7.9	-3.9	-29.8	-13.1	-99.7	-9.6	-16.9	-6.6	-2.7	-25.8	-10.7	-11.4
Ograins	9.4	-3.3	-0.4	-1.3	-0.5	-0.7	0.0	-0.1	-2.2	0.0	0.8	0.0	0.1	-0.1	0.0	-0.1	-1.2	0.0	-1.3	-1.6
Vegfrunuts	-1.0	0.2	-0.1	0.2	0.2	0.0	-0.1	0.0	0.3	0.1	0.1	0.0	-0.6	0.2	0.1	-0.1	0.0	0.3	0.3	0.1
Oilseeds	-2.0	1.4	-0.4	0.4	-0.1	-0.3	-0.4	-0.1	0.5	0.2	10.7	-0.5	-0.4	-0.1	0.3	-0.3	-0.2	0.1	-0.4	0.3
Raw Sugar	4.6	-0.7	-0.7	-1.4	-0.9	-0.5	0.0	-0.1	-2.8	-0.4	1.6	-0.1	0.8	0.1	0.5	-0.1	-0.1	0.1	-0.3	-0.3
Plant fibres	-2.9	1.0	-0.2	0.3	0.2	-0.1	-0.2	0.0	0.2	0.3	2.8	-0.4	-5.8	-0.9	0.6	-0.4	-0.3	0.3	-0.1	0.3
Ocrops	-0.7	1.8	0.4	1.0	0.4	0.2	0.0	0.1	1.1	1.4	6.2	0.9	4.7	0.4	2.0	0.2	0.9	0.7	0.2	0.4
Catshp	3.6	-3.7	-0.3	-1.2	-0.4	-0.4	0.0	-0.1	-0.1	0.1	0.5	0.0	1.7	-1.1	0.2	0.0	0.0	-0.9	-0.2	-0.6
Pigspoulty	-0.1	-0.2	0.0	-0.3	-0.1	0.0	0.0	0.0	0.3	0.5	0.5	0.0	2.6	-0.2	0.6	0.0	0.0	-0.2	-0.1	-0.3
Milk	0.1	-0.1	0.0	-0.2	-0.1	-0.2	0.0	0.0	-0.1	0.0	-0.3	-0.5	1.5	-3.6	0.1	-0.1	0.0	0.0	-0.1	-0.1
Wool	-4.5	0.4	0.0	0.3	0.0	-0.2	-2.8	-0.1	0.1	0.1	0.4	-1.6	9.7	2.2	0.2	-2.3	-0.7	-0.6	-0.3	0.5
Red meat	6.7	-5.5	-0.6	-1.9	-1.6	-1.6	-4.7	-5.0	-2.4	-0.6	-0.5	-3.9	1.3	-8.6	-4.1	-0.5	-0.6	-4.7	-0.4	-0.8
Whitemeat	0.7	-1.7	-0.4	-0.7	-0.9	-0.6	-3.6	-0.9	-0.1	-0.3	1.0	-1.3	1.1	-3.5	-0.7	-0.4	-0.9	-1.6	-0.4	-0.8
Vegoilsfats	-1.3	0.9	-0.2	0.5	0.0	-0.1	0.0	0.0	0.1	1.0	11.8	-0.1	-4.6	-0.4	1.8	-0.4	-1.0	0.5	-0.3	0.2
Dairy	0.1	0.0	-0.1	-0.2	-0.1	-0.2	-0.1	0.0	-0.2	-0.4	0.3	-18.8	-0.6	-6.4	-0.4	-0.7	-0.4	-2.1	-0.2	-0.1
Ricepro	2.5	-0.1	0.0	0.0	0.1	-0.1	0.0	-0.1	-0.1	-0.1	-1.8	-0.4	22.8	2.3	21.4	-1.1	0.7	0.4	-0.2	0.0
Sugarpro	5.2	-1.3	-1.3	-2.7	-1.6	-0.5	0.0	-0.2	-3.1	-1.1	-0.1	-3.3	-4.3	-2.9	0.6	-0.1	0.0	0.0	-0.8	-0.4
Ofoodpro	-0.1	0.5	0.0	0.1	0.1	0.0	0.1	0.0	0.2	0.1	3.5	-0.1	-1.6	-0.1	0.2	0.0	-0.2	0.5	0.0	0.0
BevsTobac	0.0	0.0	-0.1	0.0	-0.1	0.0	0.0	0.0	0.1	0.0	0.4	-0.2	3.2	0.3	0.0	0.0	0.0	0.0	0.0	0.0
Manu	-0.1	0.1	0.1	0.1	0.0	0.0	0.0	0.1	0.0	0.0	0.2	0.0	-3.0	-0.3	0.1	0.0	-0.1	0.0	0.0	0.0
Svces	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.2	0.1	0.0	0.0	0.0	0.0	0.0	0.0
QGDP	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0

As expected, increased dumping of EU cereals, meat and sugar has a slightly more adverse impact on the developing regions in the long run. The most notable results are recorded within the cereals sectors (particularly wheat) (Table 26), where large impacts are felt in the African regions (particularly Senegal and the Rest of North Africa), Latin America, the Caribbean and West Asia and the Middle East. An examination of the net trade balances provides a useful long run revenue estimate from increased EU dumping. In Table 27, long run EU27 net export revenue gains rise €4,882 million, of which trade balances improve for wheat (€3,157 million), red meat (€1,704 million), white meat (€678 million) and processed sugar (€410 million). In comparison with the medium run experiment A, these larger trade balance improvements are largely due to increased Armington elasticities on import demands from reductions in world prices on subsidised EU exports. Meanwhile, with increases in EU27 cereals production crowding out other cropping activities, trade balances for 'oilseeds', 'vegetables, fruits and nuts' and 'other crops', fall.

Summing across all developing regions (Table 27), the fall in net agro-food export revenues is €3,273 million compared with the long run baseline (not shown). One third of this loss is accounted for by Latin America (€1080 million) owing to net revenue losses on 'wheat', 'red meat' and 'processed sugar'. Elsewhere, agro-food trade balance losses in East and South East Asia (€327 million) and the Rest of South Asia (€264 million) are chiefly due to deteriorating red and white meat trade balance deteriorations. In Africa, almost all regions, witness agro-food net export revenue losses on worsening wheat, red meat and processed sugar trade. On a positive note, developing countries' agro-food trade balance deteriorations are partially mitigated by corresponding improvements on 'vegetables, fruits and nuts' (e.g., Rest of North Africa, West Asia and the Middle East), 'other crops' (e.g., Latin America, West Asia and the Middle East, Rest of Central and East Africa) and 'other food' (e.g., Rest of North Africa, West Asia and the Middle East, Rest of Central and East Africa) trade.

Table 27: Changes in trade balances (€ millions) in scenario C2 vs. Scenario C1

	EU27	Eurdvping	Cent Ame	Lat Ame	Carib bean	ESE Asia	Banglad esh	RoS Asia	WAsia MEast	Egypt	Ro NAfr	Nige ria	Sene gal	Ro WAfr	Ethio pia	Tanza nia	Ugan da	Cent EAfr	Sou Afr	RoDvWld
Paddy rice	-20	0	0	1	0	0	9	1	2	0	0	0	-2	-1	0	2	0	1	0	6
Wheat	3157	-417	2	-541	-7	-26	-2	-123	-340	-7	-676	-17	-63	-53	-16	-3	-2	-33	-19	-1385
Ograins	487	-129	0	-91	-1	-34	0	-8	3	1	22	0	-1	-2	0	-1	-1	-2	-10	-295
Vegfrunuts	-346	49	-3	23	3	-21	-1	-3	44	1	112	0	-2	-2	0	0	0	7	5	77
Oilseeds	-85	12	-1	6	1	10	0	-9	18	0	9	-1	0	-1	0	0	0	-2	0	17
Plants	-37	11	0	3	0	2	-1	-2	8	2	9	0	-1	-7	0	0	0	1	0	13
Ocrops	-561	2	9	125	5	23	0	18	59	1	37	3	-6	13	6	2	3	53	4	181
Catshp	-55	7	0	0	0	2	0	0	28	0	9	0	0	1	0	0	0	-3	0	9
Pigspoultry	-107	14	0	8	1	11	0	1	17	1	15	0	0	0	1	0	0	1	1	37
Wool	-8	2	0	1	0	-2	0	-2	2	0	2	0	0	0	0	0	0	0	-2	7
Red meat	1704	-556	-6	-392	-7	-38	0	-93	-15	-1	8	0	-3	-15	-2	0	0	-32	-2	-621
White meat	678	-27	-1	-69	-1	-101	0	-1	-21	0	17	0	-1	-6	0	0	0	-10	-5	-355
Vegoilsfats	-172	17	-2	60	0	-35	0	-1	4	1	81	0	-3	-1	0	0	0	4	-1	43
Dairy	185	-3	-1	-23	0	-13	0	-3	-24	-4	7	7	-1	-3	0	0	0	-3	-3	-133
Ricepro	9	0	0	-1	1	-44	-1	-20	7	-2	0	0	46	14	0	-1	0	3	0	-6
Sugarpro	410	-21	-19	-222	-13	-34	0	-15	-68	-2	2	2	-2	3	1	-2	0	1	-10	-78
Ofoodpro	-398	93	0	34	5	-19	0	-3	42	3	131	0	-15	-6	0	0	0	29	2	97
BevsTobac	42	2	-1	-3	-1	-6	0	-1	6	0	1	0	1	0	0	0	0	0	-2	-46
Manu	-3692	541	17	526	18	205	-2	170	77	2	44	-8	-39	-35	3	1	-1	-20	39	2077
Svces	-691	125	6	101	2	61	-1	44	78	5	96	-6	-31	-21	2	0	0	0	6	910
Total	**500**	**-278**	**0**	**-454**	**6**	**-60**	**2**	**-50**	**-73**	**0**	**-73**	**-20**	**-123**	**-122**	**-5**	**-2**	**-1**	**-5**	**3**	**555**
AgFood	**4882**	**-944**	**-23**	**-1080**	**-14**	**-327**	**4**	**-264**	**-228**	**-7**	**-214**	**-6**	**-53**	**-66**	**-10**	**-3**	**0**	**16**	**-42**	**-2432**

In terms of EU27 real income (results not shown), the EU27 loses €4,872 million (-0.04 per cent in per capita income terms), compared with the medium run losses of €4,302 million.[35] This is largely attributed to allocative efficiency falls ((€3,464 million) from greater volumes of subsidised exports resulting in expansions in (subsidised) EU27 agro-food activities. With the same Uruguay Round export subsidy limits compared with 2004, the long run CAP budget effects are very similar to the medium run estimates. In Table 28 are presented the real income changes in the developing regions. The pattern of the gains and losses is the same as in the medium run, although ToT and allocative efficiency changes are larger owing to greater volumes of import driven trade (i.e., higher trade elasticities). In per capita terms, the largest real income gains are in Senegal (2.03 per cent), the Rest of North Africa (0.51 per cent) and the Rest of West Africa (0.44 per cent),[36] whilst as noted in section 4.2, smaller per capita gains accrue to Egypt and Nigeria given their smaller dependency on net imports of wheat. In terms of developing country losers, large agro-food net exporters make EV losses of €344 million (Latin America), €114 million (East and South East Asia) and €82 million (Rest of South Asia).

Table 28: Non-EU real income effects (€ millions) in scenario C2 vs. scenario C1

	EV	ToT	Alloc	Endw	U
Eurdvping	447	291	295	-139	0.08
CentAme	-2	4	0	-5	0.00
LatAme	-344	-228	-29	-87	-0.04
Caribbean	28	23	9	-5	0.02
ESEAsia	-114	89	12	-215	-0.01
Bangladesh	6	8	1	-2	0.01
RoSAsia	-82	-32	15	-65	-0.01
WAsiaMEast	383	324	150	-91	0.05
Egypt	20	26	0	-6	0.04
RoNAfr	662	569	138	-45	0.51
Nigeria	28	30	3	-5	0.06
Senegal	105	92	13	0	2.03
RoWAfr	161	144	18	-1	0.44
Ethiopia	6	5	2	-1	0.10
Tanzania	1	2	0	-1	0.01
Uganda	4	4	0	0	0.07
CentEAfr	118	103	23	-8	0.12
SouAfr	-8	5	-2	-11	0.00
RoDevWld	-163	-145	760	-777	0.00

[35] For the UK, EV (per capita income) in the long run is -€574 million (-0.03 per cent) compared with experiment A's medium term estimates of -€487 million (-0.03 per cent).

[36] This compares with medium run (i.e., scenario A2) estimates of 1.55 per cent (Senegal), 0.37 per cent (Rest of North Africa) and 0.35 per cent (Rest of West Africa).

Scenario C3 (export refund elimination) vs. Scenario C1 (Baseline)

Table 6 shows that the largest export refund rates for the 2004 benchmark database are applied to 'processed sugar', 'red meat', 'dairy', 'processed rice' and 'other grains', although the largest extra-EU export volumes are in 'other food', 'dairy' and 'red meat'. As expected, the underlying factors motivating the results in scenario C3 (vs. scenario C1) are much the same as scenario A3 (vs. scenario A1), with the exception that the trade elasticities of substitution are assumed 30 per cent larger to reflect a longer time horizon. Consequently, the medium and long run trends in market and world prices are very similar, whilst sectoral output responsiveness is increased. In the EU27, there are relatively larger output falls (Table 29) in dairy (and therefore raw milk), 'red meat', 'other food', 'processed sugar (as well as raw sugar) and 'other grains'.

In the developing countries, there are consistently larger output gains (Table 29) owing to the loss of the EU's trade competitiveness in dairy, meat and 'other food' products. In all developing regions, dairy output rises consistently, with strong output rises in Sub-Saharan Africa (particularly Western Africa).[37] A similar trend occurs in 'red meat', 'white meat' and 'other food' sectors, although the strength of the developing country output rises is relatively lower since the relative loss in export competition to the EU is considerably smaller. In terms of subsidy rates, processed sugar is the most protected EU export sector. Thus, there are improvements in developing country processed sugar output although as the largest net exporter of sugar, the most important gain is accrues to Latin America (2.3 per cent). Indeed, with greater long run expansions in Latin American sugar production coupled with larger domestic increases in dairy production across all developing countries, the Rest of West Africa and all Eastern African regions witness marginally larger reductions in sugar production (compared with the medium term result in scenario A3).

[37] Calculated from a small base.

Table 29: Per centage changes in output in scenario C3 vs. scenario C1

	EU27	Eurdvping	Cent Ame	Lat Ame	Carib bean	ESE Asia	Bangladesh	RoS Asia	WAsia MEast	Egypt	Ro NAfr	Nige ria	Sene gal	Ro WAfr	Ethio pia	Tanzania	Ugan da	Cent EAfr	Sou Afr	RoDvWld
Land	0.0	0.4	0.0	0.3	0.2	0.2	0.0	0.0	0.5	0.3	0.2	0.3	0.9	0.2	-0.1	0.1	0.2	0.1	0.3	0.2
UnskLab	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SkLab	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Capital	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Natres	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Paddy rice	0.9	0.7	0.2	0.3	0.0	0.1	0.0	0.0	-0.1	0.1	-0.6	0.0	-3.4	-0.1	1.5	0.9	-0.1	-0.4	0.3	0.1
Wheat	0.1	-0.2	0.3	-0.1	-1.2	0.2	1.1	0.1	0.3	0.1	-0.4	0.0	-6.7	0.1	0.8	2.2	0.0	0.6	0.4	-0.2
Ograins	-1.7	1.2	0.1	0.4	0.3	0.4	0.2	0.1	0.8	0.1	0.4	0.0	-0.1	0.0	0.0	0.1	0.2	0.1	0.3	0.8
Vegfrunuts	0.5	0.2	0.0	-0.1	-0.2	0.1	0.1	0.0	-0.1	0.1	0.0	-0.1	-1.2	-0.1	0.1	0.8	0.0	0.1	0.0	-0.1
Oilseeds	1.0	-0.5	0.2	-0.3	-0.2	0.0	0.6	0.0	-0.2	0.0	-0.1	0.4	-0.6	-0.1	2.8	0.6	0.3	0.6	0.3	0.0
Raw Sugar	-1.0	1.0	0.5	1.2	-0.1	0.5	-4.8	0.0	2.7	0.3	1.7	0.1	-0.1	-0.6	-10.7	-5.1	-1.2	-3.6	0.1	0.4
Plant fibres	1.4	-0.4	0.1	-0.1	-0.3	0.0	0.4	0.0	0.2	-0.3	-0.2	0.4	-3.0	0.0	0.5	1.7	0.7	0.3	0.1	-0.1
Ocrops	0.0	-0.8	-0.4	-0.7	-0.5	-0.3	0.1	0.0	-0.2	-1.1	-0.7	-0.5	-3.7	-1.2	0.7	0.3	-0.2	-0.2	-0.1	-0.2
Catshp	-1.0	1.3	-0.4	0.6	1.2	0.5	0.0	0.1	0.0	0.1	0.3	0.0	-0.6	0.4	-0.2	-0.3	0.1	0.5	0.1	0.3
Pigspoulty	-0.5	0.2	-0.2	0.6	0.8	0.1	0.0	0.0	-0.1	-0.4	-0.1	0.0	-0.2	0.5	-0.1	-0.2	0.1	0.5	0.2	0.4
Milk	-5.6	1.2	1.9	2.7	4.3	4.7	0.0	0.1	3.5	0.1	9.1	2.6	26.3	27.3	0.1	-0.3	0.1	1.4	1.6	2.1
Wool	2.9	-0.2	-0.1	-0.2	-0.8	-0.1	1.1	0.0	-0.1	-0.8	0.0	-0.2	-2.1	-3.6	0.7	2.2	0.7	0.4	0.1	-0.2
Red meat	-2.7	2.1	-0.6	0.9	1.0	0.5	1.8	2.0	0.8	0.4	0.7	0.8	-0.3	2.3	2.5	0.4	0.2	1.7	0.1	0.4
White meat	-0.8	1.9	-0.3	1.0	0.5	0.3	4.5	0.9	0.1	0.3	0.1	1.1	0.4	3.9	0.7	0.0	0.4	1.2	0.4	0.9
Vegoilsfats	0.4	-0.3	0.1	-0.4	-0.1	0.0	0.4	0.1	0.0	-0.5	-0.9	0.0	-1.7	0.0	2.0	2.1	1.3	0.2	0.2	0.1
Dairy	-7.1	7.1	3.6	4.0	5.8	5.1	5.7	0.8	5.8	6.9	19.8	96.1	35.2	45.3	19.3	24.4	8.6	24.2	4.0	2.7
Ricepro	0.1	0.6	0.0	0.1	-0.3	0.1	0.0	0.1	0.6	0.1	1.9	0.4	-1.5	-0.8	-7.7	-1.0	-0.8	-0.6	0.2	0.0
Sugarpro	-1.7	1.5	1.0	2.3	-0.5	0.6	-5.2	0.0	2.7	0.8	2.0	2.4	4.6	-6.3	-13.1	-9.2	-6.2	-6.4	0.3	0.4
Ofoodpro	-0.7	0.8	0.3	0.4	0.2	0.4	0.6	0.2	0.7	0.5	0.6	1.6	0.9	1.4	0.6	0.4	1.8	0.4	0.4	0.1
BevsTobac	0.0	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-0.1	0.1	-0.1	0.0	0.2	-0.1	0.0	0.0	0.0	0.0
Manu	0.2	-0.2	-0.1	-0.1	-0.1	0.0	0.2	0.0	-0.1	-0.1	-0.1	0.0	-0.3	0.0	1.5	0.6	0.2	0.0	-0.1	0.0
Svces	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-0.1	0.0	0.0	-0.1	-0.1	0.6	-0.1	0.0	0.0	0.0	0.0
QGDP	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-0.1	0.0	0.0	0.0	0.0	0.0

Table 30: Changes in trade balances (€ millions) in scenario C3 vs. Scenario C1

	EU27	Eurdvping	Cent Ame	Lat Ame	Carib bean	ESE Asia	Bangladesh	RoS Asia	WAsia MEast	Egypt	Ro NAfr	Nige ria	Sene gal	Ro WAfr	Ethio pia	Tanzania	Ugan da	Cent EAfr	Sou Afr	RoDvWld
Paddy rice	4	0	0	0	-1	-1	-2	0	-2	0	0	0	-2	0	0	3	0	0	0	-1
Wheat	126	-25	-1	-16	-2	-10	0	5	-34	-5	-18	0	0	0	1	0	0	-1	-1	-20
Ograins	-62	22	0	6	-4	4	0	2	-18	-2	-2	0	0	0	0	1	0	1	1	55
Vegfrunuts	222	-43	1	-12	-7	7	1	5	-35	-1	-16	0	-1	-1	1	3	0	-1	-1	-99
Oilseeds	87	-5	0	-13	-4	-23	0	1	-25	-1	-1	1	0	0	2	1	0	2	0	-11
Plants	19	-5	0	-3	-1	-4	1	1	-9	-1	-1	0	-1	1	0	1	0	3	0	-2
Ocrops	417	-6	-10	-98	-7	-31	1	-15	-61	-2	-3	-2	0	-30	2	3	-1	-18	-4	-117
Catshp	41	1	0	1	1	-2	0	0	-11	0	0	0	0	0	0	0	0	3	0	-34
Pigspoultry	68	-8	0	-7	-2	-16	0	-1	-11	-1	-1	0	0	0	0	0	0	-1	-1	-20
Wool	7	-1	0	-1	0	-2	0	0	-1	0	0	0	0	0	0	0	0	0	1	-3
Red meat	-605	186	-15	186	-5	28	0	42	2	0	8	0	0	6	3	0	0	19	5	226
White meat	-731	44	-7	124	0	89	0	1	27	0	2	0	0	6	0	1	0	17	7	434
Vegoilsfats	136	-12	0	-68	-2	-8	0	3	-11	-4	-7	0	-1	-1	0	1	0	0	0	-23
Dairy	-4703	579	40	447	63	357	5	78	777	62	75	-2	6	24	1	0	1	35	58	2413
Ricepro	1	0	0	0	-1	6	0	13	-7	1	-1	0	-3	-4	0	-1	0	-6	0	8
Sugarpro	-458	14	12	404	-11	19	-58	-6	47	0	10	-2	0	-20	-37	-66	-6	-79	3	32
Ofoodpro	-575	51	11	112	0	300	6	46	65	5	15	-2	3	20	2	7	3	25	25	-35
BevsTobac	-17	-2	0	0	0	2	0	0	-2	0	0	0	0	0	0	0	0	1	1	19
Manu	4940	-611	-30	-585	-44	-543	38	-153	-440	-21	-39	12	-2	-10	16	33	1	3	-79	-2603
Svces	963	-157	-11	-123	12	-129	4	-48	-239	-33	-28	11	-2	-2	17	14	1	-2	-13	-874
Total	**-120**	**22**	**-10**	**354**	**-15**	**43**	**-4**	**-26**	**12**	**-3**	**-7**	**16**	**-3**	**-11**	**8**	**1**	**-1**	**1**	**2**	**-655**
AgFood	**-6023**	**790**	**31**	**1062**	**18**	**715**	**-47**	**175**	**691**	**52**	**60**	**-7**	**1**	**0**	**-26**	**-46**	**-3**	**-0**	**93**	**2822**

The long impacts on the trade balances are presented in Table 30, where the collective agro-food net export revenue gain for the developing countries is €3,561 million (not shown). In common with the medium run scenario (experiment A), the largest aggregate net export revenue gains to the sum of all developing countries are in dairy (€2,606 million), 'other food' processing (€693 million), 'red meat' (€465 million), 'white meat' (€312 million) and to a lesser extent, sugar trade (€225 million). In dairy trade, almost all developing countries make long run net export revenue gains. Significant dairy trade revenue improvements are estimated in West Asia and the Middle East (€777 million), Latin America (€447 million) and East and South East Asia (€357 million). In 'other food' and meat trade, both Latin America and East and South East Asia enjoy the largest trade balance improvements, whilst a large proportion of the EU's lost export competitiveness for sugar trade in the long run, is picked up by Latin America (also at the expense of other developing countries – e.g., Bangladesh, Ethiopia, Tanzania, Rest of Central and Eastern Africa).

In the long run, EU27 (UK) EV gains rise slightly in comparison with corresponding medium run estimates. With greater trade elasticities, allocative efficiency, ToT and endowment effects, long run EU27 (UK) real income is estimated to rise €6,361 million (€605 million), or equivalently, a 0.06 per cent (0.04 per cent) increase in per capita income. In this long run experiment, Stock purchase and export refund savings remain unchanged compared with the medium run, since the same stock purchase ceiling limits and export refund eliminations are encountered as in the medium run experiment (scenario A3).

Finally, in the developing regions, the real income (EV) estimates (Table 31) compared with corresponding medium run estimates, are the result of two opposing factors. On the one hand, net agro-food importers witness slightly stronger deteriorations in the ToT, whilst endowment accumulation effects are improved in the long run due to increases in land usage from elimination of the export subsidies. Overall, Ethiopia and Tanzania witness marginally larger losses compared with the medium run, whilst Latin America and the large Asian composite regions record very slight real income improvements.

Table 31: Non-EU Real income effects (€ millions) in scenario C3 vs. scenario C1

	EV	ToT	Alloc	Endw	U
Eurdvping	-280	-157	-291	168	-0.05
CentAme	9	-30	-2	41	0.01
LatAme	355	175	18	162	0.04
Caribbean	-66	-77	-30	41	-0.05
ESEAsia	407	-73	-13	493	0.02
Bangladesh	-17	-43	-8	34	-0.04
RoSAsia	151	26	-7	132	0.02
WAsiaMEast	-141	-232	-116	207	-0.02
Egypt	-6	-44	-3	42	-0.01
RoNAfr	-163	-145	-63	44	-0.13
Nigeria	-32	-72	-2	42	-0.06
Senegal	-11	-38	-4	31	-0.20
RoWAfr	-58	-79	-14	36	-0.16
Ethiopia	-29	-42	-5	18	-0.32
Tanzania	-38	-45	-3	10	-0.23
Uganda	-24	-32	0	9	-0.05
CentEAfr	-68	-87	-27	46	-0.07
SouAfr	11	-27	-16	54	0.01
RoDevWld	920	54	-599	1465	0.01

III.4 Effect of export subsidies on developing countries exports

Table 32 to 38 presents the effect of exports refunds under the different scenarios on the exports of the different regions.

Comparing **scenario A2 with A1 (experiment A baseline)**, we examined the medium term (2004-2013) maximum potential damage from full employment of the Uruguay export refund limits. Elsewhere, there is greater specialisation in other non-subsidised export commodities ('other crops') in sub-Saharan Africa resulting in small agro-food trade balance gains. Notwithstanding, aggregating over all developing regions net agro-food export revenues decline €1,997 million, with wheat accounting for €1,576 million. Developing country real income effects are largely determined by terms of trade (ToT) changes from 'wheat' (where the largest world price reductions have occurred). With the exception of Latin America and Rest of Asia, all developing countries are net importers of cheaper wheat commodities, resulting in ToT improvements.

A view of Table 33 shows that whilst the EU-27 exports grow significantly during with the full use of export subsidies, export revenues in all the country decline (particularly in the case of wheat, other grains and red meat).

Comparing scenario A3 with A1, we examine the medium run impacts of EU export refund eliminations. EU27 'red meat' exports are protected to a lesser extent than dairy, although EU exports of this commodity are reasonably large. In 'other

food', whilst export refund protection is much lower, EU export volumes from this large aggregate sector are considerably larger than those of dairy. Of the €2,714 million net export revenue gain to the developing regions, dairy, (€1,971 million), 'other food' (€537 million) and 'red meat' (€333 million) see the largest improvements. Decomposing by developing region, large net exporters such a Latin America (€757 million) and East and South East Asia (€587 million) witness the largest net agro-food export revenue gains, whilst with large gains on dairy trade, the West Asia and Middle East region makes net agro-food trade revenue gains of €527 million.

In experiment C, a set long run experiments corresponding to experiment A are run over the time period 2004-2020. The baseline shocks are broadly the same, although modulation rates are increased, pillar 1 funding is reduced, production quotas are eliminated and larger Armington trade elasticities are employed. As expected, the underlying trends are the same as the corresponding medium run scenarios. With a change in the trade elasticities for all regions, price changes are relatively unaffected compared with the medium run, whilst output changes (positive and negative) are more elastic, reflecting reductions in pillar 1 payments and greater supply responsiveness from the usage of larger trade elasticities in all regions in the longer run scenario to 2020.

Consequently, **when comparing scenario C2 with the long run baseline (C1)**, increased EU dumping of cereals, meat, sugar and rice has an even more detrimental impact on developing country net export trade revenues. In the medium run, it was estimated that the net trade balance deteriorates €1,997 million compared with the baseline, whilst in the long run, the corresponding deterioration in developing country net trade revenues is €3,273 million. The largest loser, Latin America, faces a rising trade balance deterioration of €1080 million in the long run (compared with €681 million in the medium term). The main losers are in Latin America and Asia.

Examining the long run impacts of EU export refund eliminations in scenario C3, the three commodity aggregates of 'dairy', 'other food' and 'red meat' commodities have most influence over the results (as in the corresponding medium run experiment). World and market price rises are similar to the medium run, whilst developing country output improvements from the loss of EU export competition are more notable, particularly in dairy sectors throughout sub-Saharan Africa. In terms of the trade balances, the collective long run net export revenue gain for the developing countries is €3,561 million (compared with €2,641 million in the medium run), with Latin America enjoying an improvement in its net trade revenues of €1,062 million (largely from dairy and sugar trade).

Examining the importance of the EU's export refunds within the Doha Package (2013-2020), this trade policy tool has an important impact in the dairy sector. Examining the contribution to output, market prices and trade balances for dairy in the developing regions, most of the (percentage) change is explained by the elimination of the EU's export refunds (vis-à-vis market access). In the 'other food' processing sector, export refund rates are much lower than dairy, although as noted above, 'other food' trade flows are considerably larger. The results show that for 'other food' processing, export refunds have a similar degree of importance as they

do for ‘dairy’, although with relatively small ‘other food’ tariff reduction shocks, this result is conditioned more by the higher tariff binding overhangs and sensitive product exceptions on ‘other food’ trade, rather than the importance of the ‘other food’ export refund per se. In other key sectors (i.e., red meat, processed rice and sugar), export refund elimination has a reduced influence within the overall Doha package, although this varies as a function of each developing region’s trade relations with the EU27. For example, in ‘processed sugar’ eliminating EU export refunds impacts much more importantly in Latin America, the Caribbean, West Asia and the Middle East and North Africa, whilst in ‘processed rice’, EU export policy is relatively more marked in the Asian composite regions and West Asia and the Middle East.

Table 32: Percentage changes in exports in scenario A1 vs. 2004 benchmark

	EU27	Eurdvping	Cent Ame	Lat Ame	Carib bean	ESE Asia	Bangladesh	RoS Asia	WAsia MEast	Egypt	Ro NAfr	Nige ria	Sene gal	Ro WAfr	Ethio pia	Tanza nia	Ugan da	Cent EAfr	Sou Afr	RoDvWld
Paddy rice	-19.9	-2.7	-2.2	-6.6	-1.1	1.4	5481.0	-25.2	-1.5	-24.3	-20.8	-1.8	1617.6	1108.3	5381.7	2766.3	2150.0	1205.4	1.1	-3.6
Wheat	3.3	-1.0	1.1	-2.5	0.4	0.0	-9.0	0.6	0.3	0.2	-1.2	-1.0	-8.5	-0.7	-13.2	-24.2	3.9	-1.1	0.6	0.1
Ograins	-8.6	-1.1	2.3	0.5	1.8	0.4	-2.5	0.6	1.0	4.0	2.9	2.9	-1.0	2.0	-1.5	-13.8	3.6	1.8	1.1	0.2
Vegfrunuts	10.5	-1.5	-1.7	-2.9	-2.5	-1.3	-6.6	-1.5	-2.5	-1.3	-4.3	-0.9	-7.4	-2.8	-7.4	-21.4	-1.4	-4.4	-2.7	-1.3
Oilseeds	-15.9	6.8	4.7	4.2	3.9	3.7	-3.7	4.4	7.1	12.4	6.8	2.3	-1.4	7.6	-5.0	-26.3	0.9	1.2	4.7	2.5
Plant fibres	17.1	-1.0	-0.2	-1.2	-0.4	-1.0	-3.7	-0.2	-1.4	0.0	-1.0	0.5	-6.0	-0.1	-8.4	-15.5	-1.8	-1.5	-0.1	-0.5
Ocrops	9.1	-1.6	-0.6	-2.6	-1.1	-1.2	-10.5	-2.3	-1.9	-0.2	-2.8	-1.9	-10.5	-1.5	-9.7	-31.2	-3.2	-3.4	-1.0	-1.8
Catshp	-37.2	16.1	3.3	3.8	22.4	8.2	9.3	5.1	14.1	17.1	17.2	16.1	6.8	2.4	1.7	-16.0	15.0	6.6	3.6	8.0
Pigspoultry	8.5	-2.4	-0.8	-1.9	-1.3	-1.5	-5.8	-2.3	-1.7	-1.1	-3.4	-2.6	-6.0	-2.1	-9.1	-18.2	-2.2	-2.4	-2.3	-1.5
Wool	15.6	-0.9	1.0	-1.6	0.4	-1.1	-2.6	-1.5	-0.8	0.4	-1.2	-0.5	-7.0	-1.0	-16.4	-25.6	-4.1	-3.7	-0.7	-0.5
Red meat	-29.3	9.0	2.6	6.9	8.9	5.8	2.1	4.0	4.3	10.2	8.2	7.9	5.4	10.8	-12.8	-16.2	9.5	3.1	12.2	3.3
White meat	4.3	-0.9	0.1	-1.8	-0.3	-0.8	0.3	-0.8	-1.5	-0.6	-0.2	-1.1	-13.4	-0.1	-17.4	-29.0	-3.5	-0.5	-0.4	0.7
Vegoilsfats	-20.4	4.6	3.0	3.5	3.8	2.1	-3.3	2.4	2.8	4.5	9.8	3.3	3.3	4.6	-7.1	-27.4	1.0	2.5	2.5	2.7
Dairy	25.2	-3.2	-4.3	-9.4	-9.6	-7.2	-12.3	-8.5	-9.5	-9.6	-9.5	-17.4	-22.3	-15.4	-25.2	-32.5	-5.5	-10.2	-8.3	-8.1
Ricepro	-8.8	0.2	-3.3	-0.9	-4.8	0.3	930.8	1.1	0.2	-5.0	-6.4	-3.0	161.9	439.6	8448.6	1236.4	125.4	893.6	0.3	-0.5
Sugarpro	-5.6	-2.0	-2.5	-2.2	-4.7	0.8	4166.9	10.2	-0.1	-1.5	-13.1	1.2	-21.3	27.5	1526.1	2713.5	1060.0	25.1	-3.9	-7.1
Ofoodpro	1.1	-0.1	0.1	-0.3	0.1	-0.1	-2.3	-0.2	-0.3	0.7	0.0	-0.2	-1.8	-0.3	-8.4	-15.0	-1.5	-0.4	0.0	-0.2
BevsTobac	0.5	1.6	0.1	-0.3	-0.2	-0.2	-1.6	-0.2	-0.2	-0.3	-0.2	-0.2	-1.1	-0.3	-6.2	-9.8	-0.8	-0.3	-0.1	-0.1
Manu	0.1	-0.1	0.2	-0.2	0.1	0.0	-2.4	0.0	0.0	0.2	0.0	0.0	-1.9	-0.1	-15.2	-18.4	-0.7	-0.2	0.1	0.0
Svces	0.0	0.1	0.2	0.0	0.1	0.1	-1.7	0.1	0.2	0.1	0.1	0.0	-1.7	0.0	-8.8	-11.1	-1.2	-0.2	0.1	0.1

Table 33: Percentage changes in exports in scenario A2 vs. scenario A1

	EU27	Eurdvping	Cent Ame	Lat Ame	Carib bean	ESE Asia	Bangladesh	RoS Asia	WAsia MEast	Egypt	Ro NAfr	Nige ria	Sene gal	Ro WAfr	Ethio pia	Tanza nia	Ugan da	Cent EAfr	Sou Afr	RoDvWld
Paddy rice	7.0	4.2	-1.2	0.6	0.4	0.4	6.0	1.8	2.8	0.1	38.3	-2.1	-8.1	1.5	7.9	3.0	3.2	6.4	0.0	1.1
Wheat	351.7	-19.1	-7.5	-23.2	-17.0	-17.8	-7.6	-17.5	-26.9	-8.2	-60.1	-21.5	-99.9	-74.4	-35.1	-37.3	-53.0	-19.1	-31.5	-11.9
Ograins	278.8	-10.6	-2.4	-2.5	-2.7	-3.3	-3.3	-2.5	-5.6	-3.7	6.6	-4.4	-7.5	-5.5	-2.5	-3.5	-1.8	-1.9	-2.7	-3.3
Vegfrunuts	-0.9	0.9	-0.1	0.6	0.8	-0.3	-0.4	-0.2	1.0	0.2	1.8	-0.8	-3.8	-0.3	0.9	-0.4	-0.3	1.1	0.4	0.3
Oilseeds	20.4	3.4	-0.8	0.4	-0.4	-1.0	-2.3	-1.0	1.2	0.4	22.1	-2.8	-8.0	-1.3	0.2	-2.1	-1.9	-0.5	-0.8	0.3
Plant fibres	-5.8	1.1	-0.3	0.6	1.0	-0.3	-0.4	-0.3	0.8	0.3	17.8	-1.0	-5.4	-0.9	1.6	-0.6	-0.4	0.4	-0.3	0.4
Ocrops	-6.5	3.0	0.7	2.3	1.9	0.5	0.5	1.1	3.7	1.7	27.1	0.8	-6.5	0.3	3.0	1.0	0.9	2.3	1.4	2.2
Catshp	5.1	5.6	-0.5	0.1	3.3	0.5	1.5	0.1	1.7	2.1	22.0	-0.3	-3.5	-3.0	0.6	0.4	1.0	-1.1	-0.4	0.2
Pigspoultry	-3.7	2.6	0.2	1.4	1.2	0.3	0.0	0.5	2.6	1.4	12.8	0.5	1.9	0.6	2.0	0.0	-0.1	0.9	0.7	0.6
Wool	-6.7	3.6	-2.0	1.2	1.0	-1.1	-2.5	-1.7	4.1	0.1	25.3	-1.5	-9.4	2.9	1.5	-2.8	0.1	0.7	-1.7	0.7
Red meat	254.1	-26.3	-3.3	-7.4	-4.2	-11.1	-13.8	-15.6	-8.5	-6.3	-2.8	-10.9	3.7	-11.9	-13.9	-5.0	-10.9	-11.7	-2.7	-4.3
White meat	15.4	-1.6	-1.1	-0.8	-1.5	-2.8	-3.6	-2.5	-0.1	-2.5	31.4	-4.3	-3.1	-3.5	-2.3	-2.0	-4.3	-0.6	-1.9	-2.8
Vegoilsfats	-3.8	1.3	-0.4	0.7	0.2	-0.2	-0.1	-0.1	0.2	0.9	10.7	-0.2	-8.0	-0.7	2.6	-1.0	-0.9	1.0	-0.6	0.5
Dairy	8.1	-1.1	-1.0	-4.4	-0.5	-2.7	-2.5	-3.0	-2.8	-4.5	-2.7	-17.7	-7.4	-14.4	-1.9	-2.1	-1.8	-1.1	-3.2	-2.3
Ricepro	47.7	-0.8	-0.5	-0.6	-0.2	-1.1	-1.1	-1.1	-0.5	-0.6	0.3	-1.7	65.6	11.1	28.0	-1.3	1.7	1.2	-0.2	-0.3
Sugarpro	60.5	-3.5	-3.8	-6.6	-2.2	-2.5	-0.4	-1.1	-8.0	-4.9	-9.3	-2.9	-7.8	-1.3	0.7	0.6	0.1	0.7	-2.3	-2.0
Ofoodpro	-1.2	1.5	0.0	0.4	0.5	0.0	0.2	0.0	0.7	0.8	8.8	-0.1	-4.1	-0.2	0.6	-0.1	-0.2	1.8	0.1	0.2
BevsTobac	0.7	0.1	-0.2	-0.1	-0.1	-0.2	-0.6	-0.2	0.2	-0.3	1.0	-0.1	4.8	0.3	-0.1	-0.3	-0.4	0.0	-0.1	-0.2
Manu	-0.3	0.2	0.1	0.3	0.1	0.0	0.0	0.2	0.0	0.0	0.2	0.0	-5.8	-0.5	0.3	-0.2	-0.1	-0.1	0.1	0.1
Svces	-0.2	0.2	0.1	0.2	0.0	0.0	-0.1	0.1	0.1	0.0	0.7	-0.1	-5.1	-0.5	0.2	-0.1	-0.1	0.0	0.0	0.1

Table 34: Percentage changes in exports in scenario A3 vs. scenario A1

	EU27	Eurdvping	Cent Ame	Lat Ame	Carib bean	ESE Asia	Bangladesh	RoS Asia	WAsia MEast	Egypt	Ro NAfr	Nige ria	Sene gal	Ro WAfr	Ethio pia	Tanza nia	Ugan da	Cent EAfr	Sou Afr	RoDvWld
Paddy rice	8.0	-1.3	0.5	0.0	-1.5	-0.3	-1.4	0.3	-1.8	0.0	-0.9	3.0	-7.1	-1.1	0.6	3.0	0.4	-0.2	0.2	0.0
Wheat	1.1	-1.5	0.7	-0.5	-1.5	0.5	2.0	1.1	-2.0	-1.6	-1.4	-0.6	-7.1	0.3	2.7	2.5	1.4	-0.1	0.5	-0.2
Ograins	-22.0	2.3	0.5	0.2	-0.2	0.7	1.2	0.8	1.0	0.5	0.3	1.3	-2.2	0.8	1.6	1.8	0.3	0.5	0.4	0.9
Vegfrunuts	0.6	0.0	0.0	-0.3	-0.9	0.1	1.0	0.4	-0.6	0.0	-1.9	1.1	-2.5	-0.2	1.6	1.5	0.6	0.2	0.0	-0.8
Oilseeds	2.4	-1.1	0.1	-0.3	-0.5	-0.1	1.6	0.4	-1.2	-0.7	-0.6	1.9	-4.6	-0.4	2.3	3.0	1.3	1.2	0.2	0.0
Plant fibres	2.8	-0.4	0.0	-0.5	-1.3	0.0	0.4	0.2	-0.7	-0.4	-0.5	0.8	-2.9	-0.1	1.7	1.3	0.4	0.3	0.1	-0.1
Ocrops	3.0	-1.3	-0.4	-1.3	-1.9	-0.4	0.6	-0.3	-2.6	-1.1	-2.1	0.0	-5.5	-0.8	1.3	1.8	-0.2	-0.1	-0.7	-0.8
Catshp	-2.4	2.9	-2.2	0.4	4.1	2.5	6.5	2.1	-0.1	3.9	4.2	5.2	0.3	1.6	3.8	6.6	5.2	1.3	0.5	-2.4
Pigspoultry	-1.8	-1.1	-0.2	-1.0	-1.4	-0.4	0.5	-0.4	-1.5	-1.1	-1.4	-0.4	-2.7	-0.9	0.4	1.1	0.3	-0.1	-0.5	-0.2
Wool	3.5	-1.2	0.1	-1.1	-2.5	-0.2	1.1	0.6	-2.0	-0.7	0.1	-0.8	-14.2	-7.4	4.6	2.8	1.3	1.3	0.5	-0.3
Red meat	-80.1	14.9	-6.0	3.4	0.9	5.2	5.9	6.9	3.7	2.4	1.5	5.1	-4.2	6.1	9.5	5.1	5.0	5.9	1.2	1.7
White meat	-20.0	3.8	-16.4	2.3	2.0	3.4	3.2	3.8	1.3	2.6	2.1	5.3	0.5	3.7	7.2	5.7	5.8	3.0	2.8	3.3
Vegoilsfats	2.0	-0.7	0.1	-0.7	-0.6	0.0	0.5	0.2	-0.3	-0.7	-0.9	0.1	-2.6	0.0	2.0	2.9	0.6	0.5	0.2	-0.1
Dairy	-66.1	29.2	19.8	45.7	29.4	31.9	31.7	35.9	39.5	43.0	43.1	113.2	82.3	96.3	39.4	28.8	19.2	28.4	34.2	11.3
Ricepro	-51.5	1.1	-1.9	0.1	-2.5	0.1	-4.6	0.7	1.0	0.4	2.7	-0.5	-4.5	-5.8	-6.7	-3.6	-3.3	-5.1	0.1	0.1
Sugarpro	-47.0	1.6	2.3	5.2	-2.8	1.6	-18.7	-9.6	6.5	1.8	7.1	1.9	7.7	-12.8	-16.8	-8.9	-15.6	-11.7	0.2	-1.2
Ofoodpro	-5.9	0.9	0.4	0.8	0.3	1.0	1.1	1.3	1.3	0.9	0.3	1.2	0.6	1.2	3.1	2.4	1.3	0.9	1.0	-0.9
BevsTobac	-0.4	0.0	0.1	0.0	0.0	0.1	0.4	0.1	0.0	0.1	-0.3	0.1	0.1	0.1	1.2	0.9	0.2	0.2	0.0	0.1
Manu	0.4	-0.2	-0.2	-0.3	-0.1	-0.1	0.3	-0.1	-0.1	-0.2	0.0	0.0	-0.4	-0.1	2.9	1.7	0.1	0.0	-0.1	-0.1
Svces	0.2	-0.3	-0.2	-0.3	0.1	-0.1	0.2	-0.1	-0.2	-0.3	-0.2	0.1	-0.4	-0.1	1.6	0.9	0.2	0.0	-0.1	-0.1

Table 35: Percentage changes in exports in scenario B (Doha Package) vs. 2013 benchmark

	EU27	Eurdvping	Cent Ame	Lat Ame	Carib bean	ESE Asia	Bangladesh	RoS Asia	WAsia MEast	Egypt	Ro NAfr	Nige ria	Sene gal	Ro WAfr	Ethio pia	Tanza nia	Ugan da	Cent EAfr	Sou Afr	RoDvWld
Paddy rice	-18.1	-8.1	-7.4	-4.6	-30.9	82.1	126.1	-25.2	-6.6	0.6	14.3	0.3	-19.0	-31.7	-47.3	-58.8	-40.3	-58.5	2.1	-3.7
Wheat	-5.3	-1.7	-4.0	-2.0	-2.5	-3.3	-12.5	0.6	1.8	-4.6	-5.3	4.2	-12.8	0.1	-4.7	-19.1	3.7	-33.6	-0.5	2.0
Ograins	1.4	1.7	-1.0	-1.1	-1.5	0.0	-6.6	1.5	-1.7	-0.4	-1.1	0.6	-3.4	0.8	-1.5	-8.4	5.7	-7.8	4.3	2.7
Vegfrunuts	-1.9	0.4	5.3	1.3	-1.8	1.7	-2.9	0.2	-1.1	-0.5	-4.8	1.5	-0.4	0.2	3.0	-8.1	1.2	-12.1	-1.5	-0.4
Oilseeds	-15.1	-4.5	-22.7	-6.0	-15.9	-5.6	-16.9	-2.8	-4.4	-3.2	-16.5	-15.7	-17.4	-7.9	-15.8	-37.8	-18.3	703.1	-5.0	-13.8
Plant fibres	2.8	0.2	-0.5	-0.9	-0.2	-0.1	-3.8	0.9	-0.1	0.0	-0.6	2.2	-2.4	1.4	-6.6	-11.2	0.5	-10.7	0.5	1.1
Ocrops	6.4	-0.8	-2.6	-0.5	0.1	0.2	-3.1	1.3	2.1	-1.3	-2.4	0.0	-4.5	-1.1	-9.1	5.6	-0.3	-16.6	1.9	4.2
Catshp	2.2	1.2	-3.4	0.4	2.6	1.2	-9.2	1.9	-0.4	2.0	1.7	4.2	-1.3	1.7	-4.3	-19.2	2.5	-8.4	2.4	-2.0
Pigspoultry	2.0	-1.2	-1.0	-1.2	-0.6	-0.8	-7.8	-0.4	-0.4	-0.7	-1.4	0.3	-2.7	-0.7	-5.9	-12.6	-0.4	-8.0	-0.6	0.5
Wool	5.6	-3.3	-5.1	-2.2	-4.7	3.9	5.6	0.5	-2.0	-0.9	-0.3	0.2	-14.6	-1.2	-17.8	-19.7	-1.8	-38.4	-1.0	3.7
Red meat	-78.8	10.1	-11.5	29.7	-13.1	0.4	7.3	33.4	2.6	-14.7	-16.0	4.0	-6.4	8.3	-11.3	6.0	6.2	-15.1	24.9	0.7
White meat	-4.7	-0.2	-21.5	0.9	-3.8	-3.6	-12.9	0.6	-2.9	-3.2	-9.5	-0.4	4.1	21.4	-12.8	7.8	5.4	-15.6	-0.3	19.0
Vegoilsfats	-1.0	-2.3	-5.8	-2.7	-3.6	-2.1	-6.5	-2.7	-1.2	-2.7	33.9	-1.9	-2.7	-1.2	-8.7	-14.8	3.1	-20.4	2.6	9.6
Dairy	-65.6	54.2	19.6	49.7	27.7	31.3	77.1	34.9	42.7	43.3	44.0	116.8	80.4	104.8	152.5	27.8	62.6	27.1	34.8	15.6
Ricepro	-56.3	2.2	-11.2	2.0	-5.7	4.4	19.5	2.4	4.1	7.1	11.7	8.5	-16.2	-27.6	527.3	-42.4	-14.0	1.5	1.4	0.4
Sugarpro	-66.7	3.1	15.5	10.1	5.6	26.9	195.3	-17.8	17.8	11.0	18.2	6.6	28.7	101.3	83.0	73.0	9.3	-9.6	13.7	-3.2
Ofoodpro	-4.7	0.4	-0.4	0.2	0.4	0.9	-3.6	1.4	2.8	1.5	-0.1	0.8	0.0	0.9	-5.1	-8.8	0.6	-3.4	1.0	-0.1
BevsTobac	0.2	4.0	-0.2	1.9	-0.2	1.2	68.7	0.4	-0.3	-0.6	-0.7	-10.1	0.4	0.6	-6.3	7.4	2.5	-2.2	0.4	0.8
Manu	0.8	-0.3	-0.3	-0.5	0.1	0.2	-3.2	0.3	0.0	0.0	0.4	0.4	2.2	0.1	-11.8	-14.2	-0.2	-1.1	-0.2	0.0
Svces	0.5	-0.1	-0.7	-0.3	0.1	-0.2	-4.0	-0.2	-0.2	-0.2	-0.2	0.4	-1.4	-0.5	-9.2	-9.4	-0.3	-1.6	-0.1	0.0

Table 36: Contribution of export refund eliminations within the Doha package

	EU27	Eurdvping	Cent Ame	Lat Ame	Carib bean	ESE Asia	Bangladesh	RoS Asia	WAsia MEast	Egypt	Ro NAfr	Nige ria	Sene gal	Ro WAfr	Ethio pia	Tanza nia	Ugan da	Cent EAfr	Sou Afr	RoDvWld
Wheat	-5.3	-1.7	-4.0	-2.0	-2.5	-3.3	-12.5	0.6	1.8	-4.6	-5.3	4.2	-12.8	0.1	-4.7	-19.1	3.7	-33.6	-0.5	2.0
Wheat	***-4.7***	***-1.4***	***0.8***	***0.4***	***-1.4***	***0.9***	***1.6***	***1.3***	***-1.9***	***-1.6***	***-1.6***	***-0.8***	***-7.2***	***0.3***	***0.3***	***1.0***	***1.2***	***-0.5***	***0.8***	***-0.3***
Ograins	1.4	1.7	-1.0	-1.1	-1.5	0.0	-6.6	1.5	-1.7	-0.4	-1.1	0.6	-3.4	0.8	-1.5	-8.4	5.7	-7.8	4.3	2.7
Ograins	***-7.6***	***2.3***	***0.5***	***0.3***	***0.0***	***0.9***	***0.8***	***0.9***	***1.1***	***0.4***	***0.3***	***1.5***	***-2.2***	***0.9***	***0.8***	***0.7***	***0.5***	***0.4***	***0.6***	***0.9***
Vegfrunuts	-1.9	0.4	5.3	1.3	-1.8	1.7	-2.9	0.2	-1.1	-0.5	-4.8	1.5	-0.4	0.2	3.0	-8.1	1.2	-12.1	-1.5	-0.4
Vegfrunuts	***-0.8***	***-0.2***	***-0.1***	***0.4***	***-1.0***	***0.1***	***0.5***	***0.2***	***-0.8***	***-0.3***	***-0.8***	***1.0***	***-2.8***	***-0.3***	***0.3***	***0.3***	***0.3***	***-0.3***	***-0.1***	***-0.2***
Oilseeds	-15.1	-4.5	-22.7	-6.0	-15.9	-5.6	-16.9	-2.8	-4.4	-3.2	-16.5	-15.7	-17.4	-7.9	-15.8	-37.8	-18.3	703.1	-5.0	-13.8
Oilseeds	***-12.0***	***-1.1***	***0.1***	***-0.2***	***-0.4***	***0.1***	***1.2***	***0.5***	***-1.2***	***-0.7***	***-0.7***	***2.3***	***-4.4***	***-0.2***	***1.1***	***1.1***	***1.2***	***1.7***	***0.5***	***-0.1***
Red meat	-78.8	10.1	-11.5	29.7	-13.1	0.4	7.3	33.4	2.6	-14.7	-16.0	4.0	-6.4	8.3	-11.3	6.0	6.2	-15.1	24.9	0.7
Red meat	***-82.4***	***14.9***	***1.2***	***3.2***	***1.0***	***5.4***	***6.3***	***7.1***	***3.7***	***2.4***	***1.4***	***5.3***	***4.4***	***6.1***	***6.2***	***2.2***	***5.2***	***5.4***	***1.1***	***1.9***
White meat	-4.7	-0.2	-21.5	0.9	-3.8	-3.6	-12.9	0.6	-2.9	-3.2	-9.5	-0.4	4.1	21.4	-12.8	7.8	5.4	-15.6	-0.3	19.0
White meat	***-21.6***	***3.6***	***1.0***	***2.1***	***1.8***	***3.4***	***4.6***	***3.6***	***1.1***	***2.4***	***1.6***	***5.2***	***0.2***	***3.9***	***3.2***	***2.2***	***5.4***	***2.2***	***2.6***	***4.3***
Dairy	-65.6	54.2	19.6	49.7	27.7	31.3	77.1	34.9	42.7	43.3	44.0	116.8	80.4	104.8	152.5	27.8	62.6	27.1	34.8	15.6
Dairy	***-74.3***	***28.9***	***14.4***	***44.5***	***22.0***	***28.8***	***33.7***	***32.9***	***39.4***	***42.7***	***43.6***	***121.1***	***86.7***	***103.4***	***41.5***	***23.9***	***19.8***	***24.6***	***34.6***	***29.4***
Ricepro	-56.3	2.2	-11.2	2.0	-5.7	4.4	19.5	2.4	4.1	7.1	11.7	8.5	-16.2	-27.6	527.3	-42.4	-14.0	1.5	1.4	0.4
Ricepro	***-59.4***	***2.0***	***0.2***	***0.5***	***-0.2***	***0.6***	***0.5***	***1.1***	***1.3***	***1.0***	***0.4***	***1.6***	***-0.9***	***-0.9***	***-1.4***	***0.3***	***-0.2***	***-0.2***	***0.2***	***0.3***
Sugarpro	-66.7	3.1	15.5	10.1	5.6	26.9	195.3	-17.8	17.8	11.0	18.2	6.6	28.7	101.3	83.0	73.0	9.3	-9.6	13.7	-3.2
Sugarpro	***-65.0***	***5.5***	***4.5***	***8.4***	***2.5***	***3.3***	***-1.2***	***1.5***	***11.3***	***6.8***	***1.3***	***3.3***	***2.9***	***0.5***	***-1.0***	***-0.2***	***-0.4***	***-0.1***	***2.8***	***2.5***
Ofoodpro	-4.7	0.4	-0.4	0.2	0.4	0.9	-3.6	1.4	2.8	1.5	-0.1	0.8	0.0	0.9	-5.1	-8.8	0.6	-3.4	1.0	-0.1
Ofoodpro	***-6.1***	***0.6***	***0.5***	***0.4***	***-0.1***	***0.7***	***0.5***	***0.9***	***0.7***	***0.3***	***-0.4***	***0.2***	***0.1***	***0.5***	***1.2***	***0.5***	***0.5***	***0.1***	***0.7***	***0.6***
BevsTobac	0.2	4.0	-0.2	1.9	-0.2	1.2	68.7	0.4	-0.3	-0.6	-0.7	-10.1	0.4	0.6	-6.3	7.4	2.5	-2.2	0.4	0.8
BevsTobac	***-0.3***	***-0.1***	***0.1***	***0.0***	***0.0***	***0.1***	***0.4***	***0.1***	***0.0***	***0.1***	***-0.2***	***0.1***	***0.0***	***0.1***	***0.1***	***0.1***	***0.2***	***0.1***	***0.0***	***0.1***

Table 37: Percentage changes in exports in scenario C2 vs. scenario C1

	EU27	Eurdvping	Cent Ame	Lat Ame	Carib bean	ESE Asia	Bangladesh	RoS Asia	WAsia MEast	Egypt	Ro NAfr	Nige ria	Sene gal	Ro WAfr	Ethio pia	Tanza nia	Ugan da	Cent EAfr	Sou Afr	RoDvWld
Paddy rice	-19.9	7.6	-2.3	0.8	0.5	0.8	11.7	2.2	4.9	0.1	69.4	-2.7	-10.1	2.0	13.4	5.2	5.1	8.0	-0.1	1.4
Wheat	383.3	-24.4	-12.6	-39.3	-25.0	-26.7	-9.3	-28.4	-49.4	-13.7	-72.5	-30.4	-99.9	-84.3	-46.6	-50.7	-67.8	-27.8	-46.8	-20.1
Ograins	351.4	-18.8	-4.7	-3.7	-4.0	-6.1	-5.3	-3.0	-7.5	-5.1	8.0	-5.6	-11.6	-6.2	-3.9	-4.5	-2.7	-3.4	-4.6	-6.0
Vegfrunuts	-2.1	2.0	0.0	0.9	1.0	-0.4	-0.6	-0.2	1.4	0.3	2.4	-1.2	-6.9	-0.5	1.5	-0.5	-0.4	1.9	0.5	0.3
Oilseeds	29.6	6.2	-1.0	0.7	-0.6	-1.7	-4.0	-1.0	2.1	0.7	31.0	-2.8	-9.5	-1.8	0.3	-2.9	-1.9	-1.0	-0.9	0.4
Plant fibres	-9.3	1.6	-0.3	1.1	1.7	-0.5	-0.6	-0.5	1.2	0.4	25.2	-1.8	-6.0	-1.2	2.2	-0.6	-0.5	0.6	-0.5	0.6
Ocrops	-13.4	3.7	1.2	3.1	2.4	1.1	1.1	2.3	6.8	2.9	41.0	1.1	-8.1	0.6	5.5	1.3	1.1	4.0	2.7	3.2
Catshp	9.8	7.0	-0.9	0.2	3.4	0.8	2.5	0.2	1.8	2.3	36.7	-0.3	-5.5	-3.7	0.9	0.9	1.3	-2.1	-0.6	0.4
Pigspoultry	-6.2	3.9	0.2	1.6	2.0	0.6	0.0	0.8	3.3	2.2	19.0	0.8	3.5	1.0	3.2	0.1	-0.2	1.4	1.2	1.0
Wool	-11.2	4.6	-2.7	1.4	2.0	-1.1	-4.7	-2.5	6.4	0.2	41.6	-1.6	-9.7	5.4	2.4	-5.3	0.0	0.8	-3.2	1.4
Red meat	294.5	-41.6	-6.1	-8.4	-5.7	-20.9	-22.9	-16.0	-13.9	-6.9	4.5	-17.2	5.8	-17.8	-27.1	-9.2	-11.4	-18.5	-3.2	-5.0
White meat	23.3	-1.9	-2.1	-1.0	-2.2	-4.0	-6.8	-3.0	-0.1	-2.9	33.6	-6.6	-3.6	-3.7	-3.9	-2.3	-6.6	-0.8	-3.4	-2.9
Vegoilsfats	-7.6	2.3	-0.7	1.2	0.3	-0.2	-0.2	-0.1	0.3	1.3	11.4	-0.3	-13.5	-1.3	3.5	-1.5	-1.0	1.3	-1.1	0.7
Dairy	6.2	-0.7	-0.9	-4.1	-0.2	-2.4	-2.2	-2.8	-2.2	-3.9	-3.3	-22.6	-7.5	-14.9	-2.1	-2.1	-2.0	-1.4	-3.0	-2.1
Ricepro	59.5	-0.9	-1.0	-0.8	-0.3	-1.9	-1.5	-1.5	-0.6	-0.9	0.5	-2.8	71.6	14.5	50.2	-2.3	1.7	1.3	-0.4	-0.5
Sugarpro	68.1	-6.7	-4.7	-10.3	-4.7	-4.2	1.0	-2.3	-8.7	-5.8	-10.7	-3.9	-13.2	-2.5	1.1	-0.4	-0.1	0.5	-3.3	-2.6
Ofoodpro	-1.5	1.5	0.0	0.7	0.8	0.0	0.3	0.0	1.2	1.2	11.0	-0.2	-5.3	-0.3	0.9	0.0	-0.2	2.8	0.2	0.3
BevsTobac	1.4	0.2	-0.4	-0.1	-0.1	-0.4	-1.0	-0.3	0.3	-0.4	1.3	-0.1	5.7	0.6	-0.2	-0.3	-0.6	0.0	-0.4	-0.3
Manu	-0.4	0.4	0.1	0.4	0.0	0.0	0.0	0.3	0.0	0.0	0.3	0.0	-9.5	-0.7	0.2	0.0	-0.2	-0.1	0.0	0.1
Svces	-0.3	0.3	0.2	0.2	0.0	0.0	-0.2	0.1	0.2	0.0	0.8	-0.3	-8.9	-0.9	0.3	0.0	-0.3	0.0	0.0	0.2

Table 38: Percentage changes in exports in scenario C3 vs. scenario C1

	EU27	Eurdvping	Cent Ame	Lat Ame	Carib bean	ESE Asia	Bangladesh	RoS Asia	WAsia MEast	Egypt	Ro NAfr	Nige ria	Sene gal	Ro WAfr	Ethio pia	Tanza nia	Ugan da	Cent EAfr	Sou Afr	RoDvWld
Paddy rice	15.1	-2.6	0.9	0.1	-2.7	-0.4	-2.6	0.3	-2.2	0.0	-1.3	6.0	-14.4	-1.4	0.8	4.5	1.2	0.1	0.7	0.0
Wheat	5.9	-2.1	0.8	-0.7	-3.2	0.5	3.8	1.9	-2.7	-3.7	-2.5	-0.8	-11.9	0.5	3.5	3.3	1.8	-0.2	0.6	-0.3
Ograins	-29.3	4.2	0.7	0.3	-0.4	1.0	1.1	0.9	1.4	0.7	0.4	2.7	-4.5	1.4	2.8	2.0	0.4	0.9	0.7	1.6
Vegfrunuts	1.6	-0.2	0.0	-0.5	-1.0	0.1	1.3	0.4	-1.0	-0.2	-2.9	1.8	-4.3	-0.2	2.7	2.9	1.1	0.3	-0.1	-1.0
Oilseeds	5.3	-1.6	0.1	-0.3	-0.7	-0.2	1.9	0.6	-1.9	-0.8	-1.4	2.8	-8.4	-0.3	3.4	3.5	2.4	1.6	0.2	0.0
Plant fibres	5.3	-0.8	0.1	-0.6	-2.7	0.0	0.6	0.3	-1.3	-0.7	-0.8	1.2	-4.7	0.0	3.8	2.1	1.2	0.6	0.2	-0.1
Ocrops	7.6	-1.9	-1.3	-2.4	-3.5	-1.0	0.4	-1.1	-6.0	-2.8	-3.8	-0.7	-6.6	-1.2	1.0	1.7	-0.7	-1.1	-1.3	-1.8
Catshp	-4.7	4.5	-2.6	0.7	7.8	3.1	10.6	4.2	-0.2	5.7	5.2	7.7	0.2	3.0	5.6	9.7	5.7	2.5	0.7	-2.7
Pigspoultry	-2.2	-2.3	-0.2	-1.5	-1.5	-0.8	0.9	-0.4	-1.6	-1.2	-2.5	-0.4	-5.3	-1.4	0.9	2.0	0.6	0.0	-0.7	-0.4
Wool	5.8	-2.4	0.4	-1.9	-3.4	-0.6	1.1	0.8	-2.8	-1.4	0.0	-1.0	-19.5	-13.9	8.1	5.1	1.9	3.0	0.9	-0.4
Red meat	-87.1	15.6	-8.5	3.6	1.3	6.0	7.6	12.3	5.2	4.2	1.7	9.1	-6.1	11.9	18.1	7.1	7.4	7.5	2.1	2.7
White meat	-23.5	4.8	-29.2	4.3	2.1	4.7	5.4	6.8	1.8	3.3	3.0	5.6	0.2	4.6	7.3	10.2	11.6	3.4	4.3	4.2
Vegoilsfats	4.2	-0.9	0.2	-1.1	-0.7	0.0	0.7	0.2	-0.4	-1.2	-1.5	0.2	-3.0	0.1	2.5	4.1	1.2	0.8	0.3	-0.2
Dairy	-87.9	42.1	36.5	66.7	52.7	50.1	47.9	52.7	49.5	55.1	57.1	201.4	130.3	119.7	55.9	46.5	26.2	52.3	52.9	20.4
Ricepro	-71.1	1.3	-2.1	0.2	-3.5	0.2	-6.0	1.1	1.2	0.5	4.6	-0.6	-8.1	-10.1	-7.2	-4.2	-5.4	-9.0	0.4	0.1
Sugarpro	-59.0	2.6	2.7	7.4	-4.9	3.0	-31.7	-16.9	12.1	2.1	9.6	3.8	11.5	-17.5	-21.5	-16.6	-28.5	-15.1	0.2	-1.7
Ofoodpro	-8.2	1.1	0.6	1.2	0.6	1.6	2.0	1.5	2.3	1.6	0.4	2.4	0.7	2.5	4.8	2.6	2.1	1.5	1.5	-1.6
BevsTobac	-0.4	0.0	0.2	0.0	0.0	0.1	0.5	0.2	0.0	0.2	-0.3	0.2	0.1	0.2	1.6	1.2	0.4	0.3	0.1	0.2
Manu	0.7	-0.3	-0.4	-0.6	-0.1	0.0	0.4	-0.2	-0.2	-0.2	0.0	0.2	-0.7	0.0	4.7	2.3	0.2	0.0	-0.1	-0.1
Svces	0.3	-0.6	-0.2	-0.3	0.2	-0.2	0.2	-0.2	-0.3	-0.5	-0.4	0.2	-0.5	0.0	2.4	1.1	0.4	0.0	-0.1	-0.1

III.5 Summary of major results and final remarks

For the simulations, three time periods are chosen: the first, 2004-2013 (medium term), captures the decoupling of agricultural support and the Health Check reforms up to the end of the current agricultural financial framework period.

The second period, 2013-2020, projects forward to end of the following agricultural financial framework period. It is assumed that no potential Doha reforms will take place prior to 2013, whilst the period of implementation for Doha will not exceed the 2020 time horizon.

In the third period, 2004-2020 (long-run), it is assumed that increased modulation rates are imposed with concurrent reductions in pillar 1 support, whilst EU27 production quotas are eliminated. The 'background' shocks are the same as the medium run baseline (A1) except that modulation rates are increased, pillar 1 funding is reduced, production quotas are eliminated and larger Armington trade elasticities are employed.[38]

Experiment A: Medium term scenarios (2004-2013)

Comparison of scenario A2 (maximum damage) with A1 (baseline).

1. Whilst the largest subsidy expenditure accrues to the dairy sector, the two cereals sectors have the most flexibility for increases in export refunds, followed by 'red meat'. Consequently, EU27 output rises and world price falls are more notable (particularly wheat) in these three sectors.
2. For the developing countries, wheat production is hard hit, particularly on the African continent (in Senegal, wheat production is practically eliminated altogether), Latin America and the Caribbean. A similar story, albeit more moderated, occurs for red and white meat markets in the developing countries, particularly key producers such as Latin America and Asia. In 'other grains', the principal loser from export subsidy driven EU output gains, is the Rest of the Developing World.
3. Elsewhere, there is greater specialisation in other non-subsidised export commodities ('other crops') in sub-Saharan Africa resulting in small agro-food trade balance gains. Notwithstanding, aggregating over all developing regions net agro-food export revenues decline €1,997 million, with wheat accounting for €1,576 million.
4. Developing country real income effects are largely determined by terms of trade (ToT) changes from 'wheat' (where the largest world price reductions have occurred). With the exception of Latin America and Rest of Asia, all developing countries are net importers of cheaper wheat commodities, resulting in ToT improvements. Similarly, allocative efficiency increases due to increases import quantities of tariffed imports. In general, the economy wide impacts from full usage of EU export refunds are small. The largest real income gains, in per capita terms, are recorded by net food importers such as Senegal (1.55 per cent), the Rest of North Africa (0.37 per cent) and the Rest of West Africa (0.35 per

[38] It is assumed that the trade elasticities are 30 per cent larger than in the medium run.

cent). As net food exporters, Latin America and the Asian regional composites witness small real income losses.

Comparison of scenario A3 (EU export refund eliminations) with A1 (baseline)

1. As a large exporter of heavily subsidised dairy products, world price rises are most notable in this sector. EU27 'red meat' exports are protected to a lesser extent than dairy, although EU exports of this commodity are reasonably large. In 'other food', whilst export refund protection is much lower, EU export volumes from this large aggregate sector are considerably larger than those of dairy.
2. In general, output changes are consistently positive across all developing regions for these three commodity groupings.
3. The real significance in this scenario is illustrated within the net trade balance results. Of the €2,714 million net export revenue gain to the developing regions, dairy, (€1,971 million), 'other food' (€537 million) and 'red meat' (€333 million) see the largest improvements. Decomposing by developing region, large net exporters such a Latin America (€757 million) and East and South East Asia (€587 million) witness the largest net agro-food export revenue gains, whilst with large gains on dairy trade, the West Asia and Middle East region makes net agro-food trade revenue gains of €527 million.
4. The impact of export refund elimination on economy wide per capita real incomes is marginal, whilst perhaps surprisingly, a majority of the developing countries lose from export refund elimination. As in scenario A2, real income results are driven by ToT effects and allocative efficiency. Despite improving net trade balances, the majority of the developing regions remain net importers of one or more of dairy, 'other food' and 'red meat' commodities. Thus, compared with the baseline, the ToT is negative for the majority of the developing countries given increases in world prices. As a large net exporter of most commodities, Latin America witnesses a notable ToT gain. With reductions in (more expensive) agro-food trade imports, allocative efficiency also falls.

Experiment C - Long terms scenarios (2004-2020)

Comparison scenario C2 (maximum damage) with C1 (long run baseline)

1. Increased EU dumping of cereals, meat, sugar and rice has an even more detrimental impact on developing country net export trade revenues. In the medium run, it was estimated that the net trade balance deteriorates €1,997 million compared with the baseline, whilst in the long run, the corresponding deterioration in developing country net trade revenues is €3,273 million. The largest loser, Latin America, faces a rising trade balance deterioration of €1080 million in the long run (compared with €681 million in the medium term).
2. In real income terms, the pattern of gainers and losers is similar to the medium run, although swings in ToT and allocative efficiency effects are more marked owing to greater volumes of import driven trade (higher trade elasticities). As net food importers, a number of developing countries make small real income gains from cheaper food imports from the EU. The most notable per capita income gains occur in Senegal (2.03 per cent), the Rest of North Africa (0.51 per cent) and the Rest of West Africa (0.44 per cent). The main losers are in Latin America and Asia.

Comparison of scenario C3 (EU export refund eliminations) with C1 (long term baseline)

1. Similar to the medium run experiment A, the three commodity aggregates of 'dairy', 'other food' and 'red meat' commodities have most influence over the results. World and market price rises are similar to the medium run, whilst developing country output improvements from the loss of EU export competition are more notable, particularly in dairy sectors throughout sub-Saharan Africa.
2. In terms of the trade balances, the collective long run net export revenue gain for the developing countries is €3,561 million (compared with €2,641 million in the medium run), with Latin America enjoying an improvement in its net trade revenues of €1,062 million (largely from dairy and sugar trade).
3. Real income results are very similar to the corresponding medium run simulation although Ethiopia and Tanzania witness marginally larger losses, whilst Latin America and the large Asian composite regions record very slight real income improvements.

Experiment B - Examining the importance of EU's export refund elimination within the Doha Package (2013-2020)

1. This trade policy tool has an important impact in the dairy sector. Examining the contribution to output, market prices and trade balances for dairy in the developing regions, most of the (per centage) change is explained by the elimination of the EU's export refunds (vis-à-vis market access).
2. In the 'other food' processing sector, export refund rates are much lower than dairy, although as noted above, 'other food' trade flows are considerably larger. The results show that for 'other food' processing, export refunds have a similar degree of importance as they do for 'dairy', although with relatively small 'other food' tariff reduction shocks, this result is conditioned more by the higher tariff binding overhangs and sensitive product exceptions on 'other food' trade, rather than the importance of the 'other food' export refund *per se*.
3. In other key sectors (i.e., red meat, processed rice and sugar), export refund elimination has a reduced influence within the overall Doha package, although this varies as a function of each developing region's trade relations with the EU27. For example, in 'processed sugar' eliminating EU export refunds impacts much more importantly in Latin America, the Caribbean, West Asia and the Middle East and North Africa, whilst in 'processed rice', EU export policy is relatively more marked in the Asian composite regions and West Asia and the Middle East.
4. Turning to the real income results, with the exception of Ethiopia and Tanzania, the overall importance of the Doha round (and therefore EU export refund eliminations) is negligible in per capita real income terms. In a number of developing countries (Central America, East and South East Asia, Bangladesh, Rest of South Asia, Ethiopia, Tanzania, Rest of East and Central Africa, Southern Africa), market access (vis-à-vis export competition) dominates the EV gains. Indeed, as the largest gainers in per capita income terms, market access dominates the equivalent variation gains in both Ethiopia and Tanzania. On the other hand, in remaining developing country regions, EV gains are more

attributed to EU export refund elimination.[39] For example, as one of the largest net losers from the Doha package in per capita terms, 141 per cent of the Rest of West Africa's losses are due to EU export refund elimination.

To close, some reflections are in order. It should be remembered that the model framework is comparative static, such that the model jumps from one point of simultaneous equilibria in the benchmark year (2004), to some equilibrium point in the future. Consequently, it is not possible to show the time path for different variables over successive periods. In the context of our experiments, it is anticipated that policy shocks (i.e., eliminations or ceiling limits) on export refunds maintained over successive discrete time periods, would have had an even more adverse impact on developing countries in the long run than the results presented here.

A possible response to this would have been to employ the recursively dynamic GTAP model variant, replete with adaptive expectations and capital accumulation effects. Unfortunately, given the size of the aggregation and the complexity of our modelling modifications (particularly the use of complementarities to model UR export refund limits and production quotas), simulation times would have been extended considerably. For this reason a 'pseudo-dynamic' capital accumulation mechanism has been introduced into the model. Thus, whilst the longer run results in experiment C (scenarios C1, C2 and C3) should be treated with some caution, they are at very least, illustrative of the potential direction and magnitude from a sustained usage of export refunds.

Finally, a comment is warranted on the magnitude of the results. In general, the economy-wide impacts of these results are minor. In the case of those simulations where we only shock export refunds, this is to be expected given that in the benchmark year export refunds are small and the shocks relate to specific agricultural sectors (e.g., dairy, meat) which constitute a relatively minor contribution toward GDP (even in many of the developing country regions). In addition, the aggregation of some of the sectors (i.e., vegetables fruits and nuts, other grains, other food) is very broad, such that the percentage changes in outputs mask the potentially large changes that may occur at the HS6 level of aggregation.

In addition, Doha experiment B (scenario B) also produces very modest welfare impacts, which is largely due to the shocks and modelling. In the former case, sensitive product exemptions on a proportion of tariff lines water-down the potential market access benefits from Doha. In the latter case, our variant of GTAP incorporates 'relatively' greater factor rigidity between agricultural and non agricultural sectors which dampens the resource reallocation impacts from market liberalisation. In addition, in common with other CGE Doha studies (e.g., Anderson et al., (2005), Hertel and Keeney (2005)) the developing countries receive the lion's share of the gains from Doha. Similarly, as reported here, some developing country losses are also reported in Anderson et al. (2005). From a simple partial equilibrium standpoint, the analysis suggests that the loss to consumers in net importing countries from higher world prices (owing to export subsidy elimination) is not

[39] This in part may reflect stronger EU trade ties as well as the limited degree of market access owing to high tariff binding overhangs and sensitive product exceptions.

compensated by producer surplus gains. This, however, only constitutes part of the story. Our Doha scenarios do not capture services trade liberalisation effects either (i.e., there are no non tariff barrier removals modelled on services or merchandise trade), whilst other issues relating to technology transfer and/or "modern trade theory" scale effects are also overlooked; both of which could have important welfare effects within developed and developing countries alike.

IV. Case studies

The purpose of this section is to study in detail the effect of export refunds on selected case studies (combination of commodities and countries). These were chosen based on the results obtained from the GTAP model. The commodities chosen were two: wheat and dairy, and seven countries were selected: Bangladesh, Egypt, Ethiopia, Nigeria, Senegal, Tanzania and Uganda, giving a total of fourteen case studies.

The aim of the case studies was to provide details about how the markets for the selected commodities operate in each one of the selected countries. This was a necessary step because, as any multi-country model, the GTAP model cannot reflect all the characteristics within each considered country or region, and the structure of the markets are an important element to determine what the effect of changes in the prices of imported good can have on the domestic markets. For instance, if a government controls the imports of a domestically produced commodity, and in addition, sets the domestic price received by the domestic producers and paid by consumers, then the effect of export refunds will not felt on the dometic economy and changes in the international prices will only affect the government expenditure.

Before starting with the case studies, it would be useful to consider the results from the GTAP simulation (Table 39) as regards the change in exports from the EU 27 and non EU 27 to the selected case study countries for the two commodities. It is clear from the Table that elimination of export refunds will in most of the cases originate a recomposition of the imports to the countries. In other terms, non-EU imports will in good measure offset EU imports.

The comparison of scenario A2 (maximum damage) with A1 (baseline) shows that imports of wheat from the EU 27 grow substantially, especially in Ethiopia and Senegal. This increase affects imports from elsewhere, which show an important decrease. In the case of dairy, the effect of the export subsidies also increases the imports from the EU-27 but the effect on the imports from elsewhere is minimal.

The results of the comparison of scenario A3 (elimination of export refunds) with A1, indicate very small changes in the case of wheat; however, in the case of dairy, the results show that export subsidies are important for keeping the level of exports. This is reflected on the decrease in the imports from the EU 27 and the increase in the imports from elsewhere.

Table 39: Change in exports to selected countries from EU 27 and non-EU 27 countries according to GTAP model and under different scenarios (percentages)

	Wheat		Dairy	
	EU 27	non-EU 27	EU 27	non-EU 27
Experiment A: 2004-2013				
Scenario A2 vs Scenario A1				
Bangladesh	**6.19**	**-1.80**	**1.18**	**-0.52**
Egypt	**4.65**	**-1.97**	**6.16**	**-2.97**
Ethiopia	**60.59**	**-30.14**	**5.27**	**-0.92**
Nigeria	**9.77**	**-8.29**	**7.24**	**-5.72**
Senegal	**63.66**	**-12.64**	**7.67**	**-3.99**
Tanzania	**1.65**	**-1.17**	**1.36**	**-1.04**
Uganda	**3.80**	**-2.99**	**5.09**	**-2.29**
Scenario A3 vs Scenario A1				
Bangladesh	**0.07**	**-0.11**	**-18.03**	**12.14**
Egypt	**0.04**	**0.22**	**-36.93**	**20.78**
Ethiopia	**0.47**	**-1.39**	**-46.14**	**11.29**
Nigeria	**0.09**	**-0.17**	**-29.73**	**29.49**
Senegal	**0.70**	**-0.56**	**-37.80**	**29.59**
Tanzania	**0.02**	**-0.08**	**-21.73**	**20.46**
Uganda	**0.04**	**-0.13**	**-35.78**	**22.89**
Experiment B: The Doha Package 2013-2020				
Scenario B (entire Doha Package)				
Bangladesh	**-0.40**	**5.90**	**-17.84**	**16.13**
Egypt	**-0.02**	**1.05**	**-38.88**	**20.11**
Ethiopia	**1.15**	**4.84**	**-41.64**	**12.67**
Nigeria	**0.01**	**-0.05**	**-32.15**	**29.92**
Senegal	**-0.09**	**-0.52**	**-39.98**	**28.57**
Tanzania	**0.02**	**2.69**	**-21.13**	**23.33**
Uganda	**0.01**	**-0.29**	**-37.00**	**22.00**
Scenario (export refund elimination only)				
Bangladesh	**0.07**	**-0.07**	**-19.09**	**12.97**
Egypt	**0.06**	**0.16**	**-44.73**	**25.71**
Ethiopia	**0.59**	**-0.83**	**-55.15**	**13.94**
Nigeria	**0.10**	**-0.19**	**-36.12**	**33.63**
Senegal	**0.94**	**-0.50**	**-41.58**	**29.58**
Tanzania	**0.01**	**0.00**	**-25.80**	**23.97**
Uganda	**0.04**	**-0.06**	**-42.31**	**24.89**
Experiment C: 2004-2020				
Scenario C2 vs Scenario C1				
Bangladesh	**7.62**	**-2.23**	**1.50**	**-0.69**
Egypt	**6.74**	**-2.35**	**9.11**	**-4.10**
Ethiopia	**73.31**	**-35.57**	**6.80**	**-1.22**
Nigeria	**12.60**	**-10.44**	**9.85**	**-8.52**
Senegal	**75.75**	**-15.54**	**10.04**	**-5.98**
Tanzania	**2.23**	**-1.50**	**1.94**	**-1.22**
Uganda	**4.87**	**-4.06**	**6.47**	**-2.88**
Scenario C3 vs Scenario C1				
Bangladesh	**0.09**	**-0.15**	**-23.62**	**16.27**
Egypt	**0.05**	**0.28**	**-49.86**	**29.93**
Ethiopia	**0.61**	**-2.23**	**-59.52**	**15.47**
Nigeria	**0.11**	**-0.23**	**-39.55**	**38.04**
Senegal	**0.99**	**-0.69**	**-51.41**	**40.24**
Tanzania	**0.02**	**-0.12**	**-28.25**	**27.62**
Uganda	**0.05**	**-0.20**	**-49.01**	**32.50**

The Doha Package considers two scenarios for the period 2013-2020: first (full package), the package is agreed and amongst several measures, export subsidies are phased out. In the second scenario only export subsidies are eliminated (i.e., export subsidies within the Doha package). The results between these two scenarios

are very similar, particularly in the case of dairy. In the case of wheat changes are very small.

As regards the long term scenarios in experiment C, they show little qualitative difference with respect to the medium term scenarios (experiment A) and the observed difference between medium term and long term results is most probably due to the length of the horizon.

Some questions that emerge from the GTAP results are related to the reaction of the domestic economies with related to changes in the price of imports. Particularly if those changes may trigger investments within the country. An example of this could be the case where the elimination of exports refunds increases import prices and makes the domestic processors to increase their use of the domestic commodity.

The structure of the case studies is as follows: first, the main characteristics of the marketing systems for each commodity within each country are presented. Of particular interest whether imports compete with domestic producers. Second, the effects of changes in export subsidies are explored using economic models that aim to capture the main stylised facts from each case study. It is important to note that, where the marketing conditions for a commodity in several countries are similar, they 'share' the same models. Finally, conclusions are presented.

IV.1 Market characteristics in selected case studies

IV.1.1 Dairy sector in Bangladesh

In Bangladesh dairying is nearly always a part of mixed farming systems and has a direct impact on income generation, poverty alleviation and availability of animal protein. Individuals can expand their labour force by raising cows and processing primary products into marketable secondary products, such as butter, cheese and yoghurt and by selling manure as fuel and fertiliser. Income from the sale of these primary and secondary products and by-products can be used to meet/provide farm household expenses, savings, investments and insurance, and its value tends to increase over time (Saadullah, 2001).

Compared with the number of dairy cows in the country the estimated total milk production is low due to low milk yields and feed constraints. The major constraints to dairy cattle production are the shortages of quality feeds and fodder, the breeds of cattle, poor management practices, limited access to veterinary care and disorganised marketing systems. In addition, there is a lack of institutional support, research and training, which would be beneficial to the farming environment. Research on the profitability of rearing dairy cattle in Bangladesh is scanty. Alam (1995) reported that the production cost of milk (per litre) from local and crossbred cows was much higher than the selling price.

In terms of consumption, per capita need is assumed to be 250 ml of milk/day but domestic availability of milk is only 32.6 ml/day (Saadullah, 2001). Furthermore, the demand for dairy products has been increasing rapidly in the country driven by growth in income, population and urbanisation. However, domestic milk production has failed to keep pace.

One of the important reasons for losses incurred by farmers in dairy farming was the low price of milk. Availability of large quantities of low price imported powder milk in the local market has contributed significantly to the low domestic milk price. As a result, local producers and milk marketing organisations cannot compete with the milk importers. High import dependence has also contributed to shape the domestic processing and marketing industry in a way that does not serve the interests of smallholder producers because such industries do not normally create the infrastructure necessary to collect milk from a large number of small producers scattered throughout the country (Jabbar, 2005).

Marketing of livestock and livestock products is handled mainly by the private sector. Other than marketing by a few dairy-processing enterprises, marketing of milk and milk products from traditional small-scale dairy enterprises is carried out in an unorganised manner. In Bangladesh there are two different systems of milk marketing: (i) village systems—where milk from farmers is marketed to consumers by middlemen; and (ii) organised collection of milk from farmers for processing and marketing by private enterprises.

A chain of intermediate traders (Farias and Paikers) is involved in transferring milk and milk products from farmers (producers) to the consumers. This increases the cost for marketing and decreases the profit margin (Saadullah, 2001). Imperfections in the village marketing systems, which result in high prices for input and low prices for output, may discourage the development of dairy in Bangladesh.

Organised collection, processing and marketing of milk is accomplished by the Bangladesh Milk Producers' Co-operative Union Ltd, Savar Dairy Farm (government owned), BRAC, Aftab Dairy and a few private dairy enterprises in the country (Saadullah, 2001). The Bangladesh Milk Producers' Co-operative Union Ltd is the oldest dairy venture in the country and it provides feeds, vaccines and AI services for 40 thousand participants (Saadullah, 2001). BRAC, Aftab Dairy and other small-scale milk processing enterprises have also become involved in collection of milk from contact farmers in urban and peri-urban areas for processing, packaging and marketing in peri-urban and urban areas (Saadullah, 2001). Private milk processing enterprises carry out their activities in limited areas and so are unable to provide services to dispersed dairy farms all over the country.

IV.1.2 Wheat sector in Bangladesh

Marketing of wheat in Bangladesh is characterised by a system where, domestic production, food aid and imports represent the supply.

According to FAS-USDA (2009), wheat acreage in Bangladesh has steadily declining due to the absence of suitable high yielding varieties and competition from rice and other remunerative crops such as corn, potatoes, and other vegetables. Nevertheless, wheat cultivation still continues to remain a preferred option under non-irrigated, low farm input-use conditions.

In recent years, the government has scaled down wheat distribution through the Public Food Distribution System, negatively impacting wheat consumption by the

rural population, which constitutes more than 70 per cent of the country's population. However, wheat consumption by the medium and high income population in urban areas is steadily growing due to changes in food habits and a growing hotels and restaurants industry (HRI) sector. In rural areas wheat flour 'Atta' is sold in loose bulk form whereas in urban areas flour millers are marketing packaged refined wheat flour under their brand names (FAS-USDA, 2009).

For the marketing year 2009/10 wheat imports were forecasted at 2.0 million tonnes, including 500,000 tonnes by the public sector, with the rest by the private sector and some under food aid (FAS-USDA, 2009). Bangladesh is predominantly a buyer of inexpensive lower quality wheat. India is the preferred origin due to the low commodity price and low freight cost. Following India's export ban in early 2007, Bangladeshi importers began depending largely on East European and Central Asian countries for low quality wheat. Australia and Canada are traditional sources of higher quality wheat. Wheat imports are currently duty free but attract a 2.5 per cent advance income tax. There are no quantitative restrictions on wheat imports.

IV.1.3 Dairy sector in Egypt

The dairy market in Egypt is an unregulated market, where milk is supplied from both domestic sources and imports.

Total Egyptian fluid milk production is estimated around 3.2 million MT. Dairy processors have been relying increasingly on local production for their inputs rather than on imports due to the government's three-year safeguard duty on milk powder imports which expired in 2003. The discontinuation of the safeguard duty on milk powder imports did not result in more milk powder imports afterwards. Furthermore, the fluctuation of the Egyptian pound has made imports more expensive relative to local products.

According to FAS (2003) Egyptians are not major milk drinkers. Per capita consumption of fluid milk in Egypt is estimated at 5.5 Kg, which is significantly lower than in other developing countries. In Egypt, most fluid milk is consumed in the form of cheese and other dairy products, feta cheese being the preferred one. Egypt's total production of Feta cheese is estimated at about 320,000 MT, 70 per cent of which is still produced by small-unlicensed factories (about 5,000 factories) from unpasteurised milk, despite an existing standard that prohibits the production of feta cheese from unpasteurised milk. The remaining 30 per cent is produced by modern factories.

Egypt does not have a significant milk powder production. Imported non-fat dry milk (NFDM) and whey powder are used mainly for the production of feta cheese, yogurt and ice cream. There are also small quantities of NFDM and whey utilised in the production of chocolate and pastries. Limited quantities of full fat dry milk are also imported and sold for direct human consumption. The private sector imports virtually all of Egypt's dry milk requirements. Poland, New Zealand and Sweden are the main suppliers of milk powder to Egypt. However, the NFDM import market is very price sensitive. The current import tariffs on NFDM are for milk and cream not containing added sugar, packages over 20 kilogram: 5 per cent plus 5 per cent of CIF value.

IV.1.4 Wheat sector in Egypt

The wheat market in Egypt, in comparison with the dairy market, is highly regulated, with support prices and public procurement applied to the domestic production and with subsidies to low cost bread.

Wheat is planted in October/November and harvested in April/May. The total wheat area for the marketing year 2007/2008 was 1.29 million HA. Total production for the marketing year 2007/2008 was 8.3 million MT (FAS-USDA, 2009).

The government has a system of procurement prices for the wheat crop that protects domestic producers. During the marketing year 2007/08, the procurement price was about LE 2,533 per MT ($460 per MT), which was much higher that the landed price of imports (as a comparison, in February 2008 landed price for Russian wheat was about $172 per MT whilst the procurement price was $432 per MT).

The Egyptian milling industry has more than adequate capacity to cover the country's need for 72 per cent extraction flour. While total consumption of 72 per cent extracted flour is estimated at 1.8 million tonnes or 2.5 million tonnes of wheat, total milling capacity is estimated at 2.7 million tonnes of 72 per cent flour, or 3.76 million tonnes of wheat.

Wheat is a strategic commodity in Egypt and the government retains the control of most of the milling industry (particularly for the subsidised baladi bread). The public sector milling industry consists of 126 mills (mostly small or medium size) and has a total capacity of approximately 7 million tonnes per year. There are seven public sector companies that operate these mills, and all are affiliated with one holding company (Food Industries Holding Company) (FAS-USDA, 2009). Of the 126 public sector mills, 109 mills are currently used for the production of 82 per cent flour and 7 mills are used to produce 72 per cent flour with total capacity of 6,230 tonnes per day (1.86 million tonnes annually).

Egyptian per capita consumption of wheat is approximately 195 kg per year. The total subsidy on baladi bread in the marketing year 2007/08 was estimated at LE 9 billion. During the same period, private sector companies purchased 2 MMT of imported wheat to produce 72 per cent extraction flour used in the production of high quality flat bread and European type bread, pastries and pasta.

Imports of wheat fluctuate around 8.3 million MT, with the Government importing nearly 6 MMT and the rest imported by the private sector. Customs duties for wheat are one per cent plus two per cent for other port charges. The main sources of imports are Russia, Ukraine and the US.

IV.1.5 Dairy sector in Ethiopia

The dairy sector in Ethiopia is characterised by a segmented market, with most of the local production being marketed under informal channels.

Ethiopia has the largest livestock population in Africa and the contribution of livestock and livestock products to the agricultural economy is significant (12-16 per

cent of national GDP). Smallholder farmers represent about 85 per cent of the population and are responsible for 98 per cent of the milk production. Productivity is relatively low, quality feeds are difficult to obtain and support services are inadequate (SNV, 2008).

There is an immediate and growing shortage of dairy products in all major cities of Ethiopia and the trends of economic prospects for dairy industry performance and development are rather good both at smallholder level and at a more commercial level. During the last decades the import dependency of Ethiopia for milk and dairy products has increased. To bridge the gap between supply and demand, dairy imports increased significantly partly due to increased food aid (WFP) milk powder imports. Furthermore, it is estimated that imported milk powder accounted for 23 per cent of Addis Ababa market (SNV, 2008).

Rapidly increasing population size with a growing urban population has resulted in a growing demand for dairy products. Dairy development can lead to income generating activities in the rural areas increasing farm incomes and employment opportunities. However, the available high potential land is intensively cultivated and fodder supply is insufficient leading to often serious environmental consequences as inappropriate husbandry measures are applied in non-suitable areas (SNV, 2008).

Besides low milk production levels, milk collection, processing and marketing are not developed. Urban, peri-urban and rural milk production systems are dominated by informal marketing systems. The formal market also appears to be expanding with the private sector (Sebeta Agro Industry, several other private milk-processing plants) entering the dairy processing industry in Addis Ababa (SNV, 2008).

Besides, smallholder dairy production, also commercial specialised dairy farms around the urban centres start to develop with their own processing facilities and marketing schemes. There have been several initiatives to stimulate milk production, collection, processing and marketing at village level (amongst others, Land O' Lakes, Finnish Bilateral Aid, ILRI, various NGO's often related to local development) (SNV, 2008).

The dairy farmers have three market-outlets for the milk left out from consumption. These are to sell to neighbours in the informal marketing channel, dealers or milk groups/ cooperatives (in some cases retailers).The availability of these market-outlets through the establishment of milk groups and cooperatives as well as the milk-collection centres have given dairy farmers a broader choice of marketing their milk instead of depending on local traders and neighbourhood buyers.

The informal market involves direct delivery of fresh milk by producers to consumer in the immediate neighbourhood or sale to itinerant traders or individuals in nearby towns. In the informal market, milk may pass from producers to consumers directly or through two or more market agents. The informal system is characterised by no licensing requirement to operate, low cost of operations, high producer price compared to formal market and no regulation of operations. In Ethiopia, 95 per cent of the national milk is marketed through informal channels and is unprocessed.

The traditional processing and marketing of dairy products, especially traditional soured butter, dominate the Ethiopian dairy sector. Only 5 per cent of the milk produced is marketed as liquid milk due to underdeveloped infrastructures in rural areas. Hence, the informal (traditional) market has remained dominant in Ethiopia. Production is non-market oriented and most of the milk produced is retained for home consumption.

Formal milk markets are particularly limited to peri-urban areas and Addis Ababa. The formal market appears to be expanding during the last decade with the private sector entering the dairy processing industry in Addis Ababa, Dire Dawa and Dessie towns. The Lame Dairy collects milk for processing from different sources, including large commercial farms and milk collection centres that receive milk from smallholder producers. The enterprise operates 25 milk collection centres located around Addis Ababa, of which 13 located around Selale, 5 around Holetta and 7 around Debre Brehane (SNV, 2008).

Ten private milk processing plants have entered the milk marketing and processing, increasing the amount of milk channelled via the formal markets. A study by Teferra Abreha (2006) indicates that in Addis Ababa milk shed there are about 66,770 cattle of which 46.5 per cent were estimated to be crossbred dairy cows. The peri-urban milk system includes smallholder and commercial dairy farms found in the proximity of Addis Ababa, secondary and other regional towns. In some case intensive production units based on stall feeding of crossbred and high grade cows is practiced. This sector controls most of the country's improved dairy stock. The urban and peri-urban dairy farmers produce 2 per cent of the total milk production of the country. The total estimated milk supplied to Addis Ababa annually is 65 million litres.

Sebeta Agro Industry established the first UHT6 dairy processing facility in the country. The new production lines will produce 500ml carton pouches (Tetra Fino Aseptic) and 250ml portion packages (Tetra Brik Aseptic). The DDE, now LAME, produces pasteurised milk in 500ml plastic pouches. The introduction of UHT dairy products on the market is a great step forward to offset the seasonality in milk production and consumption (SNV, 2008).

Share of milk sold in the formal market is insignificant in Ethiopia, less than 2 per cent, compared to 15 per cent share in Kenya and 5 per cent in Uganda (SNV, 2008). This figure tell us that in Ethiopia there is no market for dairy, exception in few major urban areas. Absent markets affect the overall dairy production and consumption in the country.

IV.1.6 Wheat sector in Ethiopia

In Ethiopia, cereals, pulses and oil seeds covered about 78, 14 and 8 per cent of the total grain cultivated area of about 11 million hectares in 2004/05 production season (Gebremedhin, 2008). In the same production season, cereals, pulses and oil seeds contributed about 85, 11 and 4 per cent of total grain production of 12.5 million tonnes, respectively.

From the total cereal production, maize, wheat, teff, sorghum and barley are the most important cereal crops. However, the relative importance of the crops changes slightly when compared in terms of their contribution to total cereal area covered due to differences in productivity (Gebremedhin, 2008).

Upon grain trade liberalisation, the reform resulted in reduced marketing margins, better market integration and entry by private traders. After liberalisation, about 95 per cent of cereal marketed by smallholders in Ethiopia was handled by private traders. However, margins and transaction costs remained high, and weak private sector capacity, inadequate market institutions and poor infrastructure remained fundamental problems in the marketing system. As a result, spatial and temporal arbitrage opportunities remained underutilised and many markets remained segmented (Gebremedhin, 2008).

Despite the increased entry of private traders in grain trade, limited access to finance and storage facilities, lack of processing linkages and limited market information remain fundamental problems confronted by traders. Cereal marketing costs accounted for about 40 to 60 per cent of consumer prices of cereal commodities in 1995/96 (Gebremedhin, 2008). Imperfections in the grain marketing system result in several consequent outcomes.

Surplus grain producing areas in Ethiopia are localised, implying the critical role of transportation to different and distant deficit areas. The size and topography of the country, limited transportation possibilities (road transport is the only available means for grain transportation), and the radial configuration of transport networks with Addis Ababa at the centre has hampered inter-regional grain flows. As a result, localised shortage of food supply exists due to poor marketing and distribution networks, high transport cost, and related infrastructural problems that isolate surplus production areas from outside sources of effective demand even during good harvest seasons. Sometimes, surplus production results in sharp drop in prices. For example, in 1999/2000, a 19 per cent increase in production resulted in 40 per cent drop in grain prices (Gebremedhin, 2008) due to lack of processing, limited storage capacity, poor post-harvest grain management, weak domestic demand, and poor international or regional market outlets. Similarly, the significant surplus of grain in 2002 resulted in 60–80 per cent of drop in producer grain prices (Gebremedhin, 2008).

Post-harvest losses in Ethiopia could be as much as 5–19 per cent for maize, 6–26 per cent for millet, 6–23 per cent for wheat, and 5–20 per cent for teff, forcing traders not to store grain for more than the minimum turnover period. The problem of post-harvest loss is particularly important due to the fact that about 80 per cent of farmer sales occur during January–March, the first quarter after harvest, and that about 50 per cent of trader purchases also take place during this period (Gebremedhin, 2008).

The deficit in wheat requirement is covered by both food aid and imports. According to FAO figures, in 2007 the production of wheat was 2.8 million MT, the imports were 601 thousand MT and food aid about 450 thousand MT (2006 figure).

IV.1.7 Dairy sector in Nigeria

The dairy sector in Nigeria shares characteristics with the dairy sectors of other sub-Saharan African countries, in the sense that the milk market is segmented into: rural market, which is the destination of most of the domestic milk and the urban, affluent market which is served by imports, which are sold directly or processed.

Industry sources also estimate Nigeria's national herd at 14 million heads (including approximately 900,000 milking cows) in 2006. The "White Fulani" or "Bunaji" breeds are dominant. The local herdsmen (mostly in the dry northern Nigeria) own and maintain the majority of the cattle and the cattle are fed on natural grass under the traditional system. Migrant pastorals move flocks over months and many miles to find pasture during the dry season, which often results in weight loss, low yields and sickness. A few commercial livestock farms maintain crossbreeds of Holstein Friesians, Brown Swiss and Montpellier for fluid milk production and the average yield is 18 litres of raw fluid milk per day (compared to the national average of only 4 litres). The foundation stocks are mostly imported from South Africa, Europe, Australia, etc. Average yield of pure breeds is 30 litres per day.

According to the Government of Nigeria, only about 600,000 litres of domestic production (valued approximately $1.5 million) entered formal marketing channels through the milk collection co-operatives of migrant herdsmen and the output of the few commercial dairy farms in 2006. The rest is either consumed within producing families or traded informally within the producing communities.

Most of Nigeria's dairy processors import milk powder and re-constitute it into liquid milk and other dairy products such as yoghurt, ice cream and confectioneries. Others repackage imported powdered milk into small affordable sachets. Multi-national firms including Frieslandfoods (Netherlands), Glanbia (Ireland), Cussons-PZ (UK), Promasidor, etc; have either partnered or acquired some Nigerian dairy firms for re-constituting and/or packaging imported milk powder.

Nigeria imports dairy products (mostly milk powder) from New Zealand, Australia, South America, the EU, India, Ukraine, Poland, and other smaller suppliers.

While industrial consumers usually prefer skimmed milk powder, retail buyers most often choose instant whole milk powder or canned condensed milk prepared from whole milk powder. Milk powder is preferred because of its ease of handling for industrial manufacturers of confectionery, ice cream, yoghurt, and other products. A general lack of refrigeration (only about 10 per cent of the households have refrigerators) means that fresh milk or products are not widely consumed. Also, milk powder (usually imported in 25 kg bags) can be easily purchased by market traders for break down and sale in smaller packets. Butter, cheese and yoghurt are limited to the more affluent Nigerian consumers.

The split between retail, industrial and institutional consumption of dairy products in Nigeria is about 55 per cent, 40 per cent and 5 per cent respectively. Distribution is largely done by private firms. The retail market is comprised of hundreds of small supermarkets in all the major cities; thousands of tiny shops and market stalls in both the rural and urban areas; and millions of street traders. Institutional consumers

include various levels of government, business/charity organisations, and others. Finally, the industrial consumers include thousands of small, medium and large-scale bakeries, dessert, beverage and other confectionery product manufacturers in both the urban and rural area.

IV.1.8 Wheat sector in Nigeria

Nigeria is a net importer of wheat although its imports are affected by prices as the recent surge in prices shown. Wheat production is about 100,000 tonnes (marketing year 2007/08). Local climatic conditions in Nigeria are not suitable for wheat production and will limit any expansion in area. The wheat that is produced is grown under irrigation in a few states in northern Nigeria.

Wheat consumption is approximately 3.3 million tonnes, though it fluctuates with prices, as happened during the marketing year 2007/08 when consumers reduced their purchases of bread as bakers not only increased loaf prices (in response to the increase in wheat prices), but also reduced the size of standard loafs. The imbalance between domestic production and consumption is covered by imports, being the United States the main exporter of wheat to Nigeria, with share of nearly 85 per cent (2007/08).

Nigeria's overall milling capacity is estimated at about 6.15 million tonnes marketing year 2007/08), however, the capacity utilisation is only 48 per cent fluctuating with international prices. It is interesting to note that during the surge in import prices (marketing year 2007/08) many mills that could not cope with the increasing wheat prices, intense competition, and slack demand for flour where forced to cut back production or even close down temporarily.

Despite excess milling capacity, existing facilities are being upgraded and new capacities are being added as most investors still see bright long-term prospects for the milling industry. While most of the expansion is for the production of bread flour, there is also rapid expansion in domestic production of pasta and crackers and biscuits. The Government of Nigeria placed an import ban on these products in 2004, and this has encouraged rapid expansion of local production.

IV.1.9 Dairy sector in Senegal

As described in FAS-USDA (2007) the dairy sector in Senegal shares similar characteristics with the dairy sector in Nigeria, in the sense that most of the production is sold on the informal market and imports cover the processing destined to the more affluent urban population.

The local milk production system relies on climatic conditions with higher production during the rainy season and a slow down and even stoppage during the seven month long dry season. Nongovernmental organisations and donors assist small rural milk producers to improve the distribution systems and increase their capacity to access urban markets.

Despite the surge in international prices in the last three years, the imports of dairy products have continued to grow over the last two years as Senegal's milk industry is

primarily dependent on imported milk powder. Despite relatively high tariffs on milk powder (26.78 per cent), Senegal imports nearly 20,000 tonnes of milk powder each year, primarily from Europe. Imports of dairy products totalled $110 million in 2006. The most consumed dairy products in the market are milk powder (in bulk or packaged small bags), sweet concentrate milk, and unsweetened concentrated milk. A growing number of local companies produce yogurt from imported milk powder. Customs duties on milk vary from 5 per cent for milk powder to 20 per cent for other processed milk products (liquid milk, skimmed, yoghourt). A VAT of 18 per cent applies to all types except nursing milk products sold in pharmacies. Maximum cumulative tariffs on milk products range from 7.7 per cent for nursing milk to 26.78 per cent for milk powder and 44.48 per cent for skimmed milk (FAS-USDA, 2007). Importers of powder milk form a strong political lobby and dominate the dairy industry. Local producers are not well organised except the few modern producers in the major cities.

According to Sharma *et al*. (2005) different stakeholders in the dairy sector have different perceptions about the impact of imports surges. Thus, processors of locally produced milk (and to a lesser extent farmers, the government, NGOs and researchers) hold that trade liberalisation and the WTO have harmed domestic markets. Wholesalers (importers), retailers and processors of reconstituted milk and dairy products have a different opinion. They prefer a continuation of the liberal trade environment. This group advanced two arguments. First, imported quantities are small relative to domestic production and therefore have a negligible effect on domestic prices. Due to seasonality of domestic production in the dairy sector, it is essential to import these products to ensure continued operation of their processing plants during low season. Second, markets for imported and domestic products are segmented and there is no overlapping either geographically, seasonally or by population segment. Imported products target either low-season for domestic production, urban markets with insufficient supply from distant/remote production areas, and/or high income consumers including expatriates and tourist hotels with a preference for speciality products such as cheese, butter and chicken cuts that are not readily available locally (Sharma *et al*., 2005).

IV.1.10 Wheat sector in Senegal

According to FAS-USDA (2009) Senegal imports 70 per cent of its cereal needs, as well as most of its dairy, vegetable oil and processed foods. After Mauritania, Senegal is the most food-import dependent country in West Africa.

Senegal was very vulnerable at the beginning of the food price inflation crisis at the beginning of 2008, and undertook dramatic measures to protect consumers and farmers by subsidising food consumption and agricultural production. The decline in world oil and commodity prices also has had its effects on the Senegalese economy as consumers continued to demand lower prices and food processors faced shrinking margins caused by expensive stocks and lower market prices. Farmer incentives were also at risk of deteriorating in advance of the 2009 agricultural production campaign.

In terms of consumption, due to French cultural and culinary influences, the French baguette has a special place in the Senegalese diet – especially in Dakar and other

urban centers (FAS-USDA, 2009). Senegal has the highest bread consumption in Francophone West Africa. In flour equivalent, consumption is about 22 kg/capita. Bread has evolved into a staple for many consumers – for some it may be the only meal, for others it is breakfast and a complement to the evening's rice and fish. Population growth, urbanisation and evolving diets have led to impressive growth in wheat consumption and trade in Senegal and throughout West Africa. In Senegal, domestic flour consumption is increasing at an annual rate of approximately 4 per cent, outpacing population growth of 2.75 per cent.

Senegal's wheat imports have risen steadily in many years, with demand driven by three major flour milling facilities – Les Grand Moulins de Dakar, Sentenac and NMA (FAS-USDA, 2009). Due to the newly added capacity on the milling sector, Senegal currently imports only marginal quantities of flour.

The Government of Senegal subsidise the consumption of bread and despite the increase in the world price of wheat, and a marginal increase in the price of flour in the fall of 2006, the bread price remained unchanged. Bread consumption is expected to remain high and may even grow at a faster rate in response to artificially low prices. For the past several years wheat has been exonerated from the VAT and is subject to customs and port duties in the amount of 7.7 per cent. Rising world wheat prices prompted the Government of Senegal to intervene to informally waive the VAT on bread production and to freeze the price of flour and bread just before the New Year and l'Aïd el Kébir holidays. The millers' price of flour is currently CFA 264,000 per MT and the price of a baguette remains at CFA 150 instead of CFA 175 proposed by bakers' associations. ($1 = CFA 507 on January 10, 2007) (FAS-USDA, 2009).

In terms of imports of wheat, France is leading export country for wheat and high value processed products (FAS-USDA, 2009). The demand for wheat and wheat flour is increasing as the demand for bread and other bakery products increases along with population growth, increasing income and changes in consumption habits. Senegal imported 326,287 MT of wheat in 2005 and nearly 357,000 MT in 2006. During the first half of 2007, wheat imports totalled about 186,000 MT. Other sources of imports are the US and Argentina.

IV.1.11 Dairy sector in Tanzania

In many countries in sub-Saharan Africa milk is mostly sold through informal marketing channels which deal mainly with raw milk and traditional dairy products. This is because of the unwillingness of many consumers to pay for the extra costs of pasteurisation in the formal marketing sector, and also because of their tastes and preferences for traditional dairy products (Omore *et al*., 2009).

Direct sales by producers to consumers, either at the farm gate or local market in producing areas, is the oldest of all channels in the milk marketing system. The popularity of this channel is, however, dwindling because more households are keeping dairy cattle in the producing areas and the number of alternative market channels and intermediaries is increasing. Currently most of the producers dispose of their milk through intermediaries who often deliver the milk directly or indirectly to consumers in the cities (Omore *et al*., 2009).

In Tanzania, most of the milk sold is either unprocessed or informally processed liquid milk. For instance, over 90 per cent of the surveyed traders in the Dar es Salaam milk shed cited raw milk as their major sale product. Producers and vendors in Mwanza also mainly traded in raw milk. About 57 per cent of all the retailers in Dar es Salaam and Mwanza cited either fresh boiled cool or warm milk as the main products they sold. Other milk products at the retail level in Tanzania included naturally fermented milk, fermented cultured milk, packaged pasteurised milk and packaged fermented milk (Omore *et al*., 2009).

Producers and vendors in Tanzania usually transported milk to selling points on bicycles or public transport and in some cases they carried it on their heads. In Tanzania, 56 per cent of the market agents relied mostly on bicycles to procure and 47 per cent to deliver milk to sales points, respectively; 30 per cent of market agents used vehicles to procure milk while 30 per cent of the sales deliveries were done on foot—usually by hawkers. Transportation of milk from the collection centres to the urban areas was mainly done using hired or own private vehicles. The higher frequency of vehicle use in Tanzania is likely to be related to larger average volumes, and to much greater distances between supply and demand areas. Supply close to urban demand areas is not enough to meet demand, requiring procurement from more distant areas (Omore *et al*., 2009). Milk purchases and sales mostly took place either under no contract or under informal unwritten contractual terms—often stipulating time of delivery, price and timing of payment (Omore *et al*., 2009).

On average, however, more remote rural areas generally display lower prices at all levels of the market, reflecting supply/demand and transport costs in reaching demand centres (Omore *et al*., 2009). The results of an assessment of the distribution of market margins by marketing channels indicated: (a) producers receive higher market margins in shorter milk marketing channels, and (b) the longer the marketing chain the smaller the proportion of the market margin enjoyed by a market agent (Omore *et al*., 2009).

Generally, Tanzania has a relatively complex and developed informal milk market. It is characterised by: a) a greater degree of market concentration (at least in the case of Dar es Salaam); b) more use of mechanised transport; c) longer distances for liquid milk delivery; and d) greater use of contracts. A large proportion of milk is often not handled by intermediaries, but is sold directly from producer to consumer suggesting that in many cases market intermediaries are not needed. Transportation is also often either on foot or by bicycle, demonstrating sustainable low reliance on mechanisation. Use of both plastic and metal containers is common. There are clear opportunities to raise quality and food safety by increased use of metal containers. In Tanzania, where demand is currently almost all for liquid milk, shifts in demand to other products would be needed to create such opportunities (Omore *et al*., 2009).
The regional markets are relatively undeveloped and quickly become saturated, particularly as many urban dwellers have taken up dairying to produce milk within intra-urban and/or peri-urban areas. Enforcement of milk processing is difficult, impractical and perhaps unnecessary and counterproductive.

One of the many constraints is the seasonal variation in milk supply and demand. Supply of milk is generally high during the rainy season when dairy feeds are

adequate compared with the dry season when feeds are scarce. Demand for milk, especially sour milk, varies between the cool and hot seasons (Kurwijila, 2001).

Urban and peri-urban dairying is principally a response to market opportunities and constraints. Government policy encourages peri-urban dairying and tolerates the keeping of animals within the city boundaries (Kurwijila, 2001). The factors which have justified the keeping of dairy cattle within and around cities in Tanzania have included the need for civil servants to 'make ends meet', the high price of raw milk in urban centres relative to the price in remote rural areas and the poor milk marketing infrastructure. In view of the illegal nature of urban dairying (it is officially prohibited or limited to a few zero grazed cows only), government policy in Tanzania has over the years encouraged the development of peri-urban dairying and smallholder dairying (Kurwijila, 2001). Peri-urban dairying in particular offers enormous potential for the supply of milk to rapidly expanding cities in Tanzania due to the following reasons: proximity to urban centres provides easy access to milk markets, which offer a good price; better access to land resources provides a cheaper source of animal feedstuffs; it is more environmentally sustainable than urban dairy farming (Kurwijila, 2001).

The markets for food commodities in Tanzania have profoundly changed since the country adopted market-led policy reforms in the mid-1980s. Reforms in the exchange rate regime, liberalisation of trade and price de-control have increased the quantities and types of food commodities imported, including livestock products.

Escalation of imports in the mid-1990s has also been associated with further opening up of domestic markets with the implementation of the WTO Agreements. The government and other stakeholders have expressed concerns that the increased imports of dairy products could displace domestically produced products. The government's concern about the impact of low-priced imports on local industries is revealed by various government policy measures that culminated in the passage of a bill in the National Assembly in February 2004, which seeks to protect the domestic industry from the dumping of cheap (and sub-standard) import products. Counter-arguments by supporters of freer trade point to the negligible effects due to very limited imported quantities and segmented markets of imported and local products (Sharma *et al*., 2005).

Between 1997 and 2004, imports of dairy products more than doubled from 3,459 tonnes to 7,111 tonnes (FAO, 2006). Prior to the imposition of a 25 per cent suspended duty on imported milk (in addition to the 25 per cent import tariff), dairy imports had reached 5,565 tonnes in 1999. Major imported dairy products are powdered milk (whole and skimmed) followed by concentrated and condensed milk and UHT. In addition, cheese, butter and yogurt are also imported. Such products are likely to compete with fresh milk sold in the market, particularly in Dar-es-Salaam and other urban centres.

According to customs statistics, in 2003 dairy products were imported from 27 countries with South Africa being the largest source (22 per cent of the total), followed by Kenya (21 per cent), Netherlands (14 per cent) and Zimbabwe (8 per cent). The EU, in aggregate, accounted for 20 per cent of the total. Dairy product imports declined in the early 1990s, attributed to structural changes in the dairy

sector largely due the privatisation of state companies. However, since 1997 the declining trend has reversed. According to some stakeholders, the increasing volume of imports is an influential factor affecting domestic prices of these products which have stagnated or slumped (Sharma *et al*., 2005).

Tanzanian imports of dairy products are negligible compared with the total volume of production. However, an analysis comparing the marketed share of domestic production in targeted urban and niche markets reveals that imports are significant and could have adverse effects on the growth of domestic production and processing industries. Such concerns emanate from the fact that production and processing costs in Tanzania are relatively higher than in some of the trading partner countries and in some of the countries where imported products originate, including those where farmers are subsidised heavily. The problem is occasionally compounded by consumer preferences for imported products which are perceived as superior (Sharma *et al*., 2005).

The import of all dairy products in Tanzania averaged 34 million litres per annum in milk equivalent terms during the past six years. This amounts to 18 per cent of the country's total production of milk, or 188 million litres per year. Although this may seem low relative to national production, a more appropriate comparison is the portion of the domestic milk that competes with imported products. Using the marketed volume (67 per cent of production) as the denominator, the share of the imports rises to 27 per cent. When imports are compared with the total domestic milk that passes through formal/licensed markets (27 per cent), the corresponding share becomes 40 per cent. Finally, when imports are compared with the amount of milk processed locally from domestic production, the share is overwhelmingly high at 90 per cent. Taking into consideration that most of the imported products are sold in urban markets, particularly Dar es Salaam (although milk and dairy products are increasingly distributed in rural markets too), the share of imported dairy products in this market is indeed very high (Sharma *et al*., 2005).

Among imported products, milk powder constitutes the largest share (71 per cent in 2002) which is mostly used for reconstitution into liquid milk by local processors. The reconstituted liquid milk is likely to compete with raw and processed milk from domestic production, particularly in urban markets. Though there is little production of quality cheese in the country, butter is readily produced locally (Sharma *et al*., 2005).

IV.1.12 Wheat sector in Tanzania

Tanzania is highly dependent on wheat imports as domestic wheat production in the country is estimated at 5 per cent of total demand with the balance being met through imports (annual average of 350,000 MT). Domestic wheat production is estimated at 20,000 MT with an average yield of about 1.5 MT per hectare (FAS-USDA, 2002). Wheat and flour consumption in Tanzania has grown in the last few years as the Government of Tanzania control over trade has been reduced. New mills have been built and per capita consumption is increasing.

The majority of the milling and baking operations are located around urban areas with the bulk being in Dar Es Salaam. The wheat and related products (mainly

bread) are consumed in the urban areas. Bread is still viewed as high value by most Tanzanians and its demand is moderately elastic as rice, corn based food products and other traditional starch based dishes remain main staples.

Tanzania requires hard, high protein wheat to blend with the soft, low protein wheat grown in the country. The market demands bright flour. Imports of wheat mainly come from Australia, Pakistan and the US.

IV.1.13 Dairy sector in Uganda

Over the last two decades in Uganda there has been a steady increase in the number of improved dairy cattle, national milk production, proportion of milk produced and marketed by smallholders, contribution of dairying to the national economy and per capita milk consumption (Baltenweck *et al*., 2007).

Ugandan milk production is largely dominated by small-scale farmers who own over 90 per cent of the national cattle population (Garcia *et al*., 2008). The total national milk production has grown from 365 million litres in 1991 to over 1.4 billion by the end of 2006 with per capita milk consumption growing from 16 litres in 1985 to 50 litres by end of 2007 (SNV, 2008). The annual growth rate of milk production between 2001 and 2006 has been 9 per cent leading to total national milk output growing from 900 million litres in 2001 to 1,400 million in 2006 (SNV, 2008).

In rural areas, where 96 per cent of poor Ugandans live, up to about 60 per cent of the households keep mostly indigenous cattle. By far, the majority of milk production systems in Uganda are characterised by (a) a 'low input–low output' approach, (b) livestock is not an important source of cash, but a source of food, store of wealth and status symbol, and (c) milk demand is increasing and driving more and more of these dairy farms to intensify and often to diversify as to increase household returns (Garcia *et al*., 2008).

Small-scale producers face many challenges/constraints, which are partly responsible for the poor production performance (SNV, 2008). Despite various initiatives to enhance quality at various stages of the dairy chain, many weaknesses still exist. The hygiene and handling practices at farm level are generally poor. The collection and transportation of warm milk as well as sale of loose unprocessed milk are still a big challenge as far as improving quality in the dairy chain is concerned.

Uganda produces a variety of milk products; these include pasteurised milk, UHT milk (long life milk), cheese, yoghurt, cultured milk, butter, ghee, creams and ice cream. A substantial amount of milk and milk products is also imported indicating that the domestic production is not sufficient to meet market demands. Uganda also exports dairy products mainly to the regional market (SNV, 2008).

There are two marketing channels: the formal and informal sector. Approximately 90 per cent of the marketed milk goes through the informal sector (raw milk market) leaving only 10 per cent to be processed and packaged before marketing. The formal sector markets pasteurised milk and other dairy products. The informal sector mainly markets unpasteurised milk because the public Health Act that prohibits its

sale is not enforced. However, the enforcement of the Act began in 2003 and has prohibited the sale of unpasteurised milk, thus boosting sale of pasteurised milk.

Within the formal and informal sectors there are a number of agents that trade milk. Thus, there are bicycle vendors who buy milk from farmers and sell it from house to house. Secondly, there are the licensed traders who own coolers and sell milk on wholesale or retail basis. Then there are licensed processors who process pack and sale milk and milk products to consumers where the demand for milk is high.

It should be noted that the boundaries between the processed milk chain and unprocessed milk chain is blurred and continuously shifting. Since the vendors and some licensed traders have no regular suppliers, they receive milk of variable quality. However, the informal/unprocessed milk chain is flexible enough to undercut the prices offered by the processors more regular and upfront through payments. Given their lower overhead costs, vendors and licensed traders have managed to outcompete the formal/processed milk chain and this has constrained the growth of the milk industry.

Although there are imports of dairy products, according to FAO figures they represent less than 2 per cent of the production. Furthermore, the total quantity of milk and milk products imported has been declining progressively since 2003 (SNV, 2008).

IV.1.14 Wheat sector in Uganda

The information about the wheat sector in Uganda is scant, with production estimates varying from organisation to organisation. The Ministry of Agriculture officials estimated production at about 10,000 MT for the year 2001. However, millers and other analysts estimated it at about 2,000 MT per year. More recent FAO data shows production to be 19,000 MT.

All wheat produced in Uganda comes from Kapchorwa district near the eastern border with Kenya on the slopes of Mt Elgon (about 10,000 - 11,000 feet ASL). Annual yield is estimated by the district Agricultural Officer as 2.0 MT/HA (average for the years 1992-1998).

Of the amount produced, an estimated 20 per cent is consumed on farm. This does not include saved seed, which is estimated at the rate of about 110kg/acre according to local officials. A sizeable proportion of the production is transported to Kenya, mainly because prices in Kenya are usually higher. It is estimated that of an average of about 1,700 MT available for commercial purposes, 1,000 MT probably goes to Kenya.

There are an estimated four millers in country. The millers indicate a total market size of about 120,000 MT of wheat per year. Wheat enters under the category of food aid from the US under the PL 480 and other under the import category from a number of destinations such as Australia, Argentina, Pakistani and Turkey. FAO estimated total imports of wheat to be 337,026 MT in 2007.

IV.2 Analysis of the effect of export refunds using market models

It is clear from the previous section that many case studies have several features in common. Thus, the purpose of this section is twofold: first, to cluster case studies with common features into economic models, and second, to use these models to understand how export refunds may affect the domestic market, i.e., the situation of different stakeholders in the domestic market, and also to explore the degree in which these subsidies might hamper the development of the domestic economies.

Four models have been constructed based on the stilised facts presented in the review of commodity markets in the selected countries. These are: the unregulated market model, the segmented dairy market model, the government intervention model and the food aid model.

IV.2.1 Unregulated market model

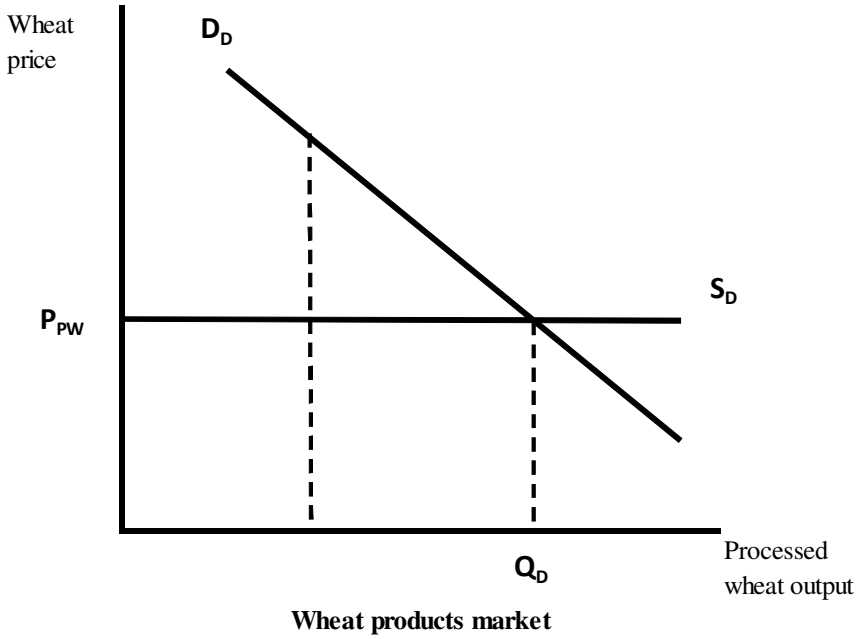
The main characteristic of this model is the coexistence of domestic production and imports due to the fact that the domestic production cannot cope with the domestic demand. Therefore, there is competition between the domestic and the imported product. It is unregulated in the sense that the government does not intervene in the market.

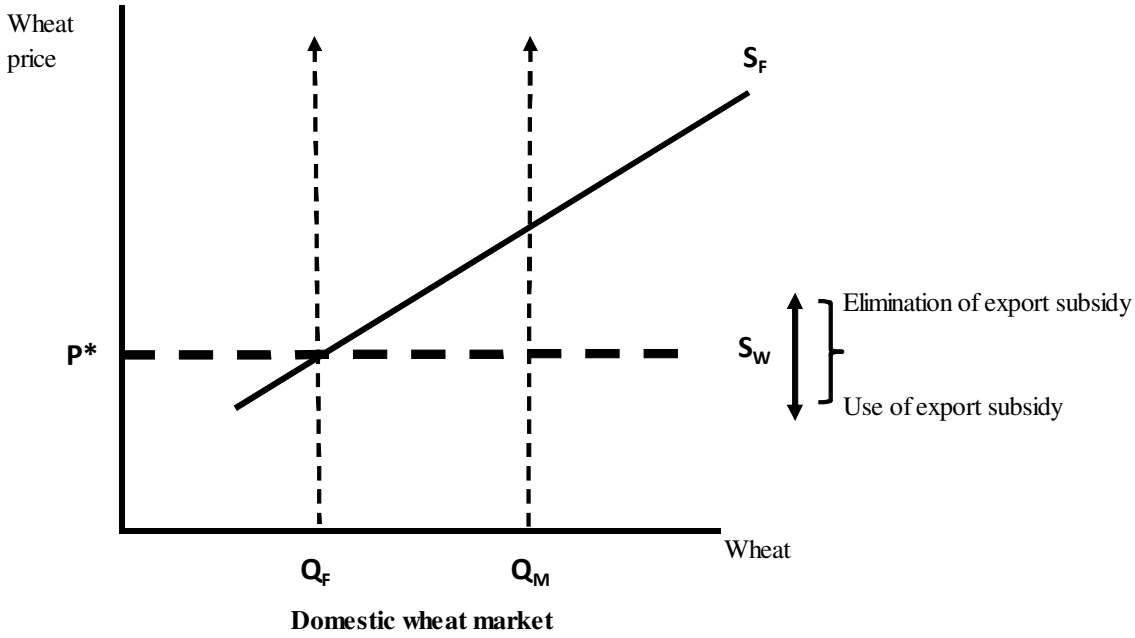
The model is presented in Figure 2 (in terms of wheat) and comprises two panels; the lower panel represents the raw commodity (*e.g.*, milk or wheat) and the upper panel represents the processed product (*e.g.*, dairy product or bread). The import supply of wheat (S_W) is presented by the flat line at the world price (P^*), the domestic supply is given by (S_F). The demand for the processed product (D_D) determines the import requirement.

Examples of this case are the dairy sector of Bangladesh and Egypt, and the wheat sector in Nigeria, Tanzania and Uganda.

In this case, the effect of change in import prices on the domestic economy is quite clear because they depress domestic prices which benefits consumers and damage the domestic production.

Figure 2. Structure of the unregulated market model





IV.2.2 Segmented dairy market model

The segmented or dual dairy market model is characterised by the existence of an informal or rural market and a formal or urban markets for milk. Examples of this type of situation are the dairy sector in Nigeria, Ethiopia, Senegal, Tanzania and Uganda.

This is represented in Figure 3, which presents three panels. The bottom panels represent the situation of the raw material (*i.e.*, milk) for the informal and formal markets.

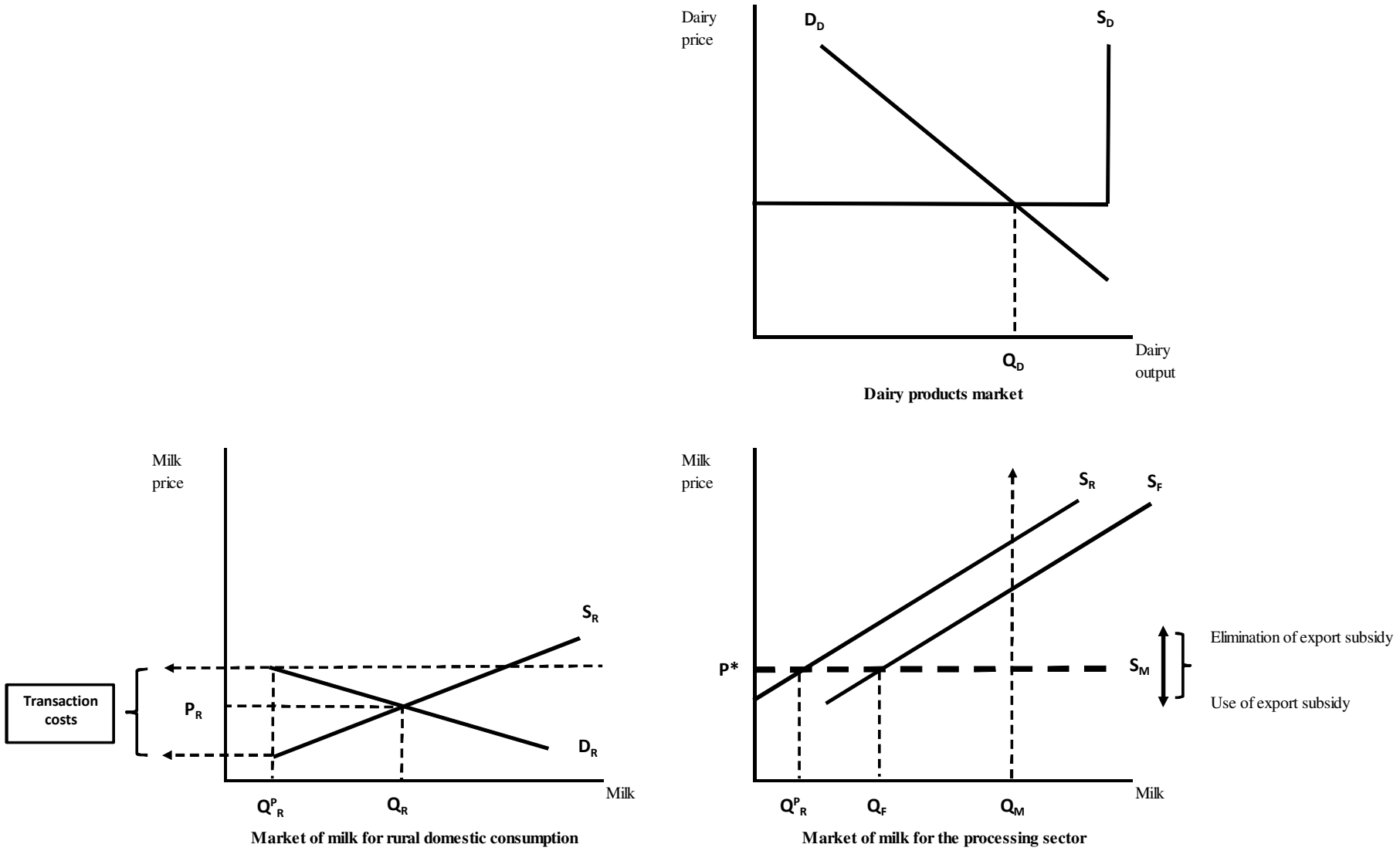
Note that most of the domestic production is sold in the informal market (rural market) and only a small proportion (which varies by country) finds its way to the formal market. The main reason advanced in the literature for this framework is the existence of high transaction costs coming from an underdeveloped marketing system that is not capable to collect the disperse supply of milk. It is important to point out that the domestic production of milk is in the hands of nomadic producers, where seasonal patterns in production are very important.

The formal market is connected with the processing sector, which mostly operates based on imports (*e.g.*, dried powder milk that is reconstituted), which produces dairy products for an affluent urban population.

As regards the impact of changes in export subsidies on the domestic production, this is relatively small because the competition between the domestic production and imports is limited (nevertheless, a small negative effect would be expected as some of the marketed milk finds its way to the formal market). Furthermore, an export subsidy would reduce the price of an input for the formal market and reduce the price of the processed products benefiting both processors and urban consumers. Clearly, however, this beneficial impact of export refunds is specific to the idiosyncracies of the dairy market.

As the described situation seems to be preserved, one should not expect any difference between the short and the long term. However, despite the fact that export subsidies might not explicitly harm the domestic markets of those countries, it is clear that they reinforce the disincentives for dealing with the high transaction costs created by the peculiar production structure.

Figure 3. Structure of the segmented dairy market model

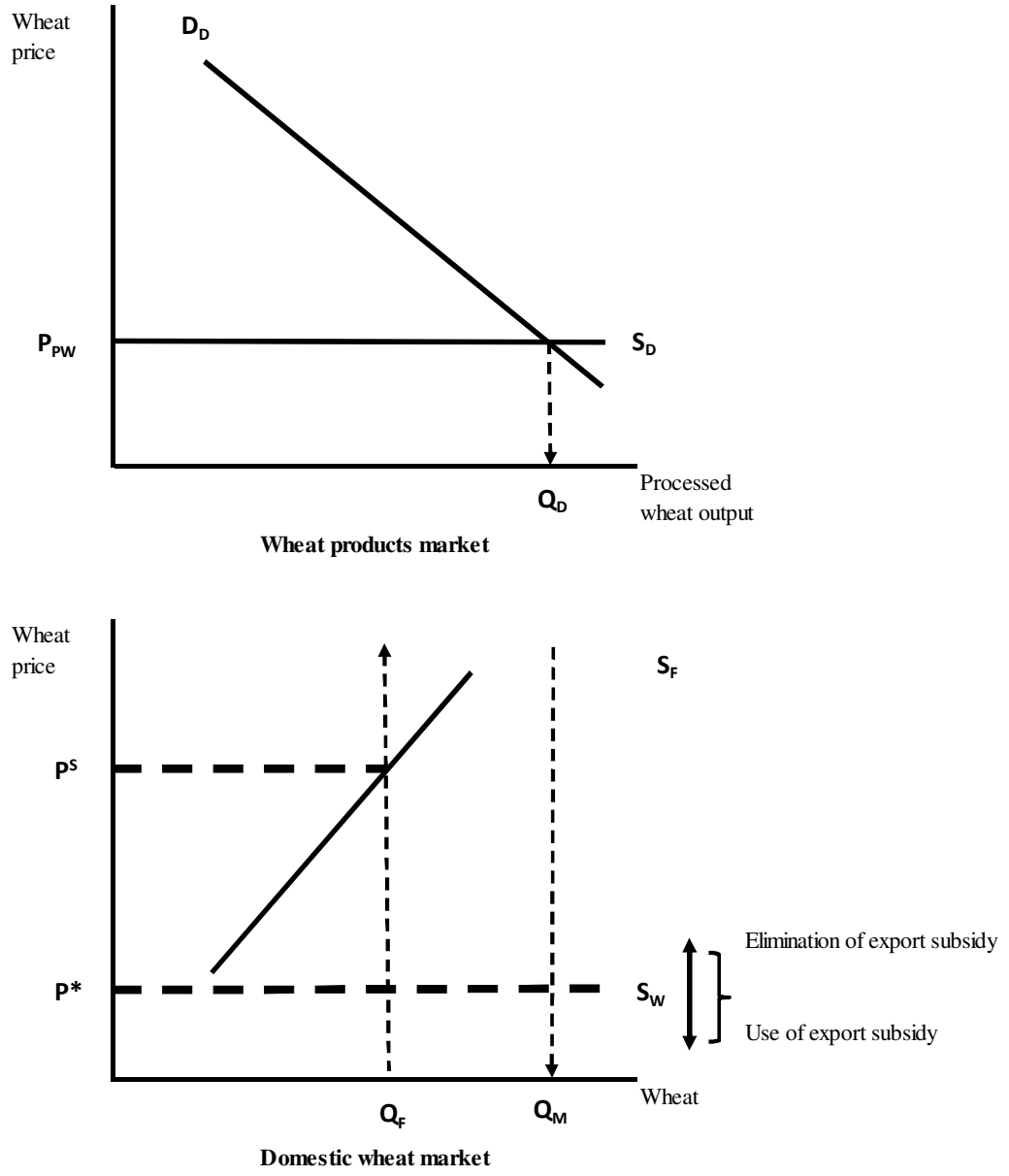


IV.2.3 Government intervention model

Figure 4 presents the case where the country isolates the commodity market from any sort of external shock that may affect producers and consumers. Examples of this case are the wheat market in Egypt and Senegal.

The model considers the raw material market (*i.e.*, wheat) and the processed product market (*i.e.*, bread). Producers are protected by a support price, which is well above the import price. In the processed product market consumers buy it subsidised. It is the total consumption of bread which determines the total import requirements of the raw material.

Figure 4. Structure of the government intervention model



Note that, if the particular conformation of the market (*i.e.*, the protection) is to remain in place, the only effect of an increase in an export subsidy that reduces the

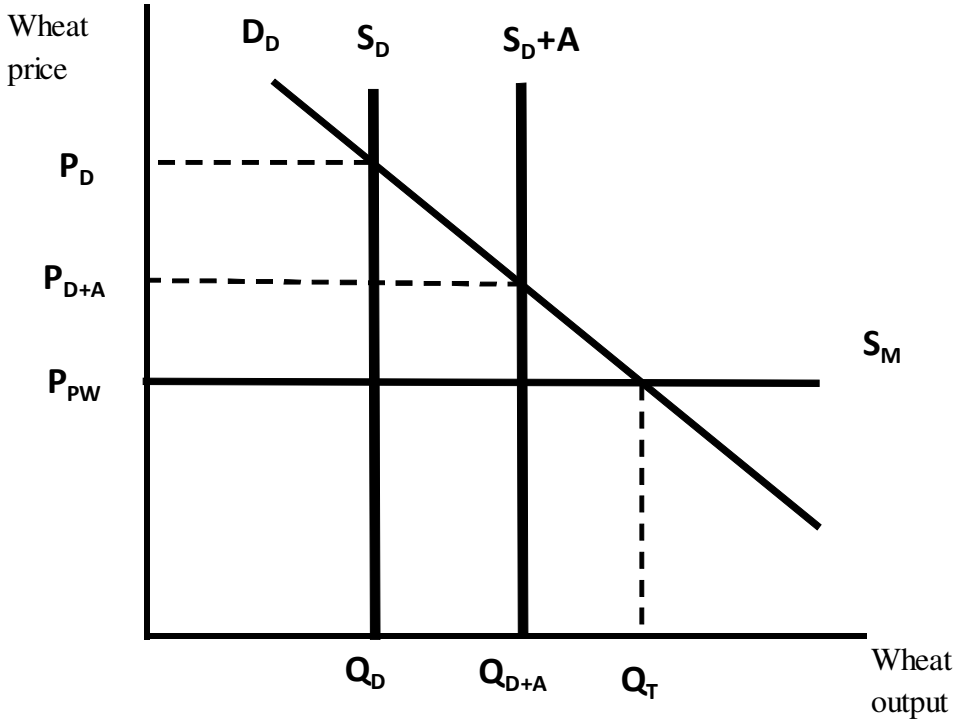
world price of the imported product is to change the government expenditure, which is reduced if the import prices decrease.

IV.2.4 Food aid model

Figure 5 presents the structure of the food aid model. It is quite similar to the first model but includes the presence of a substantial food aid, which may depress even more prices (assuming that imports are not present). Examples of this situation are the wheat sector in Bangladesh and Ethiopia.

In Figure 5 the domestic price is given by the import price and the supply comprises domestic production, food aid and imports. It should be noted that food aid may also displace the demand if there is a domestic market for food aid products (*e.g.*, families receiving the donation in kind decide to sell them and use the money for other purposes).

Figure 5. Structure of the food aid model



The effect of export subsidies, whilst advantageous for consumers, is damaging for the domestic production as they further reduce the prices received by farmers. This may create incentives in the long term for the country to cease producing the commodity.

IV.3 Conclusions from the case studies

The analyses from the case studies indicate that the impact of export subsidies depends on the characteristics of the particular domestic commodity market.

Four prototype situations (models) were identified: (1) when the market is unregulated and imports compete with domestic production; (2) when the market is actually segmented or dual into formal and informal markets and the imports are destined to the urban market; (3) when the market is very regulated and the government isolates both producers and consumers; and (4) the case when, in addition to imports, the country is recipient of food aid.

The first case (**unregulated market**) represents the dairy sector of Bangladesh and Egypt, and the wheat sector in Nigeria, Tanzania and Uganda. In this case, the effect of change in import prices on the domestic economy is quite clear because they depress domestic prices which benefits consumers and damage production, and can trigger stronger negative effects in the long term.

The second case (**segmented markets**) represents the dairy sector in Nigeria, Ethiopia, Senegal, Tanzania and Uganda. As regards the impact of changes in export subsidies on the domestic production, this is relatively small because the competition between the domestic production and imports is limited (nevertheless, a small negative effect would be expected as some of the marketed milk finds its way to the formal market). Furthermore, an export subsidy would reduce the price of an input for the formal market and reduce the price of the processed products benefiting both processors and urban consumers. As the described situation seems to be preserved, one should not expect any difference between the short and the long term. However, despite the fact that export subsidies might not explicitly harm the domestic markets of those countries, it is clear that they reinforce the disincentives for dealing with the high transaction costs created by the peculiar production structure.

The third case (**regulated market**) can be exemplified by the case of wheat markets in Egypt and Senegal. Given the particular conformation of the market (*i.e.*, the protection) is to remain in place, the only effect of an export subsidy that reduces the price of the imported product would be to change the government expenditure.

Examples of the fourth situation (**imports and food aid**) can be found in the wheat sectors in Bangladesh and Ethiopia. The effect of export subsidies, whilst advantageous for consumers, is damaging for the domestic production as it reduces the prices received by farmers. This may create incentives in the long term for the country to cease producing the commodity.

V. Conclusions and final remarks

The purpose of the project has been to assess the effect of the European Union (EU) export refunds on developing countries since the 2003 reform of the Common Agricultural Policy (CAP). This is because it is widely argued that export refunds are highly trade distortive instruments and have a detrimental effect on developing countries. The negative effect of the trade refunds on developing countries is because they either depress international prices affecting competing exports from developing countries or they affect the domestic supply by reducing domestic prices in developing countries and therefore harm farmers.

The report consisted of three main parts: a literature review; a global quantitative analysis using the GTAP model; and an analysis of case studies focused on the effect of export subsidies on the domestic economies. The major results are presented below.

Literature review

As regards the results from the literature review, most studies found that elimination of export subsidies would lead to an increase in world prices and would have a limited impact on the trade volumes and welfare of developing countries. Specifically, the impacts on the different developing countries (producers and consumers) will differ in sign and magnitude depending on the country being net importer of the product analysed or net exporter or having the potential to become net exporter (appropriate infrastructure, marketing policies, etc.).

Overall, eliminating export support alone is expected to have a limited economic impact (also due to the sharp decrease in export refunds during the past decade), however, this impact will be noteworthy if combined with reducing/eliminating tariffs and domestic support.

Similar conclusions as regards the different impacts from one developing country to another can be drawn based on the 'micro-level' studies reviewed. Namely, in some countries where domestic production does not compete with the imported production because they are destined to serve different markets, where the dometic market is isolated from the international markets through government regulations there will be limited impacts of export refunds elimination on the welfare of producers, at least in the short term. Whether this will change in the longer term due to changes in policies, investment in infrastructure, etc. remains to be seen. Countries with export potential will benefit from the elimination of export refunds.

In terms of the differences found between different studies (although showing similar results in terms of the importance that elimination of exports refunds may have for the world trade), these are not only due to differences in terms of the models assumptions (e.g., paramaters, model structure) but also due to the lack of accurate data on export refunds (e.g., the WTO notification procedure does not work well, there is no clear trend on the use of export subsidies, there is no accurate information on the extent to which notifications lead to actual subsidies being applied, there are differences in the way information on export subsidies by product is reported by WTO members).

It should be noted that it was not possible to find information on the specific gender impacts of export refunds elimination. Based on studies focusing on gender and exports in developing countries, we can assume that the impacts on women welfare in developing countries will differ from one country to another (e.g., in countries where women are successfully involved in export activities, elimination of export refunds might have a positive impact on gender).

Quantitative analysis using the GTAP model

The analysis comprised three experiments (consisting of 7 scenarios). In each case, the marginal impacts of the EU's export refunds are assessed by comparing with an appropriate 'baseline' or *status quo* scenario. Medium (2004-2013) and long run (2004-2020) estimates of export subsidies are estimated in experiments A and C, respectively. More specifically, in each experiment, a 'maximum damage' (full permissable UR limit) and export refund elimination scenario are compared with the baseline. In experiment B (2013-2020), the contribution of EU export refund elimination is evaluated within the context of a hypothetical package of Doha trade reforms. The main results are as follows:

(1) Comparing scenario A2 with A1 (baseline), we examined the medium term (2004-2013) maximum potential damage from full employment of the Uruguay export refund limits. Whilst the largest subsidy expenditure accrues to the dairy sector, the two cereals sectors have the most flexibility for increases in export refunds, followed by 'red meat'. Consequently, EU27 output rises and world price falls are more notable (particularly wheat) in these three sectors. For the developing countries, wheat production is hard hit, particularly on the African continent (in Senegal, wheat production is practically eliminated altogether), Latin America and the Caribbean. A similar story, albeit more moderated, occurs for red and white meat markets in the developing countries, particularly key producers such as Latin America and Asia. In 'other grains', the principal loser from export subsidy driven EU output gains, is the Rest of the Developing World

Elsewhere, there is greater specialisation in other non-subsidised export commodities ('other crops') in sub-Saharan Africa resulting in small agro-food trade balance gains. Notwithstanding, aggregating over all developing regions net agro-food export revenues decline €1,997 million, with wheat accounting for €1,576 million. Developing country real income effects are largely determined by terms of trade (ToT) changes from 'wheat' (where the largest world price reductions have occurred). With the exception of Latin America and Rest of Asia, all developing countries are net importers of cheaper wheat commodities, resulting in ToT improvements. Similarly, allocative efficiency increases due to increases import quantities of tariffed imports. ***In general, the economy wide impacts from full usage of EU export refunds are small.*** The largest real income gains, in per capita terms, are recorded by net food importers such as Senegal (1.55 per cent), the Rest of North Africa (0.37 per cent) and the Rest of West Africa (0.35 per cent). As net food exporters, Latin America and the Asian regional composites witness small real income losses.

(2) Comparing scenario A3 with A1 (baseline), we examine the medium run impacts of EU export refund eliminations. As a large exporter of heavily subsidised dairy products, world price rises are most notable in this sector. EU27 'red meat' exports are protected to a lesser extent than dairy, although EU exports of this commodity are reasonably large. In 'other food', whilst export refund protection is much lower, EU export volumes from this large aggregate sector are considerably larger than those of dairy. In general, output changes are consistently positive across all developing regions for these three commodity groupings, although the real significance is illustrated within the net trade balance results. Of the €2,714 million net export revenue gain to the developing regions, dairy, (€1,971 million), 'other food' (€537 million) and 'red meat' (€333 million)

see the largest improvements. Decomposing by developing region, large net exporters such a Latin America (€757 million) and East and South East Asia (€587 million) witness the largest net agro-food export revenue gains, whilst with large gains on dairy trade, the West Asia and Middle East region makes net agro-food trade revenue gains of €527 million.

The impact of export refund elimination on economy wide per capita real incomes is marginal, whilst perhaps surprisingly, a majority of the developing countries lose from export refund elimination. As in scenario A2, real income results are driven by ToT effects and allocative efficiency. Despite improving net trade balances, the majority of the developing regions remain net importers of one or more of dairy, 'other food' and 'red meat' commodities. Thus, compared with the baseline, the ToT is negative for the majority of the developing countries given increases in world prices. As a large net exporter of most commodities, Latin America witnesses a notable ToT gain. With reductions in (more expensive) agro-food trade imports, allocative efficiency also falls.

A second set of corresponding long run experiments are run over the time period 2004-2020. The baseline shocks are broadly the same, although modulation rates are increased, pillar 1 funding is reduced, production quotas are eliminated and larger Armington trade elasticities are employed.[40] As expected, the underlying trends are the same as the corresponding medium run scenarios. With a change in the trade elasticities for all regions, price changes are relatively unaffected compared with the medium run, whilst output changes (positive and negative) are more elastic, reflecting reductions in pillar 1 payments and greater supply responsiveness from the usage of larger trade elasticities in all regions in the longer run scenario to 2020.

(3) Consequently, when **comparing scenario C2 with C1 (long run baseline)**, increased EU dumping of cereals, meat, sugar and rice has an even more detrimental impact on developing country net export trade revenues. In the medium run, it was estimated that the net trade balance deteriorates €1,997 million compared with the baseline, whilst in the long run, the corresponding deterioration in developing country net trade revenues is €3,273 million. The largest loser, Latin America, faces a rising trade balance deterioration of €1080 million in the long run (compared with €681 million in the medium term). In real income terms, the pattern of gainers and losers is similar to the medium run, although swings in ToT and allocative efficiency effects are more marked owing to greater volumes of import driven trade (higher trade elasticities). As net food importers, a number of developing countries make small real income gains from cheaper food imports from the EU. The most notable per capita income gains occur in Senegal (2.03 per cent), the Rest of North Africa (0.51 per cent) and the Rest of West Africa (0.44 per cent). The main losers are in Latin America and Asia.

(4) Examining the **long run impacts of EU export refund eliminations in scenario C3**, in common with the medium run scenario, the three commodity aggregates of 'dairy', 'other food' and 'red meat' commodities have the most influence over the

[40] It is assumed that the trade elasticities are 30 per cent larger than in the medium run.

results. World and market price rises are similar to the medium run, whilst developing country output improvements from the loss of EU export competition are more notable, particularly in dairy sectors throughout sub-Saharan Africa. In terms of the trade balances, the collective long run net export revenue gain for the developing countries is €3,561 million (compared with €2,641 million in the medium run), with Latin America enjoying an improvement in its net trade revenues of €1,062 million (largely from dairy and sugar trade). Real income results are very similar to the corresponding medium run simulation although Ethiopia and Tanzania witness marginally larger losses, whilst Latin America and the large Asian composite regions record very slight real income improvements.

(5) Examining the importance of the EU's export refunds within the Doha Package (2013-2020) in experiment B, it is observed that EU export refund eliminations have a notable impact in the dairy sector. Examining the contribution to output, market prices and trade balances for dairy in the developing regions, most of the (percentage) change is explained by the elimination of the EU's export refunds (vis-à-vis market access). In the 'other food' processing sector, export refund rates are much lower than dairy, although as noted above, 'other food' trade flows are considerably larger. The results show that for 'other food' processing, export refunds have a similar degree of importance as they do for 'dairy', although with relatively small 'other food' tariff reduction shocks, this result is conditioned more by the higher tariff binding overhangs and sensitive product exceptions on 'other food' trade, rather than the importance of the 'other food' export refund *per se*. In other key sectors (i.e., red meat, processed rice and sugar), export refund elimination has a reduced influence within the overall Doha package, although this varies as a function of each developing region's trade relations with the EU27. For example, in 'processed sugar' eliminating EU export refunds impacts much more importantly in Latin America, the Caribbean, West Asia and the Middle East and North Africa, whilst in 'processed rice', EU export policy is relatively more marked in the Asian composite regions and West Asia and the Middle East.

Turning to the real income results, with the exception of Ethiopia and Tanzania, the overall importance of the Doha round (and therefore EU export refund eliminations) is negligible in per capita real income terms. In a number of developing countries (Central America, East and South East Asia, Bangladesh, Rest of South Asia, Ethiopia, Tanzania, Rest of East and Central Africa, Southern Africa), market access (vis-à-vis export competition) dominates the EV gains. Indeed, as the largest gainers in per capita income terms, market access dominates the equivalent variation gains in both Ethiopia and Tanzania. On the other hand, in remaining developing country regions, EV gains are more attributed to EU export refund elimination.[41] For example, as one of the largest net losers from the Doha package in per capita terms, 141 per cent of the Rest of West Africa's losses are due to EU export refund elimination.

[41] This, in part, may reflect stronger EU trade ties as well as the limited degree of market access owing to high tariff binding overhangs and sensitive product exceptions.

Case studies

The analyses from the case studies indicate that the impact of export subsidies depends on the characteristics of the particular commodity market. Four prototype situations (models) were identified from the cases: (1) when the market is unregulated and imports compete with domestic production; (2) when the market is actually segmented into formal and informal markets; (3) when the market is very regulated and the government isolates both producers and consumers; and (4) the case when, in addition to imports, the country is recipient of food aid.

As regards the **unregulated market** (dairy sector of Bangladesh and Egypt, and the wheat sector in Nigeria, Tanzania and Uganda) the effect of change in import prices (due to a change in export refunds) on the domestic economy is quite clear because a decrease in the import prices depress domestic prices. Whilst this benefits consumers and it may damage production and can trigger stronger negative effects in the long term.

In the second case, **segmented markets** (dairy sector in Nigeria, Ethiopia, Senegal, Tanzania and Uganda), the impact of changes in export subsidies on the domestic production is relatively small because the competition between the domestic production and imports is limited (nevertheless, a small negative effect would be expected as some of the marketed milk finds its way to the formal market). Furthermore, an export subsidy would reduce the price of an input for the formal market and reduce the price of the processed products benefiting both processors and urban consumers. As the described situation seems to be preserved, one should not expect any difference between the short and the long term. However, despite the fact that export subsidies might not explicitly harm the domestic markets of those countries, it is clear that they reinforce the disincentives for dealing with the high transaction costs created by the peculiar production structure.

With respect to case of **regulated markets** (wheat market in Egypt and Senegal), given the particular conformation of the market, the only effect of an export subsidy that reduces the price of the imported product is to change the budgetary outlay of the government.

Finally, the fourth situation, **imports and food aid** (wheat sector in Bangladesh and Ethiopia), the effect of export subsidies, whilst advantageous for consumers, is damaging to the domestic production as they reduce the prices received by farmers. This may create incentives in the long term for the country to cease producing the commodity.

Final remarks

Overall, whilst the different analyses show that export refunds may have the possibility to create distortions on developing countries, the results from the literature review indicate that their elimination may have small impact in terms of prices, production and welfare.

The presence of export refunds may create in developing countries disincentives either to exports, to domestic production or may help to create and maintain

industrial sectors that are import dependent and do not invest in integrating domestic resources into the supply chains. Furthermore, use of export refunds to offset domestic disequilibria within export may create greater variability in the world markets generating further disincentive for investment.

It is also important to note as coming from the GTAP analysis that the presence of export refunds may benefits net food importers (per capita largest in Senegal, Rest of North Africa, Rest of West Africa) and damage net food exporters (Latin America, East and South East Asia, Rest of Southern Asia) and their elimination generate the opposite effect.

Certainly, the level and characteristics of the damage inflicted by export refunds depend on the particularities of the commodity markets in developing countries, which are complex arrangements as exemplified by the case studies.

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