Implications of Trade Liberalization and Domestic Reforms on EU Agricultural Markets

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Abstract

The objective of this paper is to explore the overall effects of further trade liberalization and the implemented CAP reforms on EU agricultural production, imports and exports within different EU regions by using the Global Trade Analysis Project (GTAP) model. The GTAP model is used to compare a lower tariff reduction formula (EU Proposal) with a higher reduction formula (US Proposal) in order to show how sensitive the examined agricultural commodity/sector is to the different tariff reduction formulae. This analysis reveals that EU imports would escalate and EU exports would plummet with declining EU production because of trade liberalization and domestic policy reforms in the EU agricultural markets and sectors.

Keywords: EU, WTO, CAP reforms, tariff reductions, export subsidies.

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Introduction

The agricultural sector has been one of the most contentious issues in the multilateral trade negotiations under the World Trade Organization (WTO). New rules are being negotiated for the three pillars of agricultural trade: export competition, domestic support and market access. Trade distorting policies in these pillars are being scrutinized and new rules created in the WTO to reduce distortion in world agricultural trade.

In the area of export competition, WTO members agreed in December 2005 at the WTO Ministerial Conference in Hong Kong to eliminate all forms of agricultural export subsidies by 2013 if there is a new multilateral trade round. However, it should be noted that no new rules on export competition will be implemented until the issue of state trading enterprises, export credits, and food aid are dealt with. These issues are deemed to be trade distorting policies for export competition.

The key distinction in the negotiations on domestic support is between trade distorting and non-trade distorting farm subsidies. This distinction arose from attempts to reduce distortion in world agricultural markets caused by domestic farm programs, while preserving the ability of policymakers to support farmers and rural areas at the level they consider appropriate. In principle, it has already been conceded that current ceilings will be substantially reduced, and WTO members with the highest domestic support levels, such as the EU, should make the biggest reductions.

The market access pillar of the negotiations has proved to be the trickiest to negotiate, because all countries have market access barriers, whereas only some have export subsidies or domestic support. Hence, the range of interests involved in the market access side of the negotiations is more complex. Most WTO members are under pressure to protect their farmers, but many also want to open up others' markets. Among the developing countries, some are dubious about opening up agricultural trade and take a defensive position, while others want to see increased exports from developing countries to developed countries as well as more trade between developing countries. The key points that have emerged concerning market access are the type of tariff reduction formula that would produce the agreed result, how developing countries might be given further flexibility for their "special products" and might be able to use "special safeguard" actions to deal with surges in imports or falls in prices, and how the sensitive products of all member countries might be treated.

Trade liberalization through the Doha Round is expected to have an impact on EU agriculture. An important question for the EU is whether the reforms of the Common Agricultural Policy (CAP) have improved the ability of the EU to adjust to a more liberal trade environment. Although the domestic reforms did not overtly deal with external trade and import protection, benefits from the CAP reforms in terms of a reduced need for export subsidies and tariff protection are automatically the results of lower support prices for EU agricultural products. Furthermore, the decision of the EU to combine all of its domestic support payments for agriculture into one decoupled Single Farm Payment (SFP) is expected to improve the ability of the EU to adjust to the gradual liberalization of agricultural markets that lies ahead.

The objective of this paper is to explore the implications of tariff reductions, the elimination of export subsidies and the implemented CAP reforms on EU agricultural production, imports and exports within different EU regions by using the multi-region and multi-sector computable general equilibrium model known as the Global Trade Analysis Project (GTAP) model. Decomposition of the different policy effects on EU agricultural production is also examined, and the model is used to compare a lower reduction formula from the EU and a higher reduction formula from the US to show how sensitive the examined agricultural commodity/sector is to the different tariff reduction formulae. This will indicate which agricultural commodities/sectors are vulnerable to further market opening and an extreme reduction in tariffs.

The WTO Negotiations and CAP Reforms:
Price Spikes and Volatility in the Global Agricultural Markets

Traditionally in the WTO, many aspects of the agricultural negotiations have been driven by an assumption of excess supply, low prices and protectionism. Subsidies to farmers and tariffs on imports have been at the heart of the stalemate in the long-struggling Doha Round of WTO trade talks. Agricultural policy in the developed countries has been driven by the need to deal with excess production. This has been particularly true of the EU and the US. For decades, both supported their farmers with excessively high levels of public support that generated chronic surpluses over domestic consumption. These surpluses produced the notorious butter, cereal and beef mountains in the EU. The excess stocks were disposed of on the world market with export subsidies. This had the effect of subduing world prices and creating a gap between EU internal prices and world prices. Essentially, the agenda agreed at the WTO is an effort to even out the distortions between countries that are exporting to the world market without subsidies and those that are relying on subsidies due to the price gap between domestic and world prices. The existence of this gap has inevitably led to the CAP reforms, which seek to lower EU internal prices closer to world prices. Ironically, the Doha Round was used as leverage by the European Commission to get the process of the CAP reforms underway (Cunha and Swinbank 2009).

The Doha Round was launched in 2001 with the goal of adding billions of dollars to global commerce and lifting millions of people worldwide out of poverty due to trade liberalization. However, the surge in prices for all agricultural commodities from 2006 to 2008 brought this assumption into question, because trade liberalization and the removal of protection and support policies in agriculture will raise world food prices (OECD 2000, Diao et al. 2001, FAPRI 2005, Abler and Blandford 2007, World Bank 2008a). The Food and Agriculture Organization of the United Nations (FAO 2008a) estimated that, mainly as a result of high food prices, the number of chronically hungry people in the world rose by 75 million in 2007 to reach 923 million. Moreover, in 2008 the FAO (2009) estimated that up to 37 countries in the world were facing food crises, and the World Bank (2008b) estimated that 33 countries would face potential social unrest because of rising food and energy prices. Food riots were reported in Egypt, Cameroon, Cote d'Ivoire, Senegal, Burkina Faso, Indonesia, Madagascar, Mauritania, Mozambique, and Haiti in early 2008. Price increases in the world market will benefit large exporters of agricultural and food products. Conversely, net food importers will lose and face a much higher food bill (FAO 2008b). Increases in food prices would be most distressing for poor developing countries with limited resources to help their poor consumers, making it more difficult to achieve the Millennium Development Goal to halve, between 1990 and 2015, the proportion of people who suffer from hunger.

According to the FAO (2008a, 2008b), high food prices have a particularly devastating effect on the poorest in both urban and rural areas, the landless, and female-headed households. Hence, high food prices hamper poverty reduction measures. Food price inflation hits the poor hardest because food accounts for a much higher share of their total expenditures than in wealthier populations. Food represents only about ten to twenty percent of consumer spending in developed countries, but expenditure on food represents as much as forty to eighty percent of consumer spending in developing countries, many of which are net food importers.

The high world commodity prices between 2006 and 2008 have spurred countries including Brazil, China, Indonesia, Vietnam, India, Egypt, Cambodia, Pakistan, Russia, Kazakhstan, Ukraine, Argentina, and Malawi to impose curbs on food exports in order to ensure their domestic supplies remain plentiful and insulate their domestic markets from price increases. Such moves lie counter to the spirit of the intended Doha Round deal, which is meant to make it easier to export and sell agricultural and other goods in overseas markets. Export restrictions are not prohibited by the WTO, and this issue has emerged as a theme in the WTO negotiations. In fact, export curbs such as quotas, taxes and export bans have exacerbated the food crisis. During the rise in food prices, many developing countries such as India, Indonesia, Saudi Arabia, Peru, Turkey, and Burkina Faso have slashed import tariffs in a desperate effort to reduce the cost of imported food in order to stave off food riots. However, developing countries such as India and Indonesia have sought in the Doha Round to maintain the possibility of keeping higher tariffs for agricultural products or obtaining concessions that would allow them to protect particular agricultural products by increasing tariffs. This position is built around the assumption of low world food prices and high world stockpiles of food. In past decades, farm subsidies and support programs have allowed major grain exporting countries to maintain large surpluses, which could be tapped during food shortages to keep prices down. However, new trade and agricultural policies have made agricultural production much more responsive to market demands, putting global food reserves at their lowest level in a quarter of a century. Without reserves, bad weather and poor harvests have a bigger impact on prices. According to the World Bank (2008b), the prices of staples jumped 80 percent in 2008 compared to 2005, whereby the real price of rice hit a 19-year high and the real price of wheat rose to a 28-year high in early 2008.

No single factor was responsible for the 2006-2008 rapid escalation of food commodity prices (USDA 2008, USDA 2009), but rather a set of interrelated factors that included both short-term and long-term supply and demand trends. Among these were the burgeoning food and feed demand in developing countries due to population growth and the increasing demand for meat and dairy products in China and India, as well as the increased demand for agricultural raw materials (grains, oilseeds, etc) to make biofuels, government policies worldwide (export bans, restrictions and taxes, aggressive importing of food supplies, etc.) to ensure domestic supplies and insulate domestic markets from food price inflation, declining yields in agriculture due to reduced investments, and production shortfalls due to weather and disasters. Additionally, macroeconomic factors contributed to the price escalation, such as sharply higher crude oil and energy prices that boosted the production costs of agricultural products from fertilizers to transport to food processing, the depreciation of the US dollar, the accumulation of foreign reserves or petrodollars that increased purchases of food worldwide, lower food stockpiles worldwide, and global investment funds that speculated in the commodities markets (Table 1).

Table 1. Factors contributing to the price spikes and volatility of food commodity prices

Contributing factors during the years	1971-74	1994-96	2006-08
Long-term			
Demand side			
Export demand growth	X	X	X
Due to food demand growth		X	X
Due to population growth			X
New use/innovation: biofuels			X
Supply side			
Slow production growth	X	X	X
Declining R&D investment		X	X
Land retirement	X	X	
Short-term			
Demand side			
Government food policies	X	X	X
Supply side			
Government food policies	X	X	X
Weather-induced crop losses/failures	X	X	X
Macroeconomic			
Economic growth		X	X
Depreciation of the US dollar	X	X	X
Rising crude oil and energy prices	X		X
Accumulation of petrodollars/foreign reserve	X		X
Future market/speculation	X		X
Inflation	X		X
Financial crisis		X	X
Reduced global stockpiles of food	X	X	X

Source: FAO 2008b, USDA 2008, USDA 2009.

The rapid rise in food prices between 2006 and 2008 was exceptional in magnitude, but not unique. Two other major periods with a rapid surge in prices occurred in 1971-1974 and 1994-1996, with similar sets of interrelated factors that caused the price spikes and volatility in prices (Table 1). In these past periods of price spikes, market adjustments eventually brought prices back down (USDA 2009). Similarly, the high prices seen in 2006-2008 have dropped, but market adjustments are occurring in a more volatile environment. The global financial and economic crisis that started at the end of 2008 has clearly contributed in reversing the 2006-2008 price spikes. The situation is similar to the 1994-1996 surges in food prices that ended with the 1997-1999 financial crisis in Asia, Russia, and Latin America that caused global demand to fall. While history provides some insights into current and future economic phenomena, the past does not

necessarily predict the future, nor does it fully explain events occurring in today's markets. The current financial and economic structure in the agricultural sector is different from that in the past, and policy options and actions have changed as well. Nonetheless, future global population and income growth, policy developments and climate change will have a substantial impact on the demand for and supply of agricultural commodities. The volatility in commodity prices will continue, but the impacts cannot be shown with the use of a general equilibrium model such as the Global Trade Analysis Project (GTAP) model. According to the model, the economy will adjust in the long term, and prices will thus return to equilibrium levels due to substitutions and structural adjustments in the economy.

Methodological Framework of the Study

The quantitative results of the assumed policy changes of this study are derived by using a multi-region and multi-sector computable general equilibrium model (Hertel 1997) known as the Global Trade Analysis Project (GTAP) model. The GTAP model and database are standard tools for analysis in the changing global markets for commodities (Hertel 1997, Dimaranan and McDougall 2005). The standard model assumes a competitive environment where consumers and firms take the prices of goods and factors of production as given. It is assumed that the outcome of the model is one of optimizing behavior by firms and consumers restricted by their resources (land, labor, capital, and natural resources), restraints (taxes etc.), and their objective functions. The computable general equilibrium (CGE) models are thus highly suited to analyzing overall trade and welfare effects, as they offer a comprehensive assessment of cross- and inter-industry linkages, including upstream and downstream effects. The GTAP version 6 database represents global production and trade for 87 countries/regions, 57 commodities/sectors, and 5 primary factors. The data characterize intermediate demand and bilateral trade in 2001, including tax rates on imports and exports, and other indirect taxes. The main data file represents the world economy in 2001 as a system of flows of goods and services, measured as money values, in millions of US dollars. In this analysis, the database is aggregated into 16 countries/regions (Table 2) and 15 commodities/sectors (Table 3), whereby 12 commodities/sectors deal with the agriculture and food sectors. This model is unable to measure or show the impact of price volatility in these commodities because of the optimizing behavior by firms and consumers that will lead prices back to new equilibrium levels in the long term. Different trade policies as well as domestic policies are implemented in the model and database as price wedges between different prices, e.g. the domestic and world market price. Exogenous changes such as trade liberalization will affect the relative prices between regions and commodities, as well as the behavior of consumers and producers within the economies, to produce a new equilibrium. The multilateral trade liberalizations assumed in this study are the abolition of export subsidies (export competition pillar) and a reduction in tariffs (market access pillar). The 2001 database is used to examine the unilateral reform in domestic support by the EU and to reflect the policy implications of the CAP reforms implemented in 2003. Thus, the GTAP model is utilized to demonstrate the impacts of policy changes on the three pillars of agricultural trade: 1) the domestic support pillar, with shocks to represent the reforms implemented in the EU Common Agricultural Policy; 2) the export competition pillar, with shocks to represent the abolition of export subsidies; and 3) the market access pillar, with shocks to represent the multilateral reduction in agricultural tariffs under two different assumptions, namely a lower reduction under the EU Proposal and higher reduction under the US Proposal.

Table 2. The country coverage comprises 16 countries/regions in the GTAP version 6 database

Regions within the EU

FIN	Finland
FRA	France
GERA	Germany and Austria
NEU	Belgium, Netherlands, UK, Ireland, Denmark, Luxembourg, Sweden
SEU	Spain, Italy, Portugal, Greece
POL	Poland
REU	Cyprus, Czech Republic, Estonia, Hungary, Latvia, Slovakia, Slovenia, Bulgaria, Romania

Other Regions

EFTA	Switzerland, Norway, Iceland
USA	United States
MERCOSUR	Brazil, Argentina, Uruguay
AUSNZ	Australia and New Zealand
RUSSIA	Russia
CHINA	China and Hong Kong
INDIA	India
LDCs	Least developed countries in Africa
ROW	Rest of the world

Table 3. The commodity coverage comprises 15 commodities/sectors in the GTAP version 6 database

WHEAT	Wheat
GRO	Other grains
V_F	Vegetables, fruits, nuts
OCR	Other crops
MILK	Raw milk
CATTLE	Bovine animals
OTAG	Animal products n.e.c.
CATTMEAT	Bovine meat products
OTMEAT	Other meat products
DAIRY	Dairy products
SUGAR	Sugar
OTFOOD	Other food products
RESOUR	Resources
MANUFAC	Manufacturing
SVCES	Services

Domestic Support: Reform of the EU Common Agricultural Policy

The GTAP model is calibrated to include the impacts of the implemented reforms in the EU Common Agricultural Policy (CAP). The CAP reforms approved at the EU Agricultural Council

in Luxembourg in September 2003 are important modeling issues. Under these reforms, most of the CAP support payments for arable crops and livestock have been decoupled from production and a new Single Farm Payment Scheme (SFP) has been set up in the EU member states. More than 90% of all direct support payments to farmers in the EU-25 member states became decoupled from production in 2005 to 2006. Nonetheless, the EU Commission has given the members states a number of options for implementing the reform, whereby part of the support payments may still be linked to production. There is a great deal of flexibility, especially for the decoupling of beef support payments, and also for cereal and milk support payments.

In the GTAP version 6 database, the OECD Producer Support Estimates (PSE) in 2001 are used as the domestic support estimates, which have been further disaggregated in the EU for 15 member states and 12 agricultural and food commodities/sectors (Jensen 2006, Huang 2006). The support payments are then grouped into four categories: output subsidies, intermediate input subsidies, land-based subsidies, and capital-based subsidies.

The policy specification for domestic support adopted in this study refers to earlier contributions. Several papers (Frandsen et al. 2002, Bach et al. 2000, Brockmeier et al. 2006) have introduced changes to the GTAP model aimed at improving policy representation, with special reference to the CAP. Gohin (2006) emphasized the correct representation of agricultural policy instruments when assessing a policy. In CGE models such as the GTAP, production costs and production technologies are represented by more or less flexible functional forms, mainly depending on the distinction between products (inputs and outputs) and factors. It is important to define which policy instruments can be reasonably classified as output subsidies and which instruments accrue to the production inputs such as land, labor and capital. Substitution possibilities between the inputs influence the production effects of changing farm subsidies. For example, the production effects of the coupled CAP support payments for beef are likely to be different if the bull premium is classified as an output subsidy rather than a capital subsidy.

Following the arguments of Gohin (2006) as well as Jensen and Yu (2005), it is reasonable to classify the Agenda 2000[1] bull premium as an output subsidy, since bulls can usually be grown relatively intensively to an appropriate carcass weight in order to meet the market demand for meat. Meanwhile, the slaughter premium and suckler cow premium are classified as capital subsidies, because the slaughter premium (paid per head of all slaughtered bovine animals) and suckler cow premium contribute to the maintenance of the existing animal stock rather than the quantity of beef produced. Since part of the decoupled Agenda 2000 beef support payments accrue explicitly to farmland after the CAP reforms, the payments should increase farmland values.

With regard to milk production, the most important point about the CAP reforms is that the intervention prices for skim milk powder (SMP) and butter were gradually reduced by 15% and 25%, respectively. EU farmers were initially compensated for income losses with the dairy cow premium, which was based on milk quotas. Later, the dairy cow premium (milk support payment) was combined with the decoupled Single Farm Payment in 2007. The decrease in the intervention prices for butter and skim milk powder have been implemented as a decrease in the market price of milk (by 15%).

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[1] The EU Common Agricultural Policy reforms implemented in 2000.

The shocks applied in the GTAP model due to the CAP reforms are based on the support payments accrued to land subsidies, output subsidies, and capital subsidies by different regions of the EU (Table 4). The implementation of the CAP reforms in each EU member state is taken into account in the model by using information from the European Commission (2005b, 2004a, 2004b). In the case of the EU-15 member states, the decoupled and coupled parts of the CAP support payments are based on statistics from the European Commission. In the case of the EU-10 new member states, the total sum of the CAP payments to the new member states is taken into account and gradually increased until 2011. All the CAP support payments for the EU-10 new member states are accrued to farmland.

Table 4. CAP support. Subsidy category and region in the EU until 2011

	Total CAP subsidies EUR million	Land subsidies* EUR million	Output subsidies** EUR million	Capital subsidies*** EUR million
Finland	522	518	26	8
France	8055	7075	0	980
Germany & Austria	6179	5963	0	216
Northern EU	8259	7920	89	250
Southern EU	7694	7222	13	459
Poland	994	997	-	-
Rest of EU	1159	1159	-	-

Source: European Commission 2004a, 2004b, 2005b, own calculations
  * Land subsidies are the historical CAP area payment, the decoupled bull premium, decoupled slaughter premium, decoupled suckler cow premium and decoupled milk premium
  ** Output subsidies are the coupled bull premium
*** Capital subsidies are the coupled slaughter premium and coupled suckler cow premium

In this study, modeling of the CAP policies by using the GTAP model is simplified in many ways, given the intricacies of the CAP. However, there are limitations to this approach that are worth highlighting. The approximation of the measures included in the CAP reform does not take into account several important parts of the reforms: the modulation of direct payments, the introduced environmental cross-compliance elements, and the provision for rural development. Modeling of such measures is incompatible with the representative assumptions used in the GTAP model, as the measures require some differentiation between the different types of farmers.

Export Competition: Abolition of Export Subsidies

Export subsidies occur when the government gives an exporter a direct per-unit payment based on the volume of goods cleared for foreign destinations. Such a payment enables an export firm to purchase the product internally at a higher price and sell it externally at a lower price. The EU is by far the largest user of per-unit export subsidies. Other significant users of export subsidies include Switzerland, Norway, and the US. The reliance of the EU on subsidies for agriculture stems from the Common Agricultural Policy (CAP). The CAP supports producer prices at levels above world market prices, stimulating production in the EU and resulting in exportable surpluses of many commodities. The EU has been actively subsidizing the disposal of surpluses in many commodities on the world market, and thus distorting trade flows.

Under the Uruguay Round Agreement on Agriculture (URAA), the WTO members committed to reducing their exports subsidies, and no new export subsidies were permitted. During the Uruguay Round implementation period of six years from 1995 to 2001, export subsidy expenditures were reduced by 36 percent and the volumes of subsidized exports were reduced by 21 percent. The URAA has made it more difficult for countries to resort to direct export subsidies to shore up domestic prices or manage excess supplies. Therefore, the Doha Round has the intention to make it impossible to use export subsidies to boost domestic prices by eliminating such subsidies entirely. This assumption is simulated in this study by using the GTAP model and database.

Export subsidies are part of the GTAP database implemented as a price wedge between the value of exports (free on board basis) and the world market price. The data for export subsidies are directly derived from WTO member countries' notifications to the WTO in the marketing year 2000/2001 and compared to the value of exports for 2000/2001 by using trade data from the United Nations Conference on Trade and Development. A few assumptions on dividing the export subsidies among the EU member states have been made. First, trade within the EU has been neglected in evaluating the export subsidy rates. It has also been assumed that the export subsidy is not dependent on the destination country. The export subsidy rates and global market shares of the aggregated commodities/sectors are estimated in the database (Table 5). Nullification of the export subsidy rates will simulate the entire removal of export subsidies in the model. The model structure assumes that the outcome is driven by the demand conditions and that supply only reacts to these changes. Incidentally, this is contrary to most partial equilibrium model results, which assume the supply capacity to be fixed and price reactions to be much larger. Results of the general equilibrium model may therefore be regarded as long-term impacts.

Table 5. Export subsidy rates and global market shares in the GTAP version 6 database. Region and commodity/sector, marketing year 2000/2001

	EU		REU		EFTA		USA	
	Export Subsidy rate	*Trade share*	*Export subsidy rate*	*Trade share*	*Export subsidy rate*	*Trade share*	*Export subsidy rate*	*Trade share*
Wheat	8.63	24		1.9		0.1		23.6
Other grains	33.39	20.2	0.01	1.7		0.3		41.3
Veges, fruits, nuts	2.31	34		1.2	125.52	0		10.8
Other crops		17.9		1.1		0.4		17.3
Raw milk & bovine animals		33.5	0.02	4.8	94.28	0.3		11.1
Animal products n.e.c.	.067	29.3		2.7		0.8		17.1
Bovine meat products	84.62	31.6		0.9	3.9	0.5		18.4
Other meat products	5.68	52.6	0.17	3.8	11.27	0.2		13.7
Dairy products	30.78	67.2	2.09	4.1	30.99	1.5	7.83	2.8
Sugar	60.22	14.2	6.73	1.2		0.1		4.1
Other food products	2.31	41.7	0.13	2.1	0.58	2.4		9.4
Resources		6.4		0.6	0.24	6.8		1.6
Manufacturing		37.3		2.6	0.13	3.1		12.5
Services		40.9		2.7		3		17.6

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Market Access: EU and US Proposals -Two Different Tariff Reduction Formulas

The GTAP model is calibrated to demonstrate the impacts of tariff reductions on production, exports and imports. After calibrating the tariffs in the GTAP database, the model is used to compare two alternative proposals for tariff reductions in the Doha Round: a lower reduction formula from the EU and higher reduction formula from the US (Table 6). This simulation will illustrate how sensitive agricultural products are to the different tariff reduction formulae. This sensitivity analysis will indicate the agricultural products that are vulnerable to further market opening (EU Proposal) and an acute reduction in tariffs (US Proposal).

Table 6. The EU Proposal and US Proposal for tariff reduction

EU Formula		US Formula	
Tariff band thresholds	*Linear cuts*	*Tariff band thresholds*	*Linear cuts*
0 - 30%	35%	0 – 20%	55 – 65%
30 - 60%	45%	20 – 40%	65 – 75%
60 - 90%	50%	40 – 60%	75 – 85%
> 90%	60%	> 60%	85 – 90%
Tariff cap	100%	Tariff cap	75%

Source: European Commission 2005a, US Department of State 2005

Approaches to trade liberalization through the reduction of tariffs confront some key methodological challenges (see Bouët et al. 2008). One of these is the frequent, wide divergence between bound tariffs and the tariff rates actually applied. Negotiations in the WTO are conducted on the basis of bound tariffs notified to the WTO. However, these bound tariffs may differ from actual applied tariffs. If so, reductions in bound tariffs as agreed upon in the WTO may not reduce the actual tariffs ('binding overhang'). Large differences between bound and applied tariffs are widespread in developing countries, but generally less so for high-income developed countries. The EU bound rates for tariffs are equal to the actual applied rates. Therefore, in the EU, any cut in bound tariffs immediately results in lower applied tariffs.

Another key issue that needs to be addressed is the weighting scheme used to aggregate the applied tariff rates. In the standard GTAP database, the applied rates in the EU are aggregated using import trade weights. This is done with the help of world import values from the United Nation's COMTRADE database of 2001, excluding intra-EU trade. Trade weights only take the relative importance of trade flows into account, and lead to an endogenous bias, as the weight for each individual tariff decreases with an increase in the tariff. Accordingly, prohibitive tariffs impede market access, and thereby reduce the trade volumes to zero. This issue is not taken into account by the import weighting approach. Trade barriers are therefore underestimated with this method.

This study draws on the detailed data on applied tariffs notified by the EU to the WTO for computation of the so-called ad valorem equivalents (AVE data). These ad valorem equivalents are calculated by working out the "unit value" of imports over the period of 1999-2001. Import values are taken from the data submitted to the Integrated Database (IDB) of the WTO. The value of imports is divided by the volume of imports over the same period, and this is then compared with the import duty to give an ad valorem equivalent. Variants of this basic formula exist to deal with cases where the "unit value" of any product is substantially affected by factors

such as the existence of tariff quotas as well as other non-tariff barriers. The data are available at the 8-digit level of the Harmonized System (HS) of classification. In this study, these detailed tariffs are aggregated through simple averages up to the product aggregates of the GTAP database. It is, however, worth recalling that although all the ad valorem tariffs of the EU are calculated to the 8-digit level, their modeling within a framework such as the GTAP model would still create conceptual problems due to the need to aggregate these tariffs again for the 12 specific commodities/sectors aggregated in the GTAP database for agriculture. The GTAP model could not include products at the level of detail at which tariff lines are specified (for example at the 8-digit level). The EU tariff schedule includes 2200 tariff lines; thus, the assessment of the impact of trade liberalization on the EU cannot be precise.

Implications of Agricultural Trade Liberalization and CAP Reforms for the EU

The potential consequences of a multilateral agreement in the Doha Round have been assessed in numerous studies (Bouët et al. 2007, Hertel et al. 2007, Anderson and Martin 2006, Decreux and Fontagné 2006, Polasky 2006, Francois et al. 2005). Among these studies, the conclusions are divergent or convergent depending on the methodological choices and designs of the trade reforms implemented in the studies. The present study utilizes a CGE methodology to show the impact of agricultural trade liberalization in the Doha Round and domestic reforms on production, exports, and imports within separate regions of the EU. The results provide only rough indications and not precise projections of the future due to the limitations of the CGE methodology, which include its complexity, data requirements, aggregation issues, and model sensitivity to the selection of key parameters. In particular, CGE models sacrifice commodity and policy details important in examining agricultural trade agreements and lag on policy and market information (Westhoff et al. 2004). Partial equilibrium models are able to capture the policy details, and the commodities are disaggregated compared to CGE models. For example, in the GTAP model, the pigmeat and poultry meat sectors are combined as other meat products, and the bovine sector includes cattle, sheep, goats, and horses. On the other hand, proper analysis of trade agreements would seem to require large-scale general equilibrium models, which simultaneously take into account changing trade flows between countries, supply and demand adjustments, and resource re-allocation between different sectors in the economy. CGE models force conceptual consistency on a problem and provide useful information on spatial trade flows and factor prices important to agriculture (Goldin and van der Mensbrugghe 1996, Hertel 1997). CGE models also capture feedback effects between processing sectors and primary agriculture that can at best be mimicked in partial equilibrium models.

The results from the GTAP model provide estimates of the changing production and trade flows in the EU and within its regions. The different structures of agricultural production and implementation of the CAP reforms are the main reasons for dividing the EU into seven countries/regions (Table 1): Finland, France, Germany & Austria, Northern EU, Southern EU, Poland, and the Rest of the EU. The economies of Denmark, Sweden, the Netherlands, Belgium, Ireland, the United Kingdom (UK), and Luxembourg are grouped as Northern EU, because these countries have relatively high wage rates and an agricultural production structure that is specialized and capital intensive. Finland's economy is similar to Northern EU, but its agricultural production structure is not yet as efficient or capital intensive as Northern EU. In addition, Finland suffers from natural handicaps due to the unfavorable climate, being the

world's northernmost country with a viable agriculture, and hence requiring excessive agricultural subsidies. In fact, this study was established for policy makers in Finland, and Finland is therefore considered as one region. France and Germany (in the GTAP database, Austria is combined with Germany) are singled out because of their sheer size and production capacity in agriculture. Spain, Italy, Portugal, and Greece are grouped as Southern EU because agriculture in these Mediterranean countries has somewhat similar characteristics that are relatively divergent from the other regions. The countries from Central and Eastern Europe and the Mediterranean included in the 2004/2007 EU enlargement are grouped as the Rest of the EU because their national agricultural policies are quite similar and these countries have lower agricultural subsidies compared to the old EU-15 member countries. Poland is singled out as one region from the Rest of the EU due to its huge agricultural production capacity (potentially a relatively large agricultural producer).

Production According to EU Region

The production of bovine meat products in the EU is the most vulnerable to domestic policy reforms and trade liberalization (Appendix 1 and 2). The total EU production of bovine meat products is estimated to decrease by 15% with a value of USD 10.6 billion under the EU tariff reduction formula (Appendix 1) and by 23% with a value of USD 15.9 billion under the US tariff reduction formula (Appendix 2). Northern EU will be the hardest hit region, facing a 26% (Figure 1) decline in production with a value of USD 5.2 billion (Figure 2) under the EU formula and a decline of 38% with a value of USD 7.5 billion under the US formula. The production of bovine meat products in Northern EU represents the largest drop in value (Figure 2) among the commodities/sectors that register a decrease in production, and one of the largest percentage drops (Figure 1) for production. Beef production clearly decreases in countries such as the UK and Ireland (Northern EU), which have decoupled all beef support payments from production. Another cause of the decreasing beef production in these countries is that labor released from agriculture is easily absorbed by strong non-agricultural sectors. The production of beef decreases to a lesser extent in countries that retained a significant proportion of the beef support payments coupled or linked to production, such as Finland. In contrast, there is no decline in the production of bovine meat products in the EU-12 new member states (in fact a slight increase) under the EU tariff reduction formula, but there is a slight decline in production under the US tariff reduction formula. Hence, the EU tariff reduction formula will only have a production decreasing impact in the old EU-15 member states, but the US tariff reduction formula is drastic enough to cause a production decrease in all the EU member states.

In terms of value (Figure 2), the production of dairy products in the EU is the second most vulnerable to domestic policy reforms and trade liberalization. The total EU production of dairy products is estimated to decrease by 7% with a value of USD 8.7 billion under the EU tariff reduction formula (Appendix 1), and by 12% with a value of USD 14.1 billion under the US tariff reduction formula (Appendix 2). Northern EU will again be the hardest hit region, with an 11% (Figure 1) decline in production with a value of USD 4.5 billion (Figure 2) under the EU formula and a decline of 18% with a value of USD 7.1 billion under the US formula. Similar to the case of bovine meat products, the full decoupling of milk support payments due to the CAP reforms and the high opportunity cost of labor in these countries are the main causes for the

decreasing production of dairy products. By contrast, there is no decline in the production of dairy products in the EU-12 new member states, but in fact there is an increase in production.

In percentage terms (Figure 1), the production of wheat and sugar are very vulnerable to domestic policy reforms and trade liberalization. Among the EU regions, the largest percentage drop in production for wheat will occur in Southern EU, and that for sugar will occur in Northern EU. The percentage decreases in production for other meat products and other food products are small compared to the examined commodities/sectors. On the other hand, the production decrease in value (Figure 2) for other food products is quite large, even though the decrease in the percentage is small. In comparison, the percentage decrease in production for sugar is many times greater than for other food products, but the value decrease in production for sugar is much smaller than for other food products.
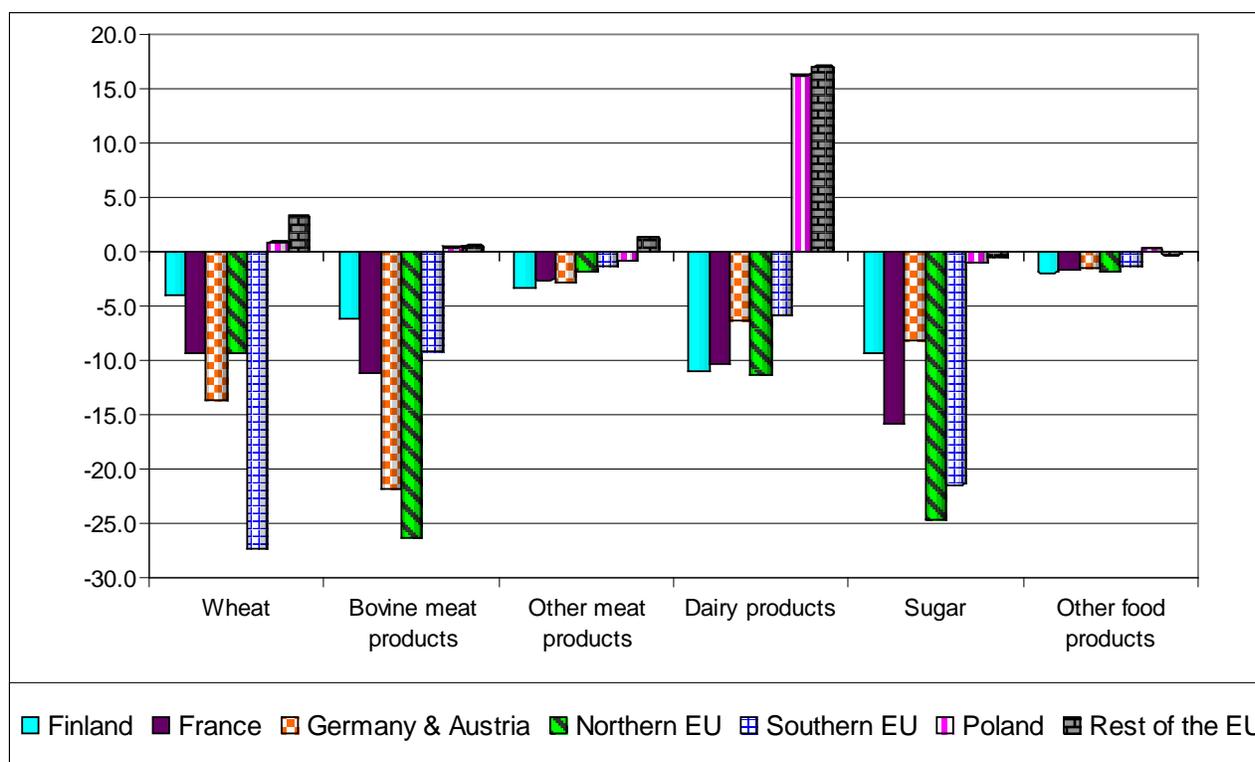
Figure1. Changes in agrifood production (in percentage - %) according to EU region under the EU Proposal for tariff reductions (Reference year 2001 using GTAP version 6 database)**.**

The total impact of CAP reforms, export subsidy abolition, and tariff reduction on production can be decomposed into individual impacts on production (Appendix 7). The charts (Figure 3 and 4) illustrating the decomposition of the different policy effects on EU production demonstrate that tariff reduction has the most powerful impact on the production of sugar, bovine meat products, bovine animals, and other crops, whereas export subsidy abolition has a considerable impact on wheat, other grains, and dairy products. The steeper tariff reduction under the US Proposal would cause a substantial further decrease in the production of other crops, sugar, bovine meat products, bovine animals, and dairy products. CAP reforms are
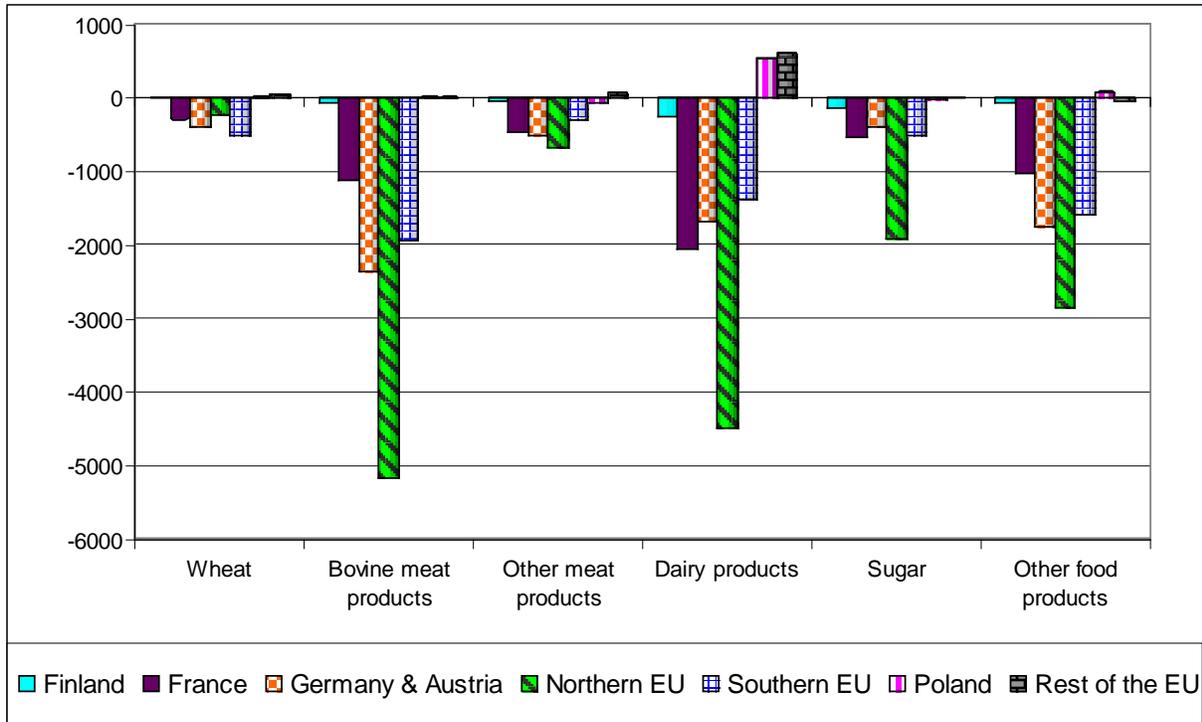
Figure 2. Changes in agrifood production (in value - US$ Million) according to EU region under the EU Proposal for tariff reductions (Reference year 2001 using GTAP version 6 database).
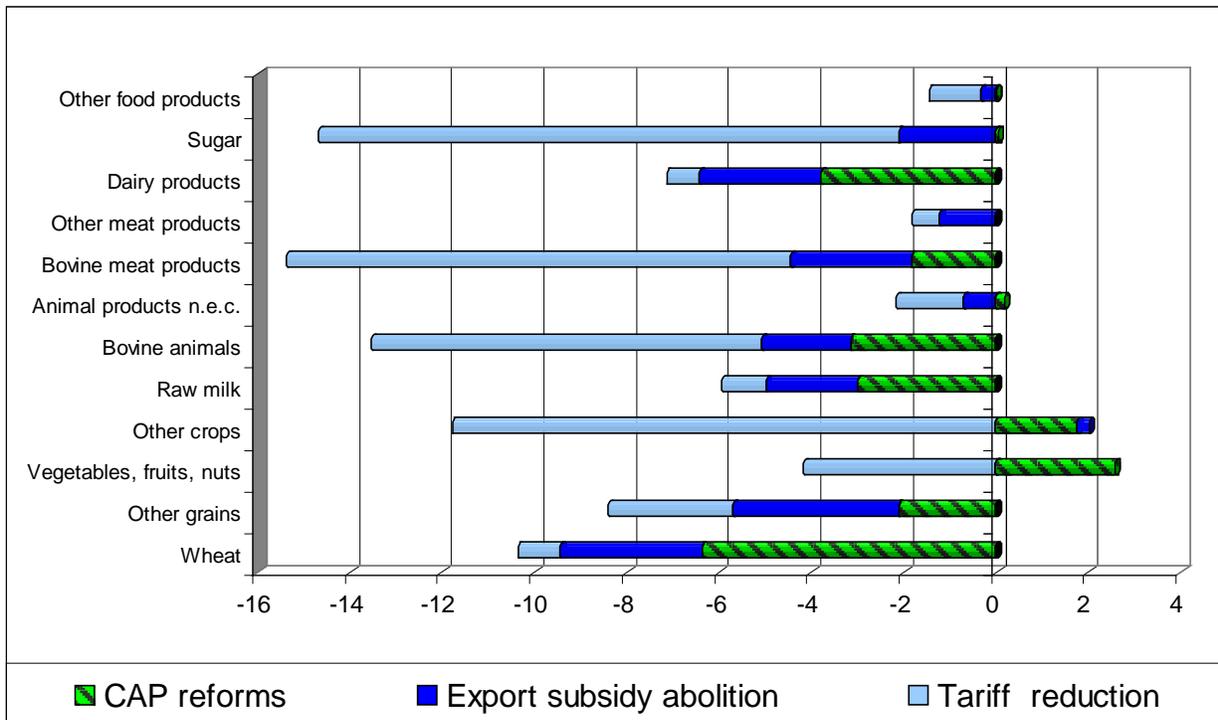

Figure 3. Decomposition of different policy effects on the changes in EU production under the EU Proposal for tariff reductions (Reference year 2001 using GTAP version 6 database).
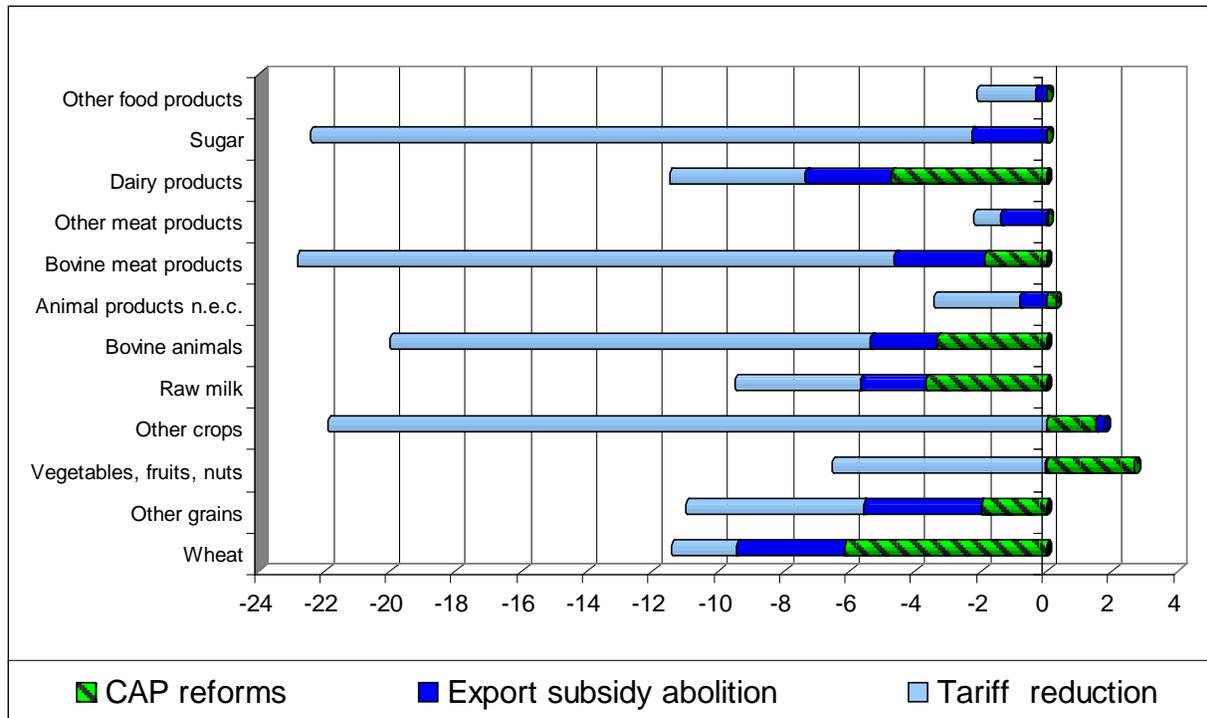
Figure 4. Decomposition of different policy effects on the changes in EU production under the US Proposal for tariff reductions (Reference year 2001 using GTAP version 6 database).

largely responsible for the decrease in production for wheat and dairy products. The decomposition shows that tariff reduction has the greatest contribution to the total drop in the production of bovine meat products in the EU. Out of the 15% drop in production under the EU formula, tariff reduction alone accounts for 11% of the drop compared to less than 5% for both CAP reforms and export subsidy abolition. Under the US formula, out of the 23% drop in production, tariff reduction alone accounts for 18%, and both CAP reforms and export subsidy abolition account for less than 5% of the drop. By comparing the EU Proposal (Figure 3) for tariff reduction with the steeper tariff reduction under the US Proposal (Figure 4), the production of bovine meat products would sharply decrease with further market opening. Therefore, some bovine meat products may be designated as sensitive products by the EU in the WTO in order to protect the domestic production of these products. Designation as sensitive products will give the EU flexibility to shield them from the full force of the applicable tariff reduction formula by applying a lower tariff reduction formula. The decomposition also shows that CAP reforms have the greatest contribution to the total drop in the production of dairy products in the EU. Out of the 7% drop in production under the EU formula, CAP reforms alone account for 4% of the drop compared to 3% for both export subsidy abolition and tariff reduction. Under the US formula, out of the 12% drop in production, CAP reforms account for 5%, tariff reduction accounts for 4%, and export subsidy abolition accounts for 3% of the drop. This is an indication that dairy products are very sensitive to domestic policy reforms. Furthermore, EU production of dairy products will considerably decrease under the US Proposal for tariff reduction compared to the EU Proposal. Thus, some dairy products may be designated as sensitive products in the WTO in order to avoid the full force of the applicable tariff reduction formula.

Exports According to EU Region

In terms of EU exports under the EU tariff reduction formula (Appendix 3), sugar (60%), bovine meat products (57%), dairy products (23%), other grains (22%), and wheat (18%) have the highest percentage reduction in exports, but dairy products (USD 5.6 billion), bovine meat products (USD 4.2 billion), and other food products (USD 2.7 billion) have the highest reduction in the value of exports. Even though the percentage reduction in the exports (Figure 5) of other food products is the lowest, the value of the reduced exports (Figure 6) is high due to the highly processed nature of the food products. On the contrary, the percentage drop in the exports of sugar is large, but the drop in the value of exports is low compared to the other products. Under the US tariff reduction formula (Appendix 4), bovine meat products (72%), sugar (71%), dairy products (28%), other grains (27%), and other crops (22%) have the highest percentage reduction in exports, but dairy products (USD 7.6 billion), bovine meat products (USD 5.3 billion), and other food products (USD 2.9 billion) have the highest value reduction in exports. Similarly, the percentage reduction in the exports of other food products is low (3%), but the value of the reduced exports is high. If the reduction in exports is measured in terms of value (Figure 6), the exports of dairy products are considered to experience the highest level of reduction, followed by bovine meat products and other food products (processed food products). Domestic policy reforms and trade liberalization in the EU may cause reductions in the exports of almost all the examined agricultural products, ranging from 3% to 60% under the EU tariff reduction formula and from 1% to 72% under the US tariff reduction formula. Among the EU countries and regions, Finland may experience the largest percentage drop in the exports of bovine meat products (80% under the EU formula; 89% under the US formula), but the value of exports is
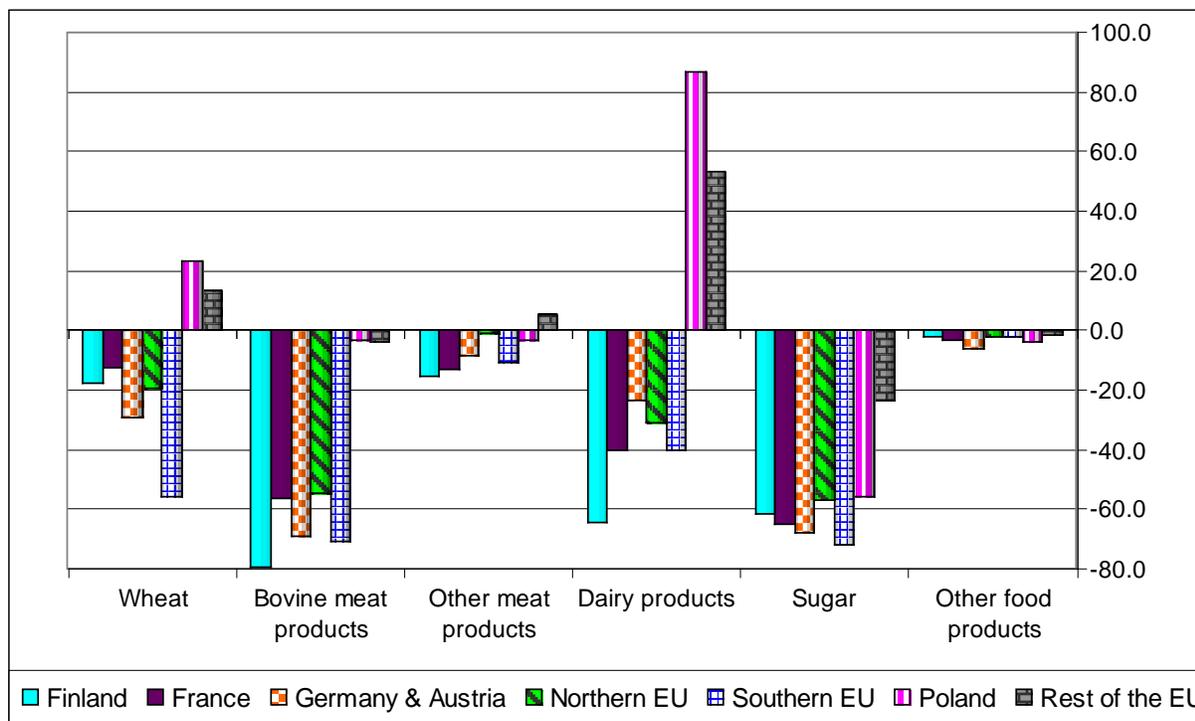

Figure 5. Changes in agrifood exports (in percentage - %) according to EU region under the EU Proposal for tariff reductions (Reference year 2001 using GTAP version 6 database).
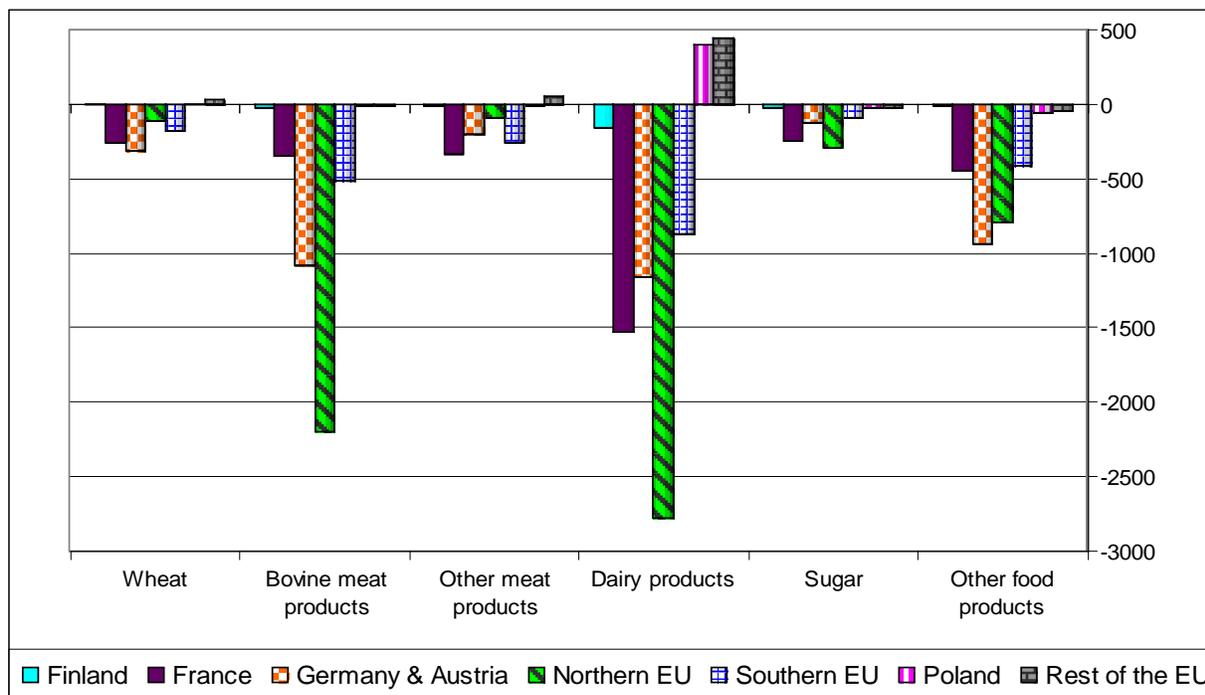
Figure 6. Changes in agrifood exports (in value - US$ Million) according to EU region under the EU Proposal for tariff reductions (Reference year 2001 using GTAP version 6 database)

negligible compared to the other EU regions. Northern EU may experience the biggest drop in the value of exports (USD 2.8 billion under the EU formula) for dairy products, but the percentage drop (31% under the EU formula) in exports is moderate compared to the other EU regions.

Imports According to EU Region

In terms of EU imports under the EU tariff reduction formula (Appendix 5), sugar (65%), bovine meat products (64%), other crops (15%), dairy products (11%), wheat (8%), and other meat products (7%) have the highest percentage increase in imports, but bovine meat products (USD 6.1 billion), other food products (USD 4.8 billion), other crops (USD 3.8 billion), sugar (USD 2.3 billion), dairy products (USD 2 billion), and other meat products (USD 1.2 billion) have the highest value increase in imports. Although the percentage increase (Figure 7) in the imports of other food products is very small, the value (Figure 8) of the increased imports is considerable due to the highly processed nature of the food products. In comparison, the percentage rise in the imports of sugar is extremely high, but the imported value is much lower than for other food products. Under the US tariff reduction formula (Appendix 6), sugar (128%), bovine meat products (124%), other crops (37%), dairy products (33%), other meat products (16%), and wheat (9%) have the highest percentage increase in imports, but bovine meat products (USD 12 billion), other crops (USD 9.6 billion), other food products (USD 8.5 billion), dairy products (USD 5.9 billion), sugar (USD 4.6 billion), and other meat products (USD 2.7 billion) have the
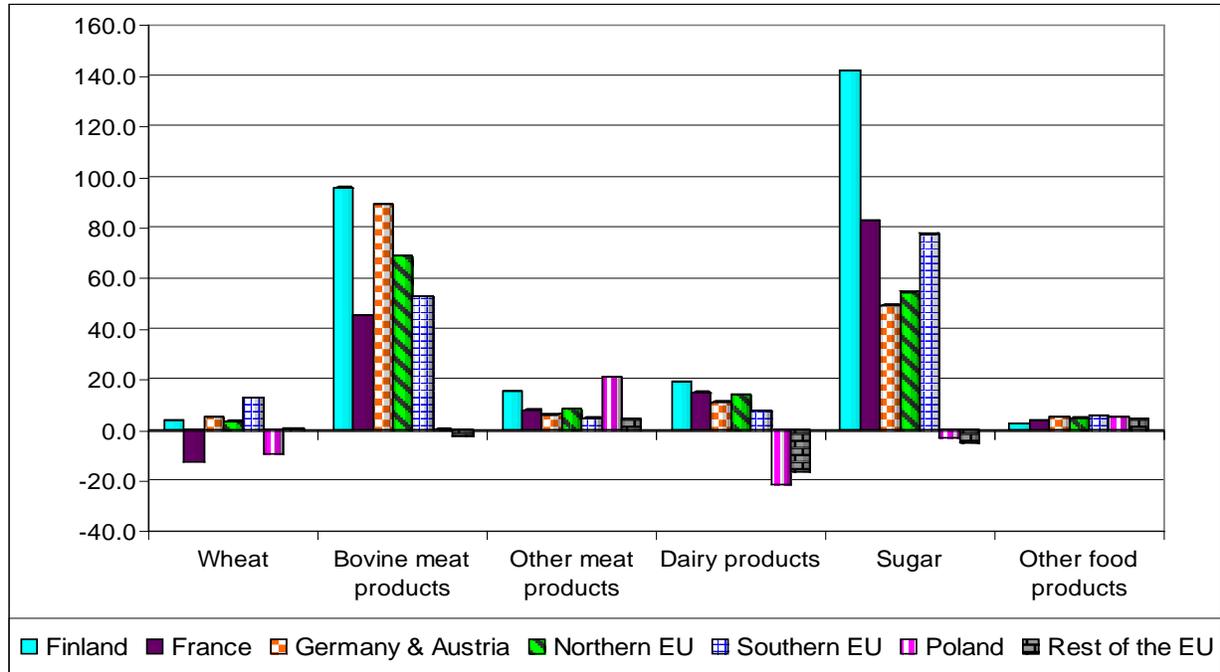
Figure 7. Changes in agrifood imports (in percentage - %) according to EU region under the EU Proposal for tariff reductions (Reference year 2001 using GTAP version 6 database).
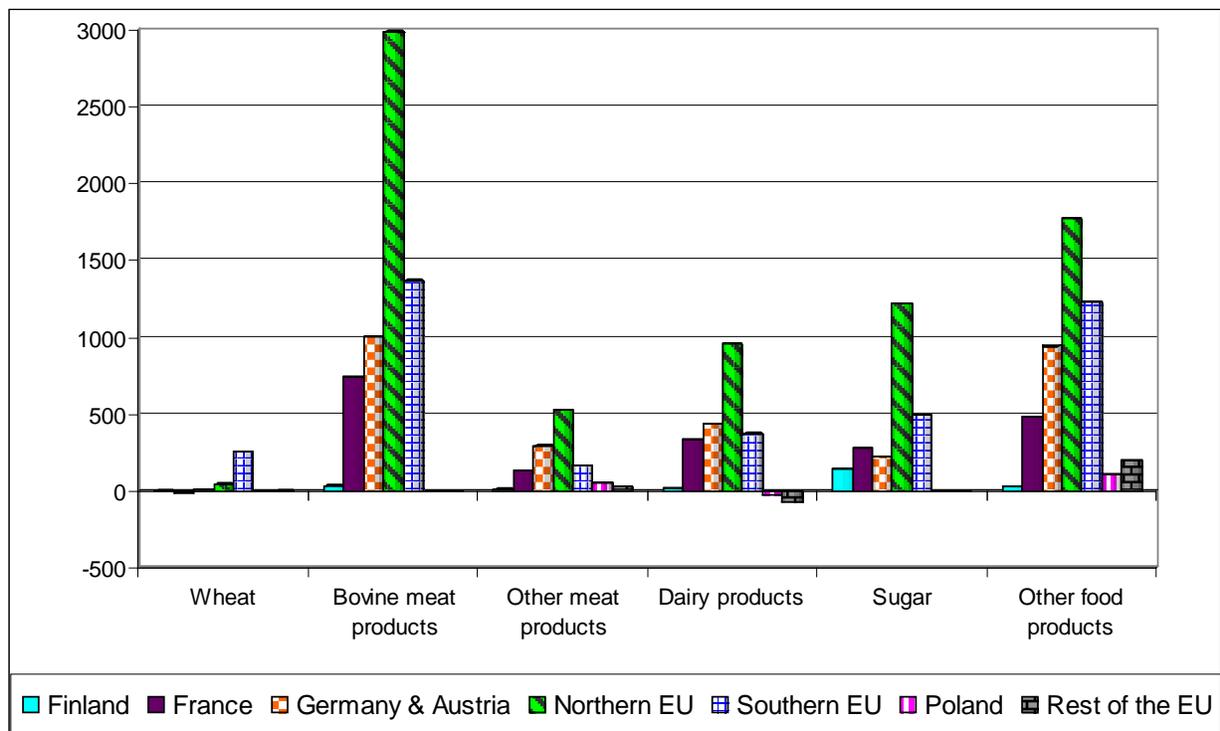

Figure 8. Changes in agrifood exports (in value - US$ Million) according to EU region under the EU Proposal for tariff reductions (Reference year 2001 using GTAP version 6 database).

highest value increase in imports. The percentage increase in the imports of other food products is the same as for wheat (9%), but the value of the increased imports of other food products is 25 times greater than the value of wheat imports. If the increase in imports is measured in terms of value (Figure 8), the import of bovine meat products is considered to experience the highest level of increase, followed by other food products (processed food products) and sugar. Domestic policy reforms and trade liberalization in the EU may cause increases in the imports of almost all the examined agricultural products, ranging from USD 13 million to USD 6 billion under the EU tariff reduction formula and from USD 56 million to USD 12 billion under the US tariff reduction formula. Among the EU countries and regions, Finland may experience the largest percentage growth in imports, especially for sugar (142% under the EU formula; 310% under the US formula), but Northern EU is the region that may experience the largest growth in the value of imports, especially for bovine meat products (USD 3 billion under the EU formula; USD 5.4 billion under the US formula).

Production, Exports, and Imports: US Proposal Versus EU Proposal; Small Versus Large EU Members; Old Versus New EU Members.

The steeper tariff reduction formula of the US Proposal compared to the EU Proposal would cause a larger decrease in EU production and EU exports as well as a higher increase in EU imports of the examined agricultural commodities/sectors (Appendix 8). The scale of production, exports, and imports for France measured in value terms is approximately ten times greater than for Finland. Therefore, France has a major role in the CAP and a major voice in the negotiating position of the EU at the WTO. The most striking impact of the steeper tariff reduction formula (US Proposal) is that the amount of EU imports doubled compared to the milder tariff reduction formula (EU Proposal). The rise in imports of sugar is most profound in Finland, and France has the steepest growth in the imports of bovine meat products compared to the other agricultural products, whereas Poland may experience a dramatic expansion in the imports of other food products. Concerning Poland, the results suggest that the country is very competitive in the production of dairy products; hence the rise in production and exports of dairy products after trade liberalization and domestic policy reforms. Several studies (Gorton et. al 2001, Dries and Swinnen 2004, IFCN 2008) have pointed out that Poland has a lower cost of production for milk compared to the old EU member countries and high scope for productivity improvement stemming from the improvement in investment conditions and catching up with the technological lag.

Trade liberalization and domestic policy reforms would cause production declines in the old EU member countries for all the examined agricultural commodities/sectors, while the new EU member countries may encounter production growth in some of the examined agricultural products (Appendix 9 and Appendix 10). Bovine meat products, dairy products, and sugar may encounter the most drastic decline in exports. In the case of imports, the level of bovine meat product and sugar imports may grow to an extremely high level due to trade liberalization, especially when the tariffs are reduced under the US Proposal, and these sectors in Finland may be flooded by imports of these products. Brockmeier et al. (2006) have shown that the highly protected beef and milk sectors of the EU are particularly affected by the application of the US Proposal for tariff reductions, and the highly protected EU agricultural sectors would experience a severe negative change in their trade balances. The Food and Agricultural Policy Research

Institute (FAPRI 2005) has found that the combined effect of trade liberalization and domestic policy changes would significantly increase beef imports in the EU and substantially decrease EU exports and production. In addition, using comparable methodology for simulating trade liberalization and domestic support reforms in the EU, Jensen and Yu (2005) have shown that EU production of bovine meat products and other agricultural products would significantly drop together with decreasing exports and expanding imports of these products. In comparison, the results are more severe in this study.

Conclusions

This study has aimed to address the question of what would be the overall effects of further trade liberalization and the implemented CAP reforms on EU agricultural production, imports and exports within different EU regions by using the multi-region and multi-sector computable general equilibrium model known as the GTAP model. Moreover, the GTAP model was used to compare a lower tariff reduction formula (EU Proposal) with a higher reduction formula (US Proposal) in order to show how sensitive the examined agricultural commodity/sector is to the different tariff reduction formulae. This will indicate the agricultural commodities/sectors that are vulnerable to further market opening and a extreme reduction in tariffs.

This study has shown that EU imports would escalate and EU exports would plummet with declining EU production because of trade liberalization and domestic policy reforms in the EU agricultural markets and sectors. The results suggest that CAP reforms accompanied by tariff reductions and the removal of export subsidies would cause a reduction in EU production in all the examined agricultural products ranging from 1% to 15% under the EU tariff reduction formula and from 2% to 23% under the US tariff reduction formula. The decline in EU agricultural production would reduce EU exports of almost all the examined agricultural products by from 3% to 60% under the EU tariff reduction formula and from 1% to 72% under the US tariff reduction formula. Additionally, EU imports would increase for almost all the examined agricultural products, ranging from USD 13 million to USD 6 billion under the EU tariff reduction formula and from USD 56 million to USD 12 billion under the US tariff reduction formula. Northern EU and Finland would be the hardest hit region and country, respectively, in terms of decreasing production and exports in combination with increasing imports. The decoupling of the CAP support payments and a drastic increase in input prices such as fertilizers, energy and labor have lowered the incentive for high cost producers to continue production. High cost producers in countries such as Finland, Sweden, and Denmark will only continue to produce with higher prices for food and agricultural products. Otherwise, agriculture is not a competitive industry for labor or capital in these countries.

The decomposition of the different policy effects on EU production demonstrated that tariff reduction has the most powerful impact on the production of sugar, bovine meat products, bovine animals, and other crops, whereas export subsidy abolition has a considerable impact on wheat, other grains, and dairy products. CAP reforms are largely responsible for the decrease in production for wheat and dairy products. The decomposition showed that tariff reduction has the greatest contribution to the total drop in the production of bovine meat products in the EU. Therefore, some bovine meat products may be designated as sensitive products by the EU in the WTO. Designation as sensitive products will give the EU flexibility to shield these products

from the full force of the applicable tariff reduction formula by applying a lower tariff reduction formula. The decomposition also showed that CAP reforms have the greatest contribution to the total drop in the production of dairy products in the EU. EU production of dairy products would considerably decrease under the US Proposal for tariff reduction compared to the EU Proposal. Thus, some dairy products may be designated as sensitive products in the WTO in order to avoid the full force of the applicable tariff reduction formula. The negotiated formula for tariff reductions in the WTO draft proposal[2] for the Agreement on Agriculture is a compromise between the EU and US Proposals. Hence, agricultural commodities/sectors analyzed as sensitive in this study may be declared as comprising sensitive products by the EU in the up-coming Doha Round. The market access pillar of the agricultural negotiations is very difficult for the EU due to its vulnerability to imports.

The most striking impact of a steeper tariff reduction formula (US Proposal) is that the quantity of EU imports would double compared to a milder tariff reduction formula (EU Proposal). The rise in imports of sugar would be most profound in Finland, and France would have the steepest growth in the imports of bovine meat products compared to the other agricultural products, whereas Poland may experience a dramatic expansion in the imports of other food products. Trade liberalization and domestic policy reforms would cause production declines in the old EU member countries for all the examined agricultural products, whereas the new EU member countries may encounter production growth in some of the examined agricultural products. Bovine meat products, dairy products, and sugar may encounter the most drastic decline in exports. Moreover, the imports of bovine meat products and sugar may grow to extremely high levels due to trade liberalization, especially if the tariffs are reduced according to the US Proposal: Finland may be flooded by imports of these products. In order to protect the domestic production of these products, the EU may designate sugar, bovine meat products, and dairy products as sensitive products in the WTO. However, aggregates are deceptive, because the GTAP model could not include products at the level of detail at which tariff lines are specified (for example at the 8-digit level, and the EU tariff schedule includes 2200 tariff lines). Consequently, the assessment of EU agricultural products that are sensitive to trade liberalization cannot be precise in this study.

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[2] Under the WTO draft proposal, tariffs between zero and 20 percent are to be reduced by 50 percent; tariffs between 20 to 50 percent would be cut by 57 percent; tariffs between 50 to 75 percent would be lowered by 64 percent; and tariffs above 75 percent would be decreased by 70 percent (WTO 2008).

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Appendix 1.

Changes in EU agrifood production according to country/region under the EU Proposal for tariff reductions
(Reference year 2001 using GTAP version 6 database)

	EU		Finland		France		Germany & Austria		Northern EU		Southern EU		Poland		Rest of the EU	
	%	US$ Mill.	%	US$ Mill.	%	US$ Mill.	%	US$ Mill.	%	US$ Mill.	%	US$ Mill.	%	US$ Mill.	%	US$ Mill.
Wheat	-10.4	-1378	-4.0	-2	-9.3	-290	-13.7	-385	-9.4	-238	-27.3	-515	0.9	11	3.4	41
Other grains	-8.4	-1187	-13.9	-44	-11.2	-328	-12.1	-401	-13.9	-284	-5.2	-158	1.6	17	0.9	10
Vegetables, fruits, nuts	-1.6	-838	-2.1	-6	-3.0	-206	-0.5	-21	-4.2	-370	-0.6	-165	-0.5	-21	-2.3	-49
Other crops	-9.8	-6309	-7.3	-47	-5.9	-886	-9.5	-1121	-17.1	-2110	-8.5	-1646	-7.8	-200	-13.2	-298
Raw milk	-5.9	-2589	-10.4	-76	-7.4	-534	-5.2	-563	-9.8	-1215	-5.5	-428	5.6	126	5.5	101
Bovine animals	-13.5	-3537	-6.4	-9	-7.6	-451	-21.6	-728	-20.7	-1588	-10.7	-771	1.0	6	0.4	4
Animal products n.e.c.	-2.0	-1057	-6.1	-35	-2.7	-206	-2.5	-222	-2.8	-409	-1.3	-186	-0.6	-18	0.5	21
Bovine meat products	-15.4	-10605	-6.2	-66	-11.2	-1112	-21.7	-2360	-26.2	-5153	-9.2	-1937	0.4	10	0.6	12
Other meat products	-1.8	-2009	-3.3	-46	-2.6	-463	-2.8	-514	-1.9	-685	-1.3	-308	-0.9	-61	1.4	68
Dairy products	-7.1	-8727	-10.9	-264	-10.3	-2052	-6.4	-1683	-11.3	-4495	-5.9	-1380	16.2	538	17.0	608
Sugar	-14.6	-3517	-9.3	-137	-15.7	-531	-8.2	-402	-24.6	-1913	-21.4	-508	-1.0	-18	-0.5	-9
Other food products	-1.4	-7263	-1.9	-62	-1.6	-1031	-1.5	-1758	-1.8	-2851	-1.3	-1593	0.3	81	-0.3	-50

Appendix 2.

Changes in EU agrifood production according to country/region under the US Proposal for tariff reductions
(Reference year 2001 using GTAP version 6 database)

	EU		Finland		France		Germany & Austria		Northern EU		Southern EU		Poland		Rest of the EU	
	%	US$ Mill.	%	US$ Mill.	%	US$ Mill.	%	US$ Mill.	%	US$ Mill.	%	US$ Mill.	%	US$ Mill.	%	US$ Mill.
Wheat	-11.4	-1520	-5.4	-2	-12.5	-390	-15.8	-442	-8.0	-204	-28.3	-535	0.4	5	4.0	49
Other grains	-11.0	-1548	-15.6	-49	-15.0	-438	-14.8	-491	-15.8	-322	-7.5	-229	1.0	11	-2.6	-30
Vegetables, fruits, nuts	-3.8	-2022	-4.8	-13	-5.1	-354	-3.3	-151	-7.4	-653	-3.0	-778	-0.3	-13	-2.7	-59
Other crops	-20.1	-13066	-16.4	-106	-13.0	-1965	-21.5	-2551	-31.9	-3946	-18.5	-3572	-14.8	-383	-24.0	-543
Raw milk	-9.5	-4160	-12.5	-92	-10.8	-780	-9.2	-1001	-15.5	-1918	-8.2	-640	6.9	154	6.3	117
Bovine animals	-20.0	-5228	-9.7	-14	-14.6	-863	-29.2	-985	-28.5	-2188	-16.1	-1159	0.0	0	-2.3	-19
Animal products n.e.c.	-3.1	-1665	-7.1	-40	-4.2	-324	-4.7	-421	-3.8	-552	-2.4	-345	-1.4	-42	1.5	59
Bovine meat products	-22.8	-15865	-9.4	-101	-19.2	-1907	-29.8	-3239	-38.4	-7536	-14.4	-3019	-0.4	-10	-2.4	-52
Other meat products	-2.2	-2405	-3.5	-49	-4.0	-711	-5.1	-943	-0.6	-238	-2.1	-502	-1.9	-136	3.5	174
Dairy products	-11.5	-14103	-13.2	-318	-14.5	-2906	-11.5	-3040	-17.9	-7113	-8.8	-2068	19.8	658	19.2	683
Sugar	-22.4	-5445	-15.7	-230	-23.8	-804	-13.9	-684	-36.8	-2866	-33.0	-783	-1.4	-25	-3.2	-53
Other food products	-2.1	-10543	-2.7	-87	-2.4	-1538	-2.4	-2773	-2.4	-3836	-1.8	-2208	0.2	49	-0.8	-150

Appendix 3.

Changes in EU agrifood exports according to country/region under the EU Proposal for tariff reductions
(Reference year 2001 using GTAP version 6 database)

	EU		Finland		France		Germany & Austria		Northern EU		Southern EU		Poland		Rest of the EU	
	%	US$ Mill.	%	US$ Mill.	%	US$ Mill.	%	US$ Mill.	%	US$ Mill.	%	US$ Mill.	%	US$ Mill.	%	US$ Mill.
Wheat	-18.0	-804	-17.9	0	-12.5	-253	-28.9	-308	-19.7	-104	-56.0	-173	23.3	0	13.7	35
Other grains	-22.4	-728	-31.0	-27	-16.0	-245	-39.7	-255	-34.9	-172	-22.9	-32	-8.7	0	1.0	2
Vegetables, fruits, nuts	-3.4	-569	-1.6	0	-6.5	-135	-2.2	-18	-5.6	-225	-1.5	-135	-10.8	-22	-9.7	-35
Other crops	-12.3	-1574	12.6	1	-16.5	-258	-9.9	-161	-15.1	-973	-2.4	-57	-25.3	-43	-16.2	-83
Raw milk	11.2	4	-4.4	0	-6.9	-1	30.9	3	43.2	2	6.5	1	-3.3	0	-1.5	0
Bovine animals	-13.9	-352	-21.1	0	-3.7	-32	-26.9	-75	-26.2	-221	-21.3	-27	2.0	3	-0.3	-1
Animal products n.e.c.	0.1	-2	-16.1	-17	-5.0	-41	-1.5	-16	3.6	98	-1.9	-16	-8.4	-9	-0.5	-2
Bovine meat products	-57.1	-4170	-79.5	-14	-56.2	-345	-68.8	-1088	-54.9	-2203	-70.5	-512	-3.3	-4	-3.9	-5
Other meat products	-4.5	-850	-15.6	-14	-13.2	-336	-8.3	-204	-0.9	-84	-11.0	-254	-3.5	-11	5.5	53
Dairy products	-22.7	-5648	-64.1	-157	-40.0	-1533	-23.5	-1164	-30.7	-2783	-40.2	-870	86.5	410	53.2	449
Sugar	-59.5	-808	-61.7	-20	-65.0	-242	-68.1	-121	-57.1	-290	-71.9	-91	-55.5	-25	-23.2	-18
Other food products	-2.9	-2691	-1.9	-7	-3.1	-446	-6.3	-938	-2.0	-794	-2.3	-409	-3.9	-57	-1.4	-39

Appendix 4.

Changes in EU agrifood exports according to country/region under the US Proposal for tariff reductions
(Reference year 2001 using GTAP version 6 database)

	EU		Finland		France		Germany & Austria		Northern EU		Southern EU		Poland		Rest of the EU	
	%	US$ Mill.	%	US$ Mill.	%	US$ Mill.	%	US$ Mill.	%	US$ Mill.	%	US$ Mill.	%	US$ Mill.	%	US$ Mill.
Wheat	-17.7	-800	-23.9	0	-16.2	-329	-31.1	-331	-3.9	-20	-54.7	-169	93.0	0	19.9	50
Other grains	-27.0	-869	-33.7	-29	-20.7	-317	-44.6	-286	-36.9	-182	-27.0	-37	-18.5	-1	-7.1	-17
Vegetables, fruits, nuts	-7.5	-1268	-2.6	-1	-10.1	-211	-7.7	-62	-9.2	-373	-6.1	-565	-10.2	-21	-9.9	-36
Other crops	-21.7	-2800	25.2	2	-30.3	-474	-20.4	-330	-27.2	-1748	-4.1	-96	-32.7	-56	-19.2	-98
Raw milk	24.6	10	1.3	0	2.0	0	44.7	4	63.1	3	18.3	1	7.3	0	13.2	1
Bovine animals	-19.7	-484	-17.0	0	-15.4	-132	-31.6	-89	-25.4	-214	-29.2	-37	-1.2	-2	-6.9	-11
Animal products n.e.c.	-1.4	-88	-19.2	-21	-7.5	-61	-3.4	-36	2.1	56	-3.7	-30	-10.6	-11	4.6	16
Bovine meat products	-71.9	-5258	-89.4	-16	-73.1	-448	-81.8	-1293	-72.1	-2895	-82.2	-597	-4.7	-5	-3.0	-4
Other meat products	0.6	-43	-3.4	-3	-18.2	-464	-10.6	-262	9.1	851	-15.6	-361	-1.6	-5	20.8	200
Dairy products	-27.7	-7559	-70.0	-171	-52.3	-2001	-36.9	-1826	-41.6	-3769	-49.9	-1081	123.8	587	83.2	701
Sugar	-71.1	-962	-58.1	-19	-79.7	-297	-73.6	-131	-69.8	-355	-80.8	-103	-57.9	-26	-41.7	-32
Other food products	-3.1	-2927	-0.8	-3	-3.9	-552	-9.1	-1340	-1.6	-633	-1.7	-302	-4.3	-64	-1.2	-33

Appendix 5.

Changes in EU agrifood imports according to country/region under the EU Proposal for tariff reductions
(Reference year 2001 using GTAP version 6 database)

	EU		Finland		France		Germany & Austria		Northern EU		Southern EU		Poland		Rest of the EU	
	%	US$ Mill.	%	US$ Mill.	%	US$ Mill.	%	US$ Mill.	%	US$ Mill.	%	US$ Mill.	%	US$ Mill.	%	US$ Mill.
Wheat	8.1	298	3.8	0	-12.5	-15	5.1	11	3.5	47	12.8	259	-9.5	-5	0.7	0
Other grains	0.5	14	-7.4	-1	3.4	4	1.0	4	0.3	3	1.4	17	-9.2	-13	-0.1	0
Vegetables, fruits, nuts	1.3	379	3.1	10	2.4	94	0.9	75	0.3	28	2.6	114	4.0	28	3.0	30
Other crops	14.6	3804	16.2	42	17.3	457	14.0	947	5.1	529	25.2	1411	27.4	190	18.5	227
Raw milk	-13.1	-11	-2.1	0	-6.5	-1	-12.4	-3	-20.1	-7	-8.1	-1	4.9	0	3.8	0
Bovine animals	4.7	110	26.1	0	-11.3	-21	-9.4	-8	11.8	91	3.0	46	2.3	0	6.8	3
Animal products n.e.c.	0.2	13	1.8	1	0.7	5	0.2	4	-3.3	-57	1.1	33	4.9	12	3.9	15
Bovine meat products	63.8	6121	95.9	35	45.3	740	89.5	1001	69.0	2981	53.0	1367	0.4	0	-2.5	-3
Other meat products	7.2	1219	15.4	12	8.0	135	6.2	295	8.4	528	4.8	167	21.3	53	4.8	28
Dairy products	11.3	2025	19.1	22	15.1	332	11.2	440	14.2	958	7.9	373	-21.5	-27	-16.3	-73
Sugar	64.5	2349	142.3	141	83.0	277	49.4	223	54.6	1216	77.6	496	-3.2	0	-5.0	-3
Other food products	5.0	4761	2.8	30	3.9	481	5.4	941	4.8	1767	5.8	1230	5.4	108	4.5	203

Appendix 6.

Changes in EU agrifood imports according to country/region under the US Proposal for tariff reductions
(Reference year 2001 using GTAP version 6 database)

	EU		Finland		France		Germany & Austria		Northern EU		Southern EU		Poland		Rest of the EU	
	%	US$ Mill.	%	US$ Mill.	%	US$ Mill.	%	US$ Mill.	%	US$ Mill.	%	US$ Mill.	%	US$ Mill.	%	US$ Mill.
Wheat	9.3	346	5.4	0	-9.3	-11	7.2	16	5.4	73	13.0	262	-2.9	-1	10.3	8
Other grains	1.9	56	-3.1	0	7.6	10	1.9	9	0.5	5	2.2	25	-6.3	-9	7.1	17
Vegetables, fruits, nuts	2.9	853	6.1	20	4.3	165	2.1	175	1.1	117	6.8	302	4.4	31	4.4	44
Other crops	36.7	9562	41.7	108	49.6	1308	35.0	2372	13.4	1394	62.8	3515	56.6	392	38.4	473
Raw milk	-18.0	-15	-4.3	0	-13.1	-1	-15.4	-4	-26.0	-8	-13.3	-2	1.8	0	-1.3	0
Bovine animals	9.3	220	47.6	1	-10.8	-20	-9.3	-8	23.4	180	3.5	54	19.8	1	33.4	12
Animal products n.e.c.	1.8	141	3.0	2	2.5	18	0.7	13	-2.0	-34	3.1	96	8.1	20	7.0	26
Bovine meat products	123.9	11954	208.7	76	100.0	1632	174.7	1955	125.4	5413	108.4	2795	71.3	17	54.3	66
Other meat products	15.9	2691	27.8	22	16.6	281	14.0	664	18.5	1167	9.9	340	44.9	111	18.3	106
Dairy products	32.7	5890	49.2	58	36.5	805	31.5	1236	39.7	2674	19.8	930	42.8	54	29.8	134
Sugar	127.5	4623	309.8	306	178.3	595	119.5	539	99.1	2206	148.1	946	63.2	7	36.5	23
Other food products	8.9	8512	5.4	59	7.1	866	9.7	1698	8.6	3167	10.1	2137	9.9	201	8.4	384

Appendix 7.

Decomposition of different policy effects on the changes in EU agrifood production under the different tariff reduction formulae of the EU Proposal and US Proposal (Reference year 2001 using GTAP version 6 database)

	EU Proposal (in percentage) Effect from				**US Proposal** (in percentage) Effect from		
	EU Total	CAP reforms	Export subsidy abolition	Tariff reduction	EU Total	CAP reforms	Export subsidy abolition	Tariff reduction
Wheat	-10.4	-6.4	-3.1	-0.9	-11.4	-6.2	-3.3	-2.0
Other grains	-8.4	-2.1	-3.6	-2.7	-11.0	-2.0	-3.6	-5.4
Vegetables, fruits, nuts	-1.6	2.6	0.0	-4.2	-3.8	2.7	0.0	-6.5
Other crops	-9.8	1.8	0.3	-11.8	-20.1	1.5	0.3	-21.9
Raw milk	-5.9	-3.0	-2.0	-0.9	-9.5	-3.7	-2.0	-3.8
Bovine animals	-13.5	-3.1	-1.9	-8.4	-20.0	-3.3	-2.0	-14.6
Animal products n.e.c.	-2.0	0.2	-0.7	-1.5	-3.1	0.3	-0.8	-2.6
Bovine meat products	-15.4	-1.8	-2.6	-10.9	-22.8	-1.8	-2.8	-18.2
Other meat products	-1.8	0.0	-1.2	-0.6	-2.2	0.0	-1.4	-0.8
Dairy products	-7.1	-3.8	-2.6	-0.7	-11.5	-4.7	-2.6	-4.1
Sugar	-14.6	0.0	-2.1	-12.6	-22.4	0.0	-2.3	-20.1
Other food products	-1.4	0.0	-0.3	-1.1	-2.1	0.0	-0.3	-1.8

Appendix 8. The US Proposal versus the EU Proposal, Small versus Large EU Members, Old versus New EU Members (Production, Exports, and Imports in US$ Million)
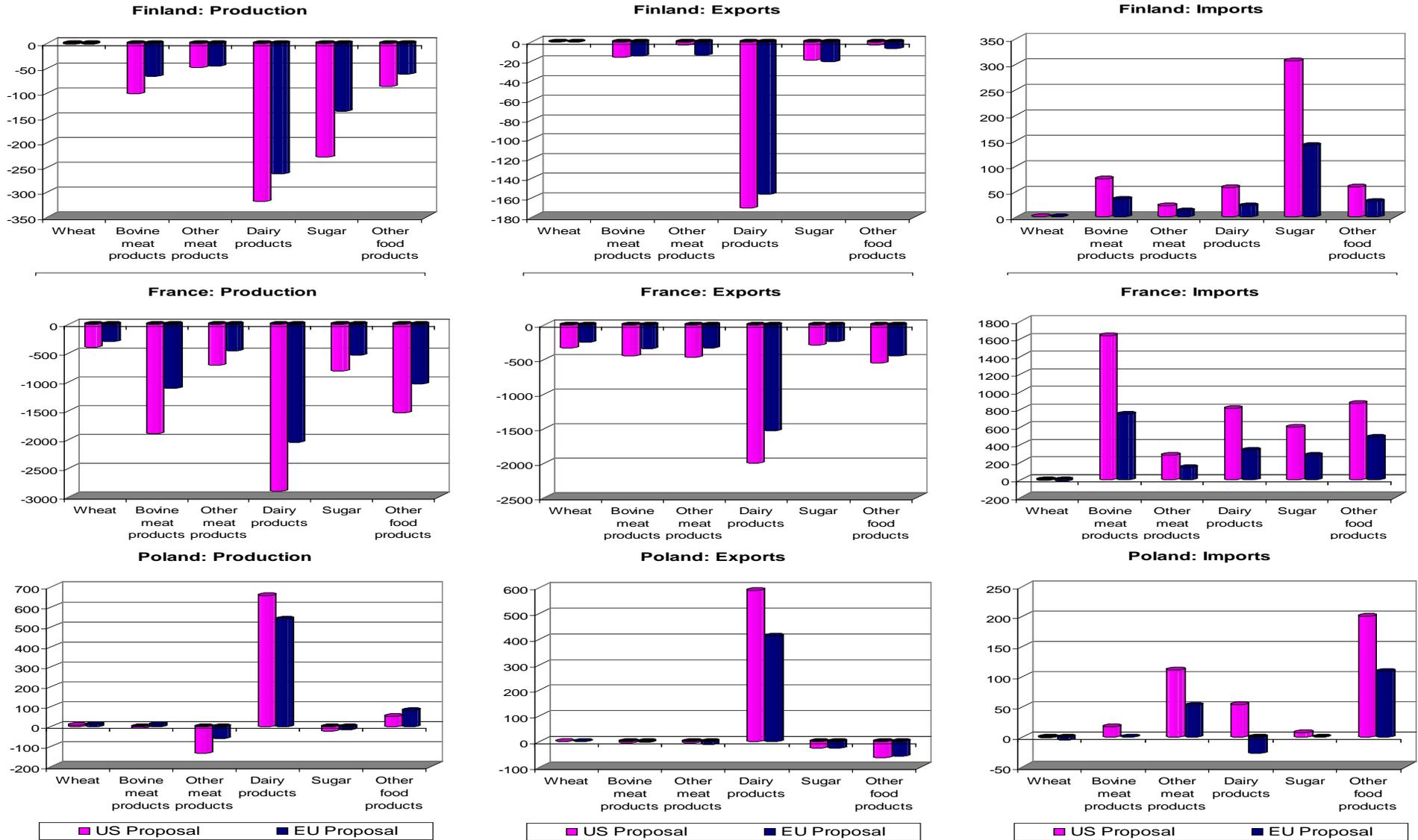
Appendix 9. Percentage increase or decrease in production, exports, and imports under the EU Proposal for tariff reduction

	Finland	France	Germany & Austria	Northern EU	Southern EU	Poland	Rest of the EU
Production: EU Proposal							
0% to 20%						W, G, M, BA, BM, DP, FP	W, G, M, BA, AP, BM, OM, DP
0% to -10%	W, V, C, BA, AP, BM, OM, S, FP	W, V, C, M, BA, AP, OM, FP	V, C, M, AP, OM, DP, S, FP	W, V, M, AP, OM, FP	G, V, C, M, AP, BM, OM, DP, FP	V, C, AP, OM, S	V, S, FP
-11% to -20%	G, M, DP	G, BM, DP, S	W, G	G, C, DP	BA		C
-21% to -30%		BA, BM	BA, BM	BA, BM, S	W, S		
Exports: EU Proposal							
0% to 100%	C		M	M, AP	M	W, BA, DP	W, G, OM, DP
0% to -20%	W, V, M, AP, OM, FP	W, G, V, C, M, BA, AP, OM, FP	V, C, AP, OM, FP	W, V, C, OM, FP	V, C, AP, OM, FP	G, V, M, AP, BM, OM, FP	V, C, M, BA, AP, BM, FP
-21% to -40%	G, BA	DP	W, G, BA, DP	G, BA, DP	G, BA, DP	C	S
-41% to -60%		BM		BM, S	W	S	
-61% to -80%	BM, DP, S	S	BM, S		BM, S		
Imports: EU Proposal							
0% to -25%	G, M	W, M, BA	M, BA	M, AP	M	W, G, DP, S	G, BM, DP, S
0% to 10%	W, V, AP, FP	G, V, AP, OM, FP	W, G, V, AP, OM, FP	W, G, V, C, OM, FP	G, V, BA, AP, OM, DP, FP	V, M, BA, AP, BM, FP	W, V, M, BA, AP, OM, FP
11% to 50%	C, BA, OM, DP	C, BM, DP	C, DP, S	BA, DP	W, C	C, OM	C
51% to 100%	BM	S	BM	BM, S	BM, S		
101% to 150%	S						

W = Wheat; G = Other grains; V = Vegetables, fruits, nuts; C = Other crops; M = Raw Milk, BA = Bovine animals; AP = Animal products; BM = Bovine meat products; OM = Other meat products; DP = Dairy products; S = Sugar; FP = Other food products

Appendix 10. Percentage increase or decrease in production, exports, and imports under the US Proposal for tariff reduction

	Finland	France	Germany & Austria	Northern EU	Southern EU	Poland	Rest of the EU
Production: US Proposal							
0% to 20%						W, G, M, BA, DP, FP	W, M, AP, OM, DP
0% to -10%	W, V, BA, AP, BM, OM, FP	V, AP, OM, FP	V, M, AP, OM, FP	W, V, AP, OM, FP	G, V, M, AP, OM, DP, FP	V, AP, BM, OM, S	G, V, BA, BM, S, FP
-11% to -20%	G, C, M, DP, S	W, G, C, M, BA, BM, DP	W, G, DP, S	G, M, DP	C, BA, BM,	C	
-21% to -30%		S	C, BA, BM	BA	W		C
-31% to -40%				C, BM, S	S		
Exports: US Proposal							
0% to 125%	C, M	M	M	M, AP, OM	M	W, M, DP	W, M, AP, OM, DP
0% to -20%	V, BA, AP, OM, FP	W, V, BA, AP, OM, FP	V, AP, OM, FP	W, V, FP	V, C, AP, OM, FP	G, V, BA, AP, BM, OM, FP	G, V, C, BA, BM, FP
-21% to -40%	W, G	G, C	W, C, BA, DP	G, C, BA	G, BA	C	
-41% to -60%	S	DP	G	DP	W, DP	S	S
-61% to -80%	DP	BM, S	S	BM, S			
-81% to -100%	BM		BM		BM, S		
Imports: US Proposal							
0% to -30%	G, M	W, M, BA	M, BA	M, AP	M	W, G	M
0% to 10%	W, V, AP, FP	G, V, AP, FP	W, G, V, AP, FP	W, G, V, FP	G, V, BA, AP, OM, FP	V, M, AP, FP	W, G, V, AP, FP
11% to 50%	C, BA, OM, DP	C, OM, DP	C, OM, DP	C, BA, OM, DP	W, DP	BA, OM, DP	C, BA, OM, DP, S
51% to 100%		BM		S	C	C, BM, S	BM
101% to 150%			S	BM	BM, S		
151% to 200%		S	BM				
201% to 310%	BM, S						

W = Wheat; G = Other grains; V = Vegetables, fruits, nuts; C = Other crops; M = Raw Milk, BA = Bovine animals; AP = Animal products; BM = Bovine meat products; OM = Other meat products; DP = Dairy products; S = Sugar; FP = Other food products