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ROADBLOCK TO REFORM: THE PERSISTENCE OF AGRICULTURAL EXPORT SUBSIDIES

by

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and Commodities
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ABSTRACT

Agricultural export subsidies are one of the most distorting of the numerous distortions affecting agricultural trade, and the reluctance of users to make clear commitments for their elimination was a key factor contributing to the deadlock of the WTO negotiations on agriculture. In August 2004 the WTO General Council decided to eliminate export subsidies by a specific yet undetermined date. Export subsidies amount to around $6 billion each year, depending on world price movements. Some countries pay export subsidies in order to dispose of their surplus agricultural production on world markets. These payments impose substantial costs on taxpayers in the subsidizing countries and reduce the world prices of several temperate and competing products to the detriment of producers in developing and least developed countries. However, they also benefit consumers in food-importing countries, many of which are developing.

Quantitative analysis using the UNCTAD/FAO ATPSM model suggests that the removal of export subsidies would raise world prices. The major beneficiaries would be EU taxpayers and developing country producers. Since consumers in developing countries probably face higher prices the welfare effects are ambiguous, but most likely only during an initial period until domestic supply capacities can catch up in many of these developing countries. This is because many of them are net importers of wheat, dairy products and beef, and the cheap subsidies imports hinder the production of these products and of substitutes. Although the benefits to some of preferential access to the EU sugar market would also likely be reduced if export subsidy reform led to the reduction of EU domestic sugar prices, increasing world market prices are likely to more than offset the losses. The analysis also points to diverse results regarding specific products for producers and consumers in most countries. This suggests that while longer-term reforms of export subsidies are desirable, the immediate removal of export subsidies is likely to cause some hardships for some developing country consumers, which will need to be addressed with appropriate support mechanisms.

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1. INTRODUCTION

The commitment to eliminate agricultural export subsidies by a specific date, although subject to negotiations, is considered to be the major achievement of the WTO General Council Decision in August 2004. The framework agreement provides for a parallel elimination of all elements and practices of export subsidization, including scheduled export subsidies and distorting elements in export credits, State trading enterprises and food aid. Such subsidies are often regarded as an unfair means of support that distorts international markets (particularly since they are prohibited for non-agricultural products) and imposes an unreasonable burden on third country producers, many of whom are in developing or least developed countries. As such, they represented for a long time a roadblock to a successful outcome in the current WTO trade negotiations.

A new round of negotiations was launched in 2001 as part of the "built-in agenda" decided at the end of the Uruguay Round. While considerable progress has been made in clarifying issues, several deadlines have been missed and export subsidies were one of the key elements behind the failure of the WTO Ministerial Conference in Cancún in late 2003 already. The current WTO work programme, decided at Doha in 2001, covers agriculture, non-agriculture market access, services, dispute settlement and other fields. Most of the negotiations were supposed to be finished as a single undertaking in January 2005. Negotiations on agriculture are among the most difficult, centring on three main pillars — market access, domestic support and export subsidies — although there are other related issues, including TBT/SPS measures. In this paper an analysis of costs and benefits for developed and developing countries resulting from an elimination of agricultural export subsidies is provided. Elimination of subsidies was agreed in the General Council Decision in 2004 (WTO, 2004), albeit without a specific deadline. The computable partial equilibrium model ATPSM[1] is used to determine the likely economic effects of eliminating export subsidies and export credit subsidy elements by country and commodity.

Some countries pay export subsidies in order to dispose of their surplus agricultural production on world markets. This surplus production is often stimulated by domestic supports and high import tariffs. The average annual amount of notified export subsidies between 1995 and 2000 was $6.2 billion. The European Union is by far the largest provider of these export subsidies. Export credits, whose use has been expanding in recent years, may also distort export competition where the credit conditions go beyond what private arrangements could achieve. In this connection, the United States is the largest provider.

Export subsidies are often considered to be the most distorting of the three pillars. The subsidizing of exports increases production and therefore decreases world

[1] The Agricultural Trade Policy Simulation Model ATPSM was developed by UNCTAD in collaboration with FAO. UNCTAD acknowledges financial support from the United Kingdom's Department for International Development for the development of the model and software system for its exploitation.

market prices. This has drawbacks for producers in non-subsidizing countries.[2] Developing countries generally cannot afford to pay export subsidies, and thus lose some of their export competitiveness relative to developed countries. Consumers, however, gain in general from the policy of subsidizing exports so long as they are not taxpayers in subsidizing countries.

In the Uruguay Round member States agreed to cap and reduce export subsidies for agriculture. However, the permitted amount is still considerable and most developing countries and agricultural exporters want them to be eliminated. So far there is no WTO agreement that disciplines the use of export credits or limits the subsidy elements in these loans. At the Doha Ministerial Conference in 2001 ministers agreed to a "reduction of, with a view to phasing out, all forms of export subsidies". In subsequent negotiations many developing countries have demanded a total elimination of export subsidies. Members of the G20, a heterogeneous group of developing countries formed shortly before the Cancún Ministerial Conference, have taken a strong position on this issue. In addition, most least developed and even net food-importing countries (apparently taking the view that their own, currently limited, agricultural production would benefit) also want export subsidies eliminated.

On the other hand, it was only in 2004 that the European Commission indicated that the European Union would be ready to eliminate all export subsidies if other countries did the same. This offer is conditional on other members' removing State trading enterprises and export credits with subsidy components ("parallelism"), on an acceptable outcome emerging with regard to market access and domestic support, and on the EU's non-trade concerns being taken into account. The offer contributed to achieving agreement on a framework for modalities, which provides for the elimination of export subsidies by a certain date.

Despite the importance attached to the elimination of export subsidies by most developing countries and the Cairns Group, several studies have shown that the impact of reducing export subsidies is smaller than that of a reduction of import tariffs. The Economic Research Service of the US Department of Agriculture (USDA) (2001) estimates that export subsidies account for 13 per cent of market distortions in agriculture, compared with 52 per cent accounted for by tariffs and 31 per cent by domestic support. The OECD (2000) finds that the results of export subsidy elimination are fairly modest. World dairy prices would increase, but effects on world crop prices would be limited. This, however, depends on the assumptions made concerning movements in world food prices. Increasing world prices reduces the necessary expenditure on subsidies. Hoekman et al. (2003) concluded from their analysis that a 50 per cent reduction in border protection for subsidized products would have a greater positive impact on developing countries' exports and imports than a comparable reduction in agricultural subsidies.

Our analysis roughly confirms these findings on the relative importance of tariffs and subsidies. One reason is that while export subsidies are about $6 billion, global tariff revenue from agricultural products is in the order of $36 billion. However, since it is likely that WTO members will agree on more ambitious reductions concerning export subsidies than concerning import tariffs the aggregate impact of export subsidy reductions may be considerable. Global annual welfare

[2] There are many examples that demonstrate this linkage. Oxfam (2002), for example, reports that "In Jamaica, trade liberalisation in the early 1990s resulted in the substitution of locally produced fresh milk by subsidised European milk powder as the major input for the Jamaican dairy industry. … these exports dominated the small Jamaican dairy market, with devastating consequences for local producers" (p. 116).

gains resulting from a total elimination are estimated at $4.3 billion, which compares with gains of about $9.5 billion from reducing import tariffs applying the Uruguay Round formula. The Australian Bureau of Agricultural and Resource Economics (ABARE, 2001) puts gains from an elimination of export subsidies at $3.6 billion, in the same order of magnitude.

Major winners are producers in agricultural exporting countries such as competitive Cairns Group members, producers in other developing countries and consumers and taxpayers in developed countries. Another advantage of eliminating export subsidies not captured by the static models that have been used is a likely stabilization effect. It can be expected that the price fluctuations would be reduced, as more adjustment would occur in the subsidizing countries and less would be pushed on to the residual world market. However, consumers in developing countries and even in Cairns Group exporters would have to pay higher food prices unless they also have an option of making corresponding tariff reductions to offset the expected increase in world prices.

Since in developing countries a large proportion of the population depends on the agricultural sector and the share of income that is spent on food is relatively higher in developing and least developed countries, quantitative analysis of this sector is extremely important for these countries. Our results indicate that in many net food-importing developing countries the supply capacity would have to be increased in order to adequately respond to the expected increase in international prices – however modest – as export subsidies are reduced. Laird et al. (2003) show similar results.

The recent proposals to eliminate first export subsidies for products of specific interest to developing countries call for a look at single commodities. Impacts differ greatly for different commodities. Extreme examples are sugar and wheat. Whereas developing countries as a group greatly benefit from the elimination of sugar subsidies, the elimination of wheat subsidies is expected to cause some hardships for consumers, at least during an adjustment period.

However, apart from these direct economic effects, the total elimination of export subsidies may have another positive effect since many developing countries maintain high import tariffs in order to protect their farmers against cheap subsidized imports from developed countries. As shown by Anderson (2004) and others, developing countries would benefit from liberalizing their own markets and the elimination of export subsidies would make this more feasible without costly adjustments. Furthermore, a reinforcement of the rural population, which depends heavily on agricultural production and is in general disproportionately poor, may contribute to poverty alleviation. Export subsidies can distort local markets in developing countries, causing harmful effects for small agricultural producers and food security. This, however, depends on specific country conditions, which are not further examined here.

In this paper, section 2 provides an overview of the current use and ceiling levels of export subsidies. Section 3 describes the theoretical economic effects of export subsidies. Section 4 describes how the Agricultural Trade Policy Simulation Model simulates export subsidies. In section 5 the recent proposals concerning export subsidies are discussed. In section 6 the results of a reduction of export subsidies are outlined. Section 7 concludes with implications and limitations and a discussion on how export subsidy policies are linked to the "development benchmarks" which were developed by UNCTAD.

2. REGULATIONS AND USE OF EXPORT SUBSIDIES

Export subsidies and WTO provisions

In the years leading up to the Uruguay Round export subsidies proliferated. The Uruguay Round Agreement on Agriculture (URAA) imposed disciplines on agricultural export subsidies for the first time. Countries that used agricultural export subsidies agreed to evaluate, declare and reduce them, according to negotiated modalities. Of the current 148 WTO members, 25 countries have export subsidy commitments for various groups of products.[3] The commitments involve both volume and budgetary outlay constraints. Developed countries committed themselves to reducing subsidized exports by 21 per cent in volume and 36 per cent in value by the year 2001. For developing countries the corresponding numbers are 14 per cent and 24 per cent, respectively, and reductions had to be completed by 2004. New subsidies cannot be introduced.

However, the URAA allowed special and differential treatment export subsidies in developing countries (e.g. marketing costs, internal transport and freight charges), export credits with a subsidy component and export subsidies related to international food aid. Least developed countries are exempt from any commitments.

Export subsidy budgetary outlays

The budgetary outlay constraint for all 25 subsidizing countries was almost $11 billion in 2000. The level of export subsidies actually provided depends on production, exchange rates and world food prices, and therefore fluctuates. Subsidies are counter-cyclical, expanding when world prices fall and vice versa. During the period from 1995 to 2000 on average $6.2 billion was spent annually on export subsidies by WTO members. The European Union is by far the largest user of export subsidies, accounting for almost 90 per cent of expenditures (see table 1). On average the EU spent $5.5 billion each year between 1995 and 2000. However, the latest available data for the EU show a distinct decline in its use of export subsidies. In the marketing years 2000/01 and 2001/02 budgetary outlays declined to $2.5 and $2.3 billion, respectively.

Since most of the export subsidies are provided by developed countries from the northern hemisphere, the bulk of subsidies are for temperate products. Almost 35 per cent is for dairy products and 23 per cent is for meat (see figure 1). Producers of cereals, incorporated products and sugar also receive a considerable amount. Beef, which is of export interest to some developing countries, makes up almost 60 per cent of all meat subsidies.

Box 1. Export subsidies

Any payments contingent on exports, producer-financed export subsidies, export marketing subsidies, export-specific transportation subsidies, and subsidies on goods incorporated into exports (Agreement on Agriculture Article 9).

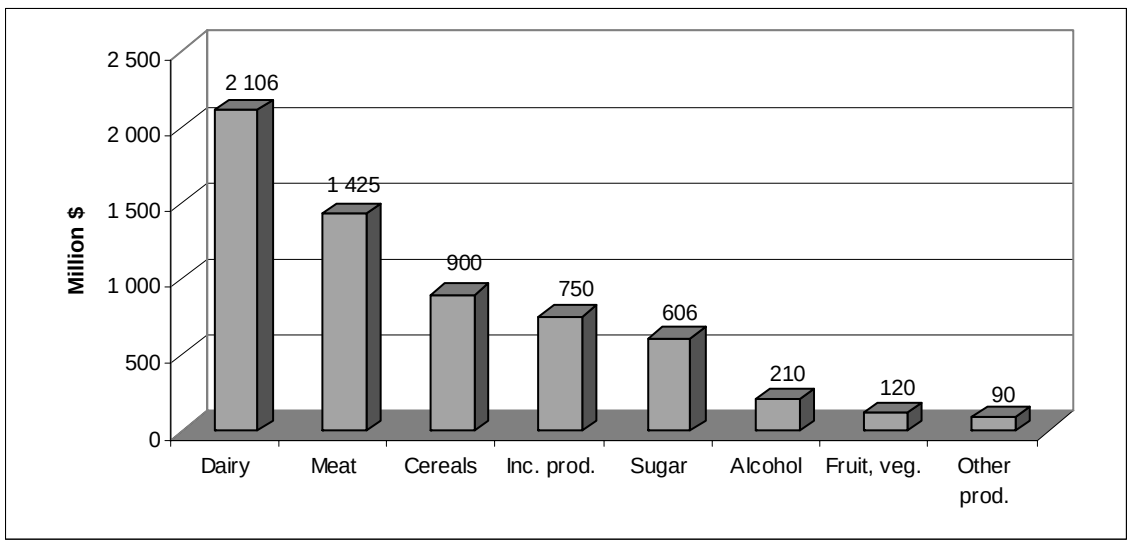
[3] These are the countries which had export subsidies during the Uruguay Round base period.

Table 1. Use of export subsidies: Averages from 1995 to 2000 by country

	Average 1995–2000 (Million $)	%		Average 1995–2000 (Million $)	%
EU	5 503.4	88.7	Israel	6.6	0.1
Switzerland	311.5	5.0	Mexico	3.8	0.1
Norway	85.7	1.4	Cyprus	2.9	0.0
USA	83.6	1.3	Australia	0.6	0.0
Canada*	54.5	0.9	Iceland	0.0	0.0
Czech Republic	37.1	0.6	New Zealand	0.0	0.0
Turkey	28.4	0.5	Romania	0.0	0.0
Poland	21.7	0.3	Bulgaria	0	0
South Africa	18.6	0.3	Brazil	0	0
Hungary	16.9	0.3	Indonesia	0	0
Colombia	12.8	0.2	Panama	0	0
Slovak Republic	10.8	0.2	Uruguay	0	0
Venezuela	7.8	0.1			
			Total	6 206.7	100

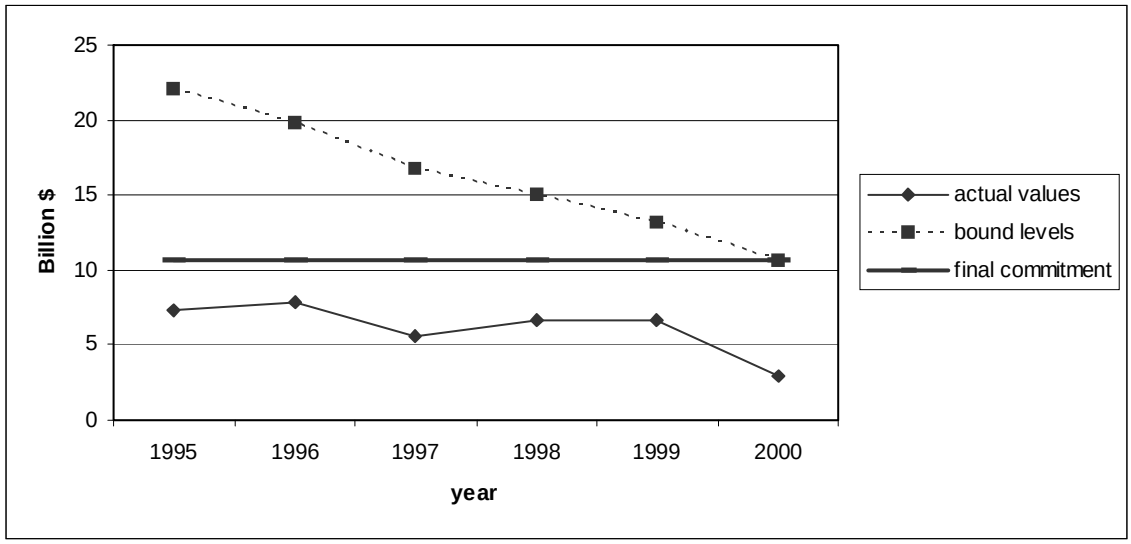
Source: UNCTAD calculation based on WTO notifications.
* See assumptions in the text.

Figure 1. Export subsidy expenditures by commodity groups



Source: UNCTAD calculation based on WTO notifications, averages 1995–2000 in million $.

Figure 2. Bound and actual export subsidy expenditure, all countries



Source: UNCTAD calculations based on WTO notifications.

The utilization rate of the average subsidy expenditures between 1995 and 2000 concerning the final 2000 commitment value of $11 billion is 59 per cent. Since this is calculated using the average annual expenditure of $6.2 billion, there is a great deal of variation, both between countries and between products. Some countries that were allowed to subsidize their exports did not do so at all, whereas other countries took full advantage. For example, Norway's utilization rate is 153 per cent, Switzerland's 119 per cent, the European Union's 80 per cent and the United States' 14 per cent.[4] Bulgaria, Brazil, Indonesia, Panama and Uruguay notified nil use. The variation concerning different products is discussed below.

Export subsidy volumes

When the actually subsidized volumes and expenditures between 1995 and 2000 are compared with the final volume and expenditure constraints, respectively, it is seen that the volume constraint is likely to be less restrictive in the future than the expenditure constraint.[5] For each product category except incorporated products the average subsidized volume between 1995 and 2000 has been calculated and compared with the final 2000 commitment. This utilization rate varies between zero (rapeseed) and 124 (poultry meat) in the EU. The average is 81 per cent for the EU, 74 per cent for Norway, 70 per cent for Switzerland and 26 per cent (excluding other milk products) for the United States.[6] Variations concerning different products are considerable.

[4] This rate is the average of actual subsidies between 1995 and 2000 divided by the 2000 commitment value, summed over all products. Since commitment values decreased during that period the rate may be higher than 100 per cent. The average utilization rate, where this rate is calculated for each year and each product, is smaller (see below). However, using the year 2000 commitment levels shows whether countries are currently, or will in the near future be, constrained rather than whether they were constrained in the past.

[5] This is not in contradiction with the observation of many analysts that in the *past*, the volume constraint has been more restrictive. The value constraint had higher reduction rates than the volume constraint and therefore the final value constraint is more restrictive than the value constraints during the implementation period.

[6] This rate is the simple average of the utilization rate concerning the 2000 commitment values for each product category. Data limitations preclude a more accurate calculation.

Commitments and negotiations

In the EU in particular, subsidized volumes of coarse grains, rice, other milk products, poultry meat, wine and fresh fruit and vegetables are up against their constraints. Taking the average subsidized volumes between 1995 and 2000, any new agreement requiring reductions of more than 10 per cent would be binding for these products. Budgetary expenditure commitments of the EU are especially restrictive for sugar, alcohol, incorporated products and other milk products. Since for some products the value constraints and for others the volume constraints are more likely to be binding, both commitments seem to be important in order to limit export subsidization. In general, volume commitments in the EU have been more binding than value commitments during the implementation period (see also Leetmaa, 2001). The average of the utilization rates calculated for each single product in each year between 1995 and 2000 is 74 per cent concerning volume and 54 per cent concerning value constraints.

In countries other than the EU as well, subsidies for selected products are up against their commitments. Table 2 shows utilization rates by value and volume by product group. Because countries have a different total number of product-specific commitments the relative number of product groups for which the utilization rate is higher that 90 per cent is also shown. Therefore, even small reductions in commitments in a new agreement on agriculture would probably impact on the

Table 2. Export subsidy utilization in selected countries

	Value			Volume		
	Average utilization rate	Products where utilization rate is higher than 90%	Percentage of product groups where utilisation rate is higher than 90%	Average utilisation rate	Products where utilization rate is higher than 90%	Percentage of product groups where utilization rate is higher than 90%
EU	80	Rice, sugar, other milk products, wine, alcohol, incorporated products	30	81	Coarse grain, rice, sugar, cheese, other milk products, beef meat, pigmeat, poultry meat, eggs, wine, fresh fruit and vegetables	58
Norway	153	Bovine meat, eggs and egg products, cheese, whey powder	36	74	Bovine meat, eggs and egg products, cheese, whey powder	40
US	14	Cheese, other milk products	15	26	Skimmed milk powder, other milk products, cheese	23
Switzerland	119	Dairy products, incorporated products	40	70	Dairy products	25

Note: The average utilization rate of value is calculated from the average expenditures during 1995 and 2000 across all commodities and the 2000 commitment level. The average utilization rate of volumes is the average across commodities of the average utilization rate calculated from the subsidized volume between 1995 and 2000 and the final 2000 volume commitment level for each commodity. The US averages exclude other milk products.

Box 2. Canadian export subsidies in dispute

Canada notified the WTO of very little or nil use of export subsidies in the second half of the 1990s. The United States and other WTO members, however, complained about Canada's dairy regime. It was claimed that it infringed the Agreement on Agriculture. The Canadian Government secured an artificially high price level for domestically sold dairy products by a complex system of federal and local Dairy Management Boards. Prices for exports were kept at a lower level. The dispute unfolded in three judicial stages. In the original dispute settlement the Appellate Body followed the valuation of the Dispute Settlement Body, which agreed with the complainant's position that Canada's export subsidies were inconsistent with its WTO obligations. Canada then changed its policy. However, the Appellate Body found during the second compliance panel that Canada's commercial export milk practices constituted export subsidies. Specifically, they found that producers were selling milk at prices below their cost of production – that is, "payments" were being provided – and that government actions regulating the domestic market had the effect of financing these payments. It is not possible to calculate the exact subsidy component of this policy. In this paper, we have assumed for the purposes of further analysis that Canada's annual export subsidy values for dairy products equal their final commitment value. This is $54.5 million.

provision of export subsidies. In countries other than the four major export subsidy providers the average utilization rate is smaller, but also in these countries subsidy measures for a few single commodities are close to the corresponding commitments.[7]

The EU's average subsidy values between 1995 and 2000 were $5.5 billion, only 20 per cent lower than its final bound expenditure level of $6.8 billion. But in 2000 and 2001, outlays decreased to $2.5 and $2.3 billion, respectively, and could therefore accommodate a reduction of more than 60 per cent in the total expenditure. However, as is the case for the 1995–2000 averages, a number of individual commodities, including rice, sugar, incorporated products, wine and fruit and vegetables, are currently close to their expenditure or volume constraints.[8]

Export credits

In the WTO Agreement on Agriculture, signatory countries agreed to "work towards the development of internationally agreed disciplines to govern the provision of export credits, export credit guarantees on insurance programmes". As yet, no such WTO agreement has been negotiated to discipline the use of export credits or to limit subsidy elements in these loans in the agricultural sector.

Official data on export credits and the associated conditions are not available. There is no obligation for WTO members to notify the extent of officially supported export credits for agricultural products and the associated conditions. However, the WTO secretariat invited members to provide

[7] The average utilization rate concerning the average export subsidy value and the final 2000 commitment level is in Australia 1 per cent, Canada 19, Colombia 4, Cyprus 17, the Czech Republic 33, Hungary 33, Iceland 7, Israel 14, Mexico 0.4, Poland 4, Romania 1, Slovakia 30, South Africa 23, Turkey 6 and Venezuela 17 per cent.

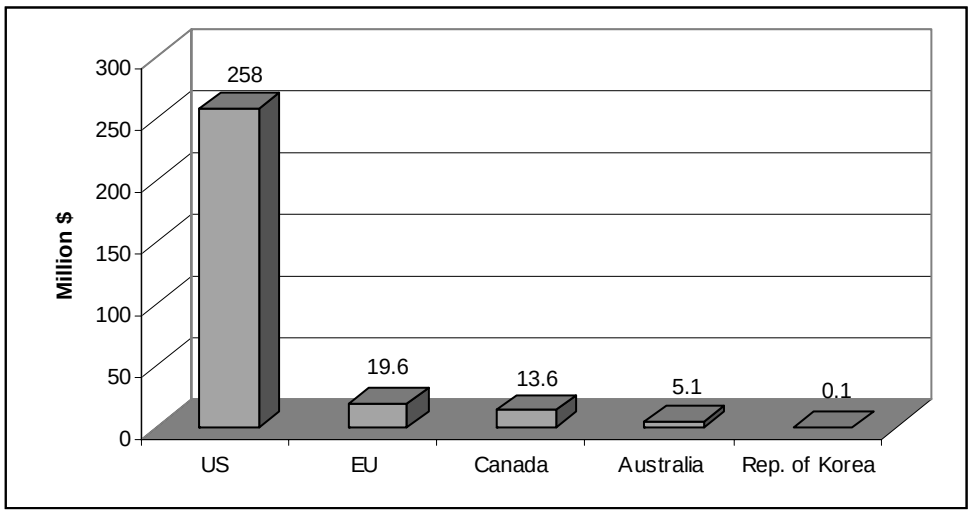
[8] For each of these products the utilization rate in 2001/2002 concerning either volumes or values, or both, is higher than 90 per cent of the corresponding commitment.

information concerning export credits, and they received information from Chile, the Czech Republic, Estonia, Japan, Maldives, New Zealand, the Republic of Korea, Slovenia, Switzerland and Zimbabwe. Except for the Czech Republic, the responses were nil use returns. Canada, the European Union and the United States have provided information on the value of exports of agricultural products that benefited from officially supported export credits. The data do not reflect the subsidy component for these exports.

The OECD (2000) analysed officially supported export credits in agriculture using confidential data that were provided by participants in the Export Credit Arrangement at the OECD. The study undertook an evaluation of the degree to which officially supported export credits have a subsidy element and distort world markets. If, for example, the interest rate is below the normal market rate or the length of time exceeds what the market would offer, the export credit may have a trade-diverting effect since the decision of an importer may be made because of the financial appeal of the export credit. The OECD calculated the difference between the officially offered export credit and the potential credit, which would otherwise have been provided by the market.

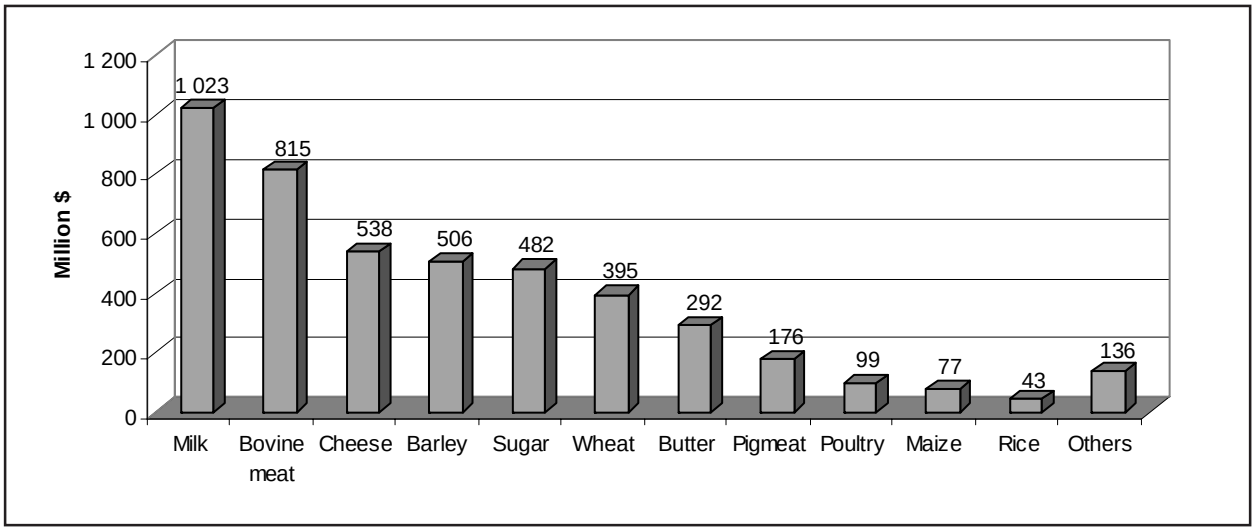
The result of this OECD study is that the overall trade-distorting effect of export credits in total trade of agriculture products is very small, although certain export credit programmes do bias targeted importers' purchasing decisions and do distort markets. Total export credits facilitated on average 4.4 per cent of world trade between 1995 and 1998, but of these, only a portion are estimated to have distortionary effects. The use of export subsidies was increasing during this period, both in total and relative to total trade. The total subsidy element amount is estimated to have been $300 million in 1998. Of this, the United States provides 86 per cent, the EU 7 per cent (excluding intra-EU credits), Canada 5 per cent and Australia 2 per cent (see figure 3). The United States is the largest user of export credits, and its export credits have at 6.6 per cent the highest subsidy content. Cereals account for almost one half of the subsidy element of all export subsidies used.

Figure 3. Subsidy element amount of export credits



Source: OECD (2000); EU data excluding intra-EU export subsidies.

Figure 4. Export subsidy outlays and export credit subsidy element



Source: ATPSM database.

Figure 4 shows the expenditure per product for selected products.

Data issues

The data shown on export subsidies are official subsidies under Article 9 of the WTO Agreement on Agriculture. De Gorter (2004) argues that this definition is inadequate. Consumer-financed export subsidies, for example, are not limited under the Agreement on Agriculture. Such a subsidy occurs when price discrimination and the pooling of revenue expand output and contract domestic consumption, causing a gap between world and domestic prices. De Gorter gives the examples of milk in the United States and wheat in Canada, where a government policy or a sanctioned monopoly producer organization allows for such a gap.

Domestic support measures, even if decoupled, may allow farmers to cover their fixed costs so that a smaller export revenue covering the variable costs only is sufficient. Thus, this kind of support can also be considered to subsidize exports. Cotton is a good example since it receives almost no export subsidies. The domestic support provided by the United States for example does, however, impact on export competition. The WTO dispute settlement panel has judged that the US cotton support of up to more than $3 billion depresses world prices and violates WTO rules. The panel found that the Unites States used hidden export subsidies to circumvent its WTO commitment to reduce export subsidies. In a similar case against the EU, the WTO ruled that Europe's subsidized sugar exports are higher than the permitted amount. The EU claimed that there are no subsidies attached to the controversial non-quota or "C" sugar exports, but the panel found that they are in fact cross-subsidized by the high guaranteed prices paid for quota sugar.

Official export subsidies are small and shrinking compared with domestic support measures. However, it is almost impossible to assess the export subsidy component of all other policies and we therefore consider the official data only. This limitation, however, has to be borne in mind when interpreting the results.

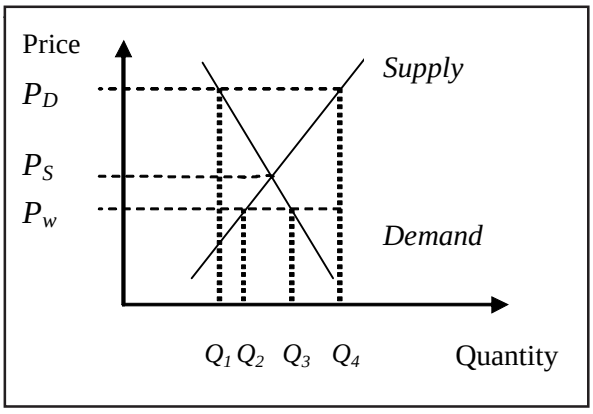
3. ECONOMIC EFFECTS OF EXPORT SUBSIDIES

Theoretical model

The interaction of tariffs and export subsidies and their distorting impact on consumption and production within one country are demonstrated in a simplified static model. The impact on world prices is shown in a similar model with supply and net import functions.[9]

We assume that in the absence of any protection measures a country would be an importer of a specific product at the world price P_w. In figure 5 the imports are $Q_3 - Q_2$. The country wants to support its producers by ensuring a higher domestic price P_D. To restrict the competition from imports it imposes a tariff $T = P_D - P_w$. Internal prices cannot, however, increase above the price at which the country becomes fully self sufficient, P_S, without additional measures. The supply at P_D, Q_4, would exceed the demand Q_1 and excess supply could not be sold on world markets at this high price. The difference between the domestic price and the world price is covered by an export subsidy. Looked at another way, in order to raise the domestic price sufficiently a tariff or similar quantitative restriction is necessary in order to prevent imports from being re-exported with the assistance of the export subsidy. The export subsidy is necessary for disposing of the surplus.

Figure 5. Tariffs and export subsidies as measures to raise domestic prices



Effects on world prices and welfare considerations

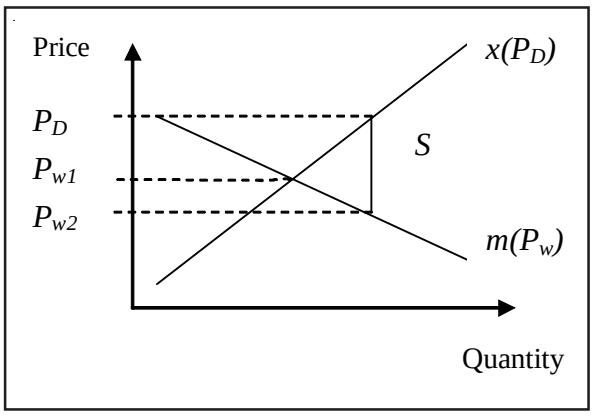
The EU provides almost 90 per cent of all export subsidies. It is therefore helpful to look at a theoretical model where one single large country provides all the export subsidies. Gaisford and Kerr (2001) consider this situation in a simple partial equilibrium model. The domestic price for a specific commodity in the export-subsidy-providing country is $P_D = P_w + S$, where P_w is the world price and S the per-unit export subsidy. Exports of this country are an increasing function of its domestic price, $X = x(P_w + S),\ x' > 0$. It is assumed that the rest of the world is passive from a policy standpoint and that the subsidy-providing country is large enough to influence the world price. The net imports of the rest of the world as a whole are a decreasing function of the world price, $M = m(P_w),\ m' < 0$. The equilibrium condition for the world market requires that global imports equals global exports:

$$x(P_w + S) = m(P_w).$$

[9] The first model is partly based on ABARE (2003) and the second one on Gaisford and Kerr (2001).

This implies that as the export subsidy is increased the world price falls and the domestic price in the export subsidizing country rises.[10] Figure 6 shows how an export subsidy of a large country impacts on prices and quantities. In the absence of subsidies the equilibrium world price would be P_{w1}. With a subsidy of S the domestic prices increase to P_D and the world price falls to $P_{w2.}$ Thus, an export subsidy has a terms-of-trade effect.

Figure 6. Price effects of export subsidies



As a consequence of an export subsidy, domestic prices rise and hence the consumer surplus in the subsidizing country is reduced while the producer surplus increases. However, since the country faces tax outlays the overall welfare effect is negative.[11] The rest of the world experiences lower world market prices and hence their total welfare effect from the subsidy is positive. Subsidies are effectively a transfer from taxpayers to domestic producers, but some of the benefits are captured by foreign consumers. However, foreign producers of the subsidized product are worse off. Because of the induced overtrading, there is an overall efficiency loss.

Political-economy considerations

In the aftermath of the Second World War many Governments were concerned to increase agricultural production for food security reasons and to achieve a certain balance between the development of rural and urban incomes.[12] In the developed world in particular, countries resorted to domestic support measures and administratively raised farm prices. Import barriers were required to ensure that domestic production could continue to be sold at prices higher than world levels without being undermined by competition from potential exporters. In response to these production-encouraging measures and as a consequence of distinct productivity gains, self-sufficiency rates increased and in some cases structural surpluses occurred. Export subsidies were increasingly used to dispose of surplus supply onto world markets. These export subsidies underpin the excess production and significantly distort agricultural trade.

The global welfare effect of an export subsidy is negative. Gains to producers in subsidizing and consumers in non-subsidizing countries are outweighed by losses to consumers and taxpayers in the subsidizing and producers in non-subsidizing countries. Thus, the driving force behind export subsidies is probably the benefits to farmers, agro-businesses and input suppliers. If Governments weigh heavily the welfare of their export sectors, subsidies can appear to be a rational policy, if not the best way of achieving the objective of supporting low-income producers.

Export subsidies lower world prices to the benefit of food importing countries. Why

[10] Change of world price: $P_W{}' = -x'/(x'-m') < 0$ and domestic price: $P_D{}' = -m'/(x'-m') < 0$.

[11] Export subsidies may be welfare-enhancing under specific conditions that result in an increase in the world price or export quantity, as illustrated by Brander and Spencer (1984). However, these conditions are unlikely to hold in the agricultural sector. (For a formal game-theoretic model see Gaisford and Kerr, 2001.)

[12] See also WTO (2000).

then do other countries complain if the subsidy-providing countries transfer welfare to them? There are two main reasons. Firstly, countries are not homogeneous. While net importing countries experience overall welfare gains net exporters experience overall losses. Secondly, whether or not a country is a net importer or exporter, producers always suffer from the decline in the world market price. The latter reasoning seems to be important for understanding positions in the current round of negotiations on agriculture. In addition to the greater emphasis that Governments seem to place on producer surplus as opposed to consumer surplus, negotiators hope that once export subsidies and domestic support are eliminated their countries may themselves become exporters of certain products. In fact, since world prices would increase, imports in developing countries are likely to fall, whereas the production would increase. This would reduce the dependence on food imports and probably have a stabilizing effect. Furthermore, a reduction would abate the adverse distributional effect that export subsidies have in many developing countries, where the rural population tends to be poorer than urban consumers.

Since subsidizing countries may find themselves in a prisoners' dilemma situation, where they would be better off if they cooperated and agreed to remove export subsidies, there may be a good reason to defer to the pressure from developing countries.

Effects of export credits

Export credits, even with a subsidy element, would not be trade-distorting if they provide for appropriate additional trade. Export credits may enable importers lacking credit to buy commodities where they otherwise would not be able to do so. However, according to a OECD (2000) study only 9 per cent of export credits are granted to net food-importing developing countries and 0.2 per cent to less developed countries.[13] More than 50 per cent of the export credits are received by OECD importers. The low shares of export credits that are given to net food-importing or less developed countries call into question the justification for export credits as help for countries facing liquidity constraints to purchase food where they otherwise could not.

The effect on decision-making determines the impact on markets. If an export credit programme reduces an importer's total cost because of non-market equivalent credit conditions and if the importer would also in the absence of this programme buy at least a certain proportion, the credit programme has an influence on the decision and hence it is trade-distorting. The export credit subsidy element drives a wedge between importer costs and exporter revenue. Both parties benefit from the subsidy element relative to the world market price. However, like export subsidies, export credits with non-market equivalent conditions hurt competing producers who are not included in export credit programmes, and therefore many countries complain about these programmes and call for appropriate restrictions.

The fact, however, that some of the poorest in the world nevertheless benefit from export credits adds to the complexity of this issue in the negotiations on agriculture.

The theoretical evidence discussed in section 3 suggests that developing countries both gain and lose from export subsidies and subsidy components in export credits. It is therefore surprising that most of the reform proposals from developing countries call for substantial reductions or elimination. This is discussed next.

[13] For about 7 per cent of the data no importers could be identified.

4. AGRICULTURE TRADE POLICY PROPOSALS

The Agreement on Agriculture, which came into force at the end of the Uruguay Round in 1995, was a first step towards meaningful disciplines on agricultural export subsidies. However, there is still much scope for the provision of export subsidies and as shown above this scope has been extensively used during the past decade. Thus, further restriction for export subsidies are still on the agenda. At the Ministerial Conference in Doha in 2001, ministers agreed to aim at "reductions of, with a view to phasing out, all forms of export subsidies". At the Ministerial Conference in 2003 WTO ministers could agree neither on modalities nor on a framework for modalities. Among the major controversial subjects was agriculture and within this area export subsidies. In August 2004 the General Council adopted a framework proposal (WTO, 2004) that provides for the elimination of export subsidies by a certain date that has to be negotiated.

Before the agreement Governments revealed their preferences concerning export subsidies. The early EU proposal (EC, 2002) states:

> "An average substantial cut in the volume of export subsidies and an average 45% cut in the level of budgetary outlays, on the condition that all forms of export subsidisation are treated on an equal footing. ... The EU is ready to eliminate export subsidies completely for certain key products for developing countries, such as wheat, oilseeds, olive oil and tobacco ... The trade distorting elements of export credits for agricultural products used by other WTO members should be identified and subjected to strict discipline."

This offer had limited value since the listed products account for only 6.5 per cent of the EU's export subsidies during 1995 and 2000. Only for wheat exports is a considerable amount – $328 million – provided on average, accounting for 81 per cent and 22 per cent of the final 2000 commitment levels concerning volumes and values, respectively. For the remaining three products EU export subsidies are negligible.

In May 2004 the European Commission offered to eliminate all export subsidies, conditional on other outcomes.

The early US proposal (USDA, 2002) was

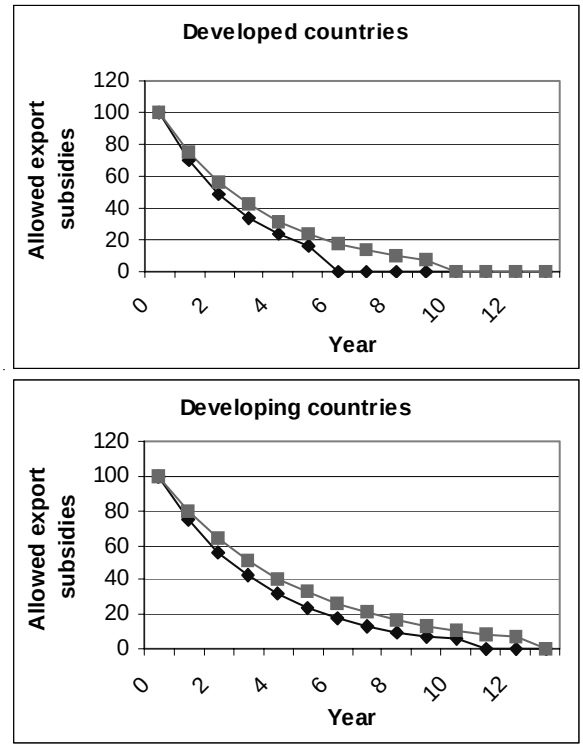
> "To reduce to zero the levels of scheduled budgetary outlays and quantity commitments on export subsidies through reduction commitments made in equal annual instalments over a five-year period. ... WTO members should develop disciplines for officially supported export credit, credit guarantee, loan and insurance programs."

This was stricter than the early EU proposal concerning export subsidies but less strict concerning export credits, which reflects the use in the United States of these two instruments. The United States uses fewer export subsidies (bound level $0.6 billion) than the EU (bound level $6.9 billion) but makes more use of export credits.

The Cairns Group has always been a "hardliner" concerning export competition. It proposed (Cairns Group, 2000) as follows:[14]

> "WTO Members agree to the elimination and prohibition of all forms of export subsidies for all agricultural products."

Figure 7. Harbinson proposal on export subsidies



The two lines in both figures are intended to reflect 50 per cent of the budgetary outlays, respectively.

The former Chair of the WTO Committee on Agriculture, Special Session, Mr. Harbinson, proposed that export subsidies be eliminated. He proposed a formula by which the budgetary outlay and quantity reduction commitments would be determined. Figure 7 shows the phasing-out of allowed budgetary outlays for developed and developing countries. A set of products representing at least 50 per cent of bound levels of budgetary outlays would have to be reduced and eliminated earlier. Selecting the set of products is a matter for each country.

In the draft Cancún text, the WTO General Council adopted the EC-US approach (EC and US, 2003), namely to eliminate export subsidies for as yet unspecified products that are of particular interest to developing countries, and to reduce export subsidies for the remaining products, but with a view to eventually phasing out all export subsidies and trade-distorting elements of export credits.[15] Most developing countries, including the Group of 20,[16] were seeking the elimination of all forms of export subsidies as an outcome in the current negotiations. The G-20 proposal was to eliminate export subsidies for products of specific interest to developing countries first and in a second step to eliminate them for all other products.

The products of specific interest to developing countries have not been specified. The early EU proposal mentions wheat, oilseeds, olive oil and tobacco. Since developing countries are not a homogeneous group it is difficult to identify products of specific interest to developing countries as a whole. Furthermore, at least two approaches are possible in identifying these products. One is to look at the demand side and the second is to look at export competition. On the demand side, wheat is a candidate since all least developed countries and the vast majority of developing countries are net importers of wheat. On the export competition side, bovine meat and sugar are possible product groups.

[14] Several other proposals containing positions on export subsidies and competition were submitted during negotiations. For a list see WTO (2002).

[15] Agreed disciplines on export credits would address appropriate provisions for differential treatment in favour of least developed and net food-importing developing countries.

[16] The Group of 20 is a group of developing countries led by Brazil, China and India, which was formed prior to the Cancún Conference in 2003.

Many developing countries could move into the production of beef and many can produce cane sugar, a substitute for beet sugar. Since most of the budgetary outlay is on dairy products, this might also be of specific interest to developing countries.

The General Council agreed to eliminate by an end date to be agreed:

- Scheduled export subsidies;
- Export credits not in accordance with certain disciplines (partly) to be agreed;
- Trade-distorting practices with respect to State trading enterprises;
- Food aid not in conformity with disciplines to be agreed.

Developing countries will benefit from longer implementation periods and will continue to benefit from special and differential treatment that allows them the provision of certain export subsidies within a reasonable period. Furthermore, State trading enterprises in developing countries that preserve consumer and ensure food security will receive special consideration for maintaining monopoly status. Disciplines on export credits will make appropriate provisions for least developed and net food-importing developing countries.

5. SIMULATING EXPORT SUBSIDY REDUCTIONS

UNCTAD's Agricultural Trade Policy Simulation Model (ATPSM) is used to estimate the potential impact of reducing or eliminating export subsidies on the agricultural sector.[17] The static, partial-equilibrium, global, agricultural-trade model is able to estimate the economic effects of changes in within-quota, applied and out-quota tariffs, import quotas, export subsidies and domestic support on production, consumption, prices, trade flows, trade revenues, quota rents, producer and consumer surplus, and welfare. A more detailed description of ATPSM and the data, including a discussion of the specific difficulties resulting from modelling agricultural policy changes with regard to quota rents, domestic support, two-way trade and preferential access, can be found in Peters and Vanzetti (2004).[18]

The present version of the model covers 175 countries, of which the current 15 European Union members form a single region. Countries designated here as "developed" are defined by the World Bank as high-income countries with per capita GNP in excess of $9,266 (World Bank, 2001). Another group is the 50 least developed countries as defined by the United Nations. There are 36 commodities in the ATPSM data set, covering most of the agricultural sector. This includes many tropical commodities of interest to developing countries, although many of these have relatively little trade by comparison with some of the temperate-zone products.

The data in the model come from different sources, including AMAD, FAO, OECD, UN Comtrade, WTO and UNCTAD. The year 2000 represents the base year for the model.

Export subsidy rates

One of the main characteristics of ATPSM is that domestic prices are all functions of the world market price, border protection and subsidies. All protection and support measures are expressed in tariff rate equivalents. Specific and mixed tariffs, domestic support, export subsidies and export credit subsidy elements are converted into *ad valorem* equivalents.

Simplified, a producer receiving export subsidies gets $P_w(1+s)$, where P_w is the world price and s is the export subsidy rate, for a commodity sold abroad. The supply reaction to a change of the export subsidy equals the supply elasticity, α, multiplied by the change of the producer price, $P_w(1+s)$. Additionally, cross-price effects are taken into account. However, the other policy measures, domestic support and import tariffs, which also influence the production decision and the two-way trade of one and the same product have to be taken into account. Two-way trade occurs because products are aggregates and therefore countries simultaneously import and export different components of the same aggregate. To accommodate two-way trade, a composite

[17] An operational version of the model, associated database and documentation are available free of charge from UNCTAD (http://www.unctad.org/tab).

[18] In this paper the "standard" ATPSM version has been used. In this version it is not the Armington assumption that determines imports but the condition that percentage changes in exports equals the percentage change of the production. Import changes are the residual of changes in production, consumption and exports.

domestic price is required. The composite price depends on import tariffs, export subsidies and domestic support measures. As a result, import tariffs and export subsidies do not have to be equal as in the simplified theoretical model, but rather single measures can be changed separately. The technique chosen in the model is described in box 3. The effect is that, *ceteris paribus*, a higher export subsidy leads to higher production and exports of the corresponding good. The impact of export subsidies on domestic prices depends on the proportion of domestic production exported. Because there is a greater incentive to produce for export markets, consumption prices are positively correlated with export subsidies provided in the same country. Furthermore, export subsidies depress world market prices, and this results in lower producer and consumer prices in the other countries.

Two export subsidy rates are calculated. One reflects the export subsidies actually received or applied and the second one reflects maximum allowable subsidies. The latter is a bound rate for export subsidy rates.

The *ad valorem* export subsidy rates are calculated from the WTO members' notifications, which comprise their annual commitment and use in terms of budgetary outlays and volumes. The bound subsidy rate that determines the maximum possible subsidy that can be provided is the year 2000 commitment level divided by the ATPSM export volume and the world market price. Thus, the bound rate expresses how much the observed export could maximally be subsidized without violating the WTO rules. Since in some cases current exports are low, bound export subsidy rates are very high in these cases.

The applied subsidy rates are calculated for each year between 1995 and 2000 on the basis of the formula

$$export\ subsidy\ rate = \frac{ES_{WTO}}{X_{WTO} P_W},$$

where ES_{WTO} is the notified use of budgetary outlay, X_{WTO} is the notified subsidized quantity and P_W is the world price. Because budgetary outlays and subsidized quantities vary from year to year the applied subsidy rate used in

Box 3. Prices in ATPSM

All domestic prices are functions of the world market price and the border protection or special domestic support measures. Transaction costs are not taken into account.

First, a domestic market price wedge t_d is computed as the weighted average of two tariffs, the export subsidy t_x and import tariff t_m, where the weights are exports X and imports M: $t_d = (X\ t_x + M\ t_m) / (M + X)$.

Second, a consumption tariff t_c is computed as the weighted average of the import tariff t_m and the domestic market tariff t_d, where the weights are imports M and domestic supply S_d: $t_c = (M\ t_m + S_d\ t_d) / D$.

Third, a supply tariff t_s is computed as the weighted average of the export tariff t_m and the domestic market tariff t_d, where the weights are exports X and domestic supply (S_d) plus the domestic support tariff t_p: $t_s = (X\ t_x + S_d\ t_d) / S + tp$.

The domestic consumer price is $P_c = P_w(1+t_c)$ and the domestic producer price is $P_s = P_w(1+t_s)$. The calculations of consumer and producer prices are applied both to the initial and to the final tariffs.

ATPSM is the average of the six annual subsidy rates.[19] The obtained applied export subsidy rates have to be adjusted to the ATPSM export data, because there is not a one-to-one correspondence between the product definition in ATPSM and the product categories used in the notifications. For the establishment of export subsidy reduction commitments during the Uruguay Round 24 groups of products were specified by the WTO. The correspondence of these groups with the ATPSM classification is shown in table A1 in the Appendix. The structure of schedules, however, varies between countries. Each member uses different product categories. Switzerland, for example, reports in five broad product groups, whereas Venezuela reports in 72 detailed groups. The different groups of products were assigned to the 36 ATPSM commodities as best as possible.

Export subsidies may be applied to some rather than all exports within a product category. If a subsidized volume that is notified to the WTO is smaller than the export volume in the ATPSM database, the calculated subsidy rate is adjusted downwards so that the expenditure for the specific product is not higher than the notified budgetary outlay. On the other hand, if exports in ATPSM are smaller than the notified subsidized export volume, the subsidy rate is not adjusted upwards in order to avoid a higher *rate* than the actual rate. Furthermore, where an applied subsidy rate is higher than the corresponding bound subsidy rate, the bound rate is used as the applied export subsidy rate in ATPSM. Since the initial applied rate is an average over the six years when binding commitments were reduced annually, the bound rate that depends only on the final commitment is smaller than the average for a commodity for which subsidies were always close to the commitment.

These downward adjustments and the exclusion from the model of products such as cut flowers, juice and wine for which export subsidies are provided imply that the sum of export subsidy expenditures in ATPSM at $4.4 billion is significantly smaller than the observed average of $6.2 billion. The results shown below are thus biased downwards for this reason.

A specific difficulty is the calculation of subsidy rates for Canadian dairy products. Canada notified to the WTO very little or nil use of export subsidies. However, as described in box 2, the WTO Appellate Body found that Canada's commercial export milk practices constitute export subsidies. Since it is not possible to calculate the exact subsidy component of this policy, we assumed that Canada provides the maximum legitimate export subsidies to its dairy products of $54.5 and calculated the corresponding subsidy rate.

Export credits

Since official data on export credits and associated conditions were not available, the data in the ATPSM database on the subsidy element of export credits are taken from the OECD (2000).[20] Unfortunately, the estimated amount of the export subsidy element is given only by countries or by product groups but not by country and product. Thus, an estimate of how much a specific country subsidizes a

[19] Data for 2001 and following years are available only for some countries. For those few countries that have not yet notified for 1999 and 2000 the average for 1995 to 1998 was taken. However, data for the whole period were available for those countries that provided more than 99 per cent of the export subsidies between 1995 and 1998.

[20] There are several deficiencies with these data. They cover only those countries that joined the Export Credit Arrangement, and the basis for the interest rate is solely 1998, a year in which the financial crises may bias the results obtained by the OECD. Furthermore, only officially supported export credits were taken into account and exchange rate guarantees were not included. To calculate the hypothetical market conditions, a credit ranking for the importer is necessary but not always available, in which cases standard Moody rankings were used.

specific product through export credits is not available. Estimates are constructed using the available information from the OECD and ATPSM export revenue data. For each country the total amount of the subsidy element is distributed among the ATPSM products in proportion to the weighting of subsidy amount estimates across commodity groups and the export revenue. Thus, the export credit subsidy element rate is

$$export\ credit\ subsidy\ element\ rate_{ij} = \frac{EC_i}{\sum_j X_{ij} P_{W_j} s_j} s_j,$$

where EC_i is the amount of the subsidy element in country i, X_{ij} is the export of country i of commodity j, P_{wj} is the world price of commodity j and s_j is the reported share of subsidies of the product group j in the total subsidy.

The consequence of this approach is that there are export credit subsidy elements on each product in the EU, the United States, Canada, the Czech Republic and the Republic of Korea. For Australia, additional information was available. Since Australia provides export credits only for wheat, the whole estimated subsidy element was attributed to this commodity.

After the subtraction of export credits for which the products are unknown or which are on products not covered by ATPSM, such as wool, the total export credit subsidy in the initial model database amounts to $228 million. This is in addition to the total export subsidy expenditure of $4.4 billion. Thus, the total export subsidy amount in ATPSM is $4.6 billion. This compares with global export revenue for the 36 commodities in the model of $200 billion.

The calculated export credit subsidy element rate was added to both the bound and the actual export subsidy rate. Thus, the export credit subsidy element is treated as an additional export subsidy. This rate is comparably small. The simple average is 0.07 per cent in the EU, 0.33 per cent in the United States, 0.13 per cent in Australia (only wheat), 0.07 per cent in Canada, 0.02 per cent in the Czech Republic and 0.0005 per cent in the Republic of Korea. This compares with much higher export subsidy rates. For example, the EU rate for beef is 54 per cent, for butter 79 per cent, for wheat 13 per cent and for sugar 31 per cent. The US rate for concentrated milk is 30 per cent and for butter 33 per cent. Norway's rate for beef is 145 per cent and for sheepmeat 121 per cent. Switzerland subsidized its dairy products with a rate of 95 per cent. There are also many small rates, such as 1.2 per cent on barley in South Africa.

How ATPSM works: The EU's beef export subsidies

Export subsidies are complex. To illustrate how they are modelled within ATPSM we provide an example of EU bovine meat, a heavily subsidized sector. According to WTO notifications, the EU provided on average $1.1 billion annually of export subsidies for beef meat. The subsidized volume was on average 851,000 metric tonnes annually. After adjusting to the ATPSM commodity classification $800 million remain. Since EU's exports of beef in the ATPSM database are 0.645 million tonnes and the initial world price for beef is $2,300 per tonnes, the export subsidy rate is about 54 per cent. The export credit subsidy element rate is 0.03 per cent.

From the subsidy, domestic support and import tariff rates and the volumes the composite tariffs t_c and t_s are calculated (see box 3). These give the domestic consumer and producer prices, and changes in the distorting measures determine the price changes, which then verify the volume changes.[21] Table 3 gives an example of the changes resulting from an elimination of export subsidies for EU beef exports.

[21] Since ATPSM is an equilibrium model a mechanism ensures that domestic and global markets are always clear.

Table 3. The impact of export subsidy elimination on the EU beef market

		Initial values	Final values
Export subsidy rate	%	53.9	0
Export credit rate	%	0.03	0
Import tariff	%	138	138
Domestic support rate	%	0	0
Consumption tariff t_c	%	89.4	58.2
Supply tariff t_s	%	83.7	48.8
World price	$/t	2 300	2 342
Producer price	$/t	4 224	3 484
Consumer price	$/t	4 357	3 706
Consumption	kt	7 158	7 577
Production	kt	7 396	7 130
Exports	kt	645	622
Imports	kt	407	1 069
Tariff revenue	$m	793	2 948

The elimination of the export subsidy reduces the composite consumption and supply tariff, which leads to lower consumer and producer prices in the EU, although the world price increases slightly. As a consequence, the EU's consumption and imports increase and production and exports decrease. Tariff revenues are increased owing to the rise in imports.

Modelling limitations

There are various limitations in modelling trade policy changes and interpreting the results. These include modelling preferential access, the lack of knowledge of the distribution of quota rents, the static nature of the model, the absence of adjustment costs, intersectoral and macroeconomic effects, and, of course, data quality. These are discussed in greater detail in Vanzetti and Peters (2003).

Specific limitations concerning export subsidies and credits include data availability, which is discussed above, the difficulty with both volume and value constraints, and the limitations in view of the fact that export subsidy rates are used. In ATPSM effectively only value constraints and budgetary outlays are used. Quantity commitment levels and the quantity of subsidized exports are available and have been used to calculate the export subsidy rates. However, these subsidy rates were then adjusted to the ATPSM export volumes. Thus, instead of, for example, subsidizing a small quantity by a high subsidy rate, all exports are subsidized by an accordingly lower rate. This may bias the results. De Gorter (2004) discusses the interplay according to volume and value constraints. Furthermore, the change of export subsidy rates impacts on world prices and export volumes. As a consequence, subsidy expenditures need not be reduced by exactly

the same percentage as the subsidy rate, since expenditures are a product of volumes, world prices and subsidy rates.

Another limitation is that some countries that provide export subsidies have production quotas for products they subsidize, for example beef and dairy products in the case of the EU. If the quota is binding, a reduction of export subsidies may not (immediately) lead to reduced exports. Since production quotas are not taken into account in ATPSM any change to export subsidies leads to changes of the production and export incentives. Thus, the production- and export-limiting effect of a reduction of export subsidies may be overestimated.

Furthermore, many countries, such as the United States in the case of wheat, provide export support on a bilateral basis, that is for specific countries. An elimination of such subsidies would have no impact on world prices if the importing countries would face liquidity constraints on purchasing food where they otherwise could not. However, the OECD (2000) has shown in the case of export credits that only a small share of subsidized exports are imported by, for example, least developed countries. Thus, it is likely that without any subsidies a large proportion of the demand would be on world markets.

Finally, the economic impact of export credit subsidy elements is different from that of export subsidies. Export subsidies permit exporters to sell products at world prices even if production costs are higher. Thus, producers receive the budgetary outlay. This need not be the case with export credits, where importers receive at least parts of the subsidy element. However, since data about the *bilateral* flows benefiting from export credits with a subsidy element were not available, export credits were treated as export subsidies.

Scenarios

Several simulations are undertaken to analyse the effects of reductions of export subsidies (see table 4). In an ambitious scenario, all export subsidies and export credit subsidy elements are eliminated. This reflects the WTO General Council decision of August 2004 and the early positions of the Cairns Group, the Group of 20 and other developing countries. A 50 per cent reduction scenario is very close to the initial EU position whereby export credits are to be reduced by 45 per cent.

Because of the interaction with other border measures, import tariffs and domestic support measures are also reduced. However, since we want to compare the scenarios with different reductions in export subsidies, the

Table 4. Alternative liberalization scenarios

Label	Description
Basic	A reduction in bound out-quota tariffs of 36 per cent in developed countries and 24 per cent in developing countries; a 60 per cent and 20 per cent reduction of domestic support in developed and developing countries, respectively. No reduction in export subsidies or export credit subsidy elements. No reductions in least developed countries.
50 per cent reduction	As in the Basic scenario, plus a 50 per cent reduction of bound export subsidies and export credit subsidy elements.
Elimination	As in the Basic scenario, plus the total elimination of export subsidies and export credit subsidy elements.

reduction of the tariffs and domestic support remains the same across all scenarios. A third scenario, in which export subsidies are not changed, provides a benchmark.

Since the export credit subsidy element rate is added to the bound and the applied subsidy rate it is implicitly assumed that an agreement would restrict the use of export credits with a subsidy element. Furthermore, bound rather than applied export subsidy rates are reduced.

In the following an equal percentage reduction in bound export subsidies and in export credit subsidy elements is summarized as a reduction of export subsidies. Furthermore, we will look at the additional economic effects resulting from a reduction of export subsidies. Because of the interaction of various border measures, we are comparing a situation in which only tariffs and domestic support are reduced with one in which in addition export subsidies are reduced. Thus, we compare the Elimination and 50 per cent reduction scenarios with the Basic scenario. The concentration on the two extremes – the Basic scenario and the Elimination scenario – may overemphasize the economic effects. However, the qualitative results are the same if we compare a 55 per cent with a 45 per cent reduction of export subsidies.

6. RESULTS

The tariff reduction scheme, as specified in the Basic scenario, is the same in all three scenarios. The Uruguay Round continuation leads to an import tariff reduction in developed countries and, because applied tariffs are smaller than bound tariff rates in most developing countries, to a small reduction of tariffs in developing countries. As a consequence, world market prices increase. Peters and Vanzetti (2004) provide more details of this scenario. Prices for temperate products increase more than prices for tropical products. Globally, the total welfare effect is positive, but some countries lose while others gain. In highly protecting developed countries consumers and taxpayers gain, producers lose and the overall welfare effect is positive. In most developing countries producers gain, whereas consumers lose as the result of higher domestic prices. The overall welfare effect varies from country to country, depending on the production and trade structure. Most least developed countries are net food-importing developing countries and suffer from increasing food prices. These results can also be seen in the first columns of tables 5 to 8.

Impact on world prices

Eliminating export subsidies leads to a further increase in world market prices. Since in the Basic scenario the average trade weighted price increase is 1.3 per cent and in the Elimination scenario 2.9 per cent, the additional price increase as a consequence of the export subsidy elimination is 1.6 percentage points. Thus, compared with the price effects resulting from a Uruguay Round continuation concerning import tariffs, an elimination of all export subsidies has a considerable impact on world market price movements.[22]

In the 50 per cent reduction scenario the average trade-weighted price increase is 2.1 per cent. The average reduction in actual export subsidy rates is only 14 per cent (simple average) and 10 per cent (trade-weighted) if bound export subsidies are reduced by 50 per cent. This reflects the difference between bound and applied subsidies. In many cases the export subsidy constraints are not binding. However, total export subsidy expenditures, including export credit subsidy element amounts, are reduced by 48 per cent. The reason is that it is not only the export subsidy rate that has been reduced but also exports. Hence, in general, subsidy expenditures are reduced by a higher percentage than subsidy rates. Furthermore, export subsidies for commodities that represent the bulk of subsidy expenditures are often up against their constraints. For example, the EU's actual export subsidy rate on concentrated milk equals the bound rate.

The increase in the world market price and the reduction in exports from export-subsidy-providing countries as a result of

[22] However, the trade-weighted price increase in a scenario where all tariffs but not the export subsidies are eliminated is at 6.9 per cent higher than the price increase that stems from an elimination of export subsidies (1.6 per cent). Thus, the price increase resulting from eliminating tariffs is about four times higher than the one resulting from eliminating export subsidies. This corresponds to the finding of the Economic Research Service at the US Department of Agriculture (2001) that market distortions resulting from tariffs are four times as high as the one resulting from export subsidies.

Table 5. Consumer surplus impacts resulting from export subsidies reductions

	Basic (no exp. sub. reduction) $m	50 per cent reduction $m	Elimination $m	Difference Elimination and Basic $m
Developed	15 151	18 684	22 785	7 634
Developing	-4 943	-12 877	-20 795	-15 852
Least developed	-1 408	-1 853	-2 298	-890
World	8 799	3 953	-309	-9 108
Cairns	-3 274	-5 485	-7 689	-4 415
Developing, ex. Cairns	-2 069	-8 453	-14 826	-12 757
Group of 20	-3 815	-8 271	-12 718	-8 903

Table 6. Producer surplus impacts resulting from export subsidies reductions

	Basic (no exp. sub. reduction) $m	50 per cent reduction $m	Elimination $m	Difference Elimination and Basic $m
Developed	-9 973	-15 101	-20 428	-10 455
Developing	6 062	13 527	21 031	14 969
Least developed	1 320	1 711	2 104	784
World	-2 590	138	2 706	5 296
Cairns	4 037	6 492	8 961	4 924
Developing, ex. Cairns	2 942	8 869	14 825	11 883
Group of 20	4 045	8 437	12 850	8 805

subsidy reductions have a different influence on various countries and groups of economic agents.

Consumers and producers in different country groups

The ATPSM results reflect the theoretical considerations set out above. Consumers in developed countries, which provide the bulk of export subsidies, benefit from the elimination of export subsidies, whereas the additional consumer surplus for all other country groups is negative (last column in table 5) because of increasing prices. Producers, however, benefit in all country groups from a reduction of export subsidies except in developed countries, where producers lose the export support (table 6). Exports from developing countries are increasing and these exporters benefit from higher world market prices. As expected, Cairns Group members in particular gain if export subsidies are removed.

The high additional gains for producers ($15 billion) and losses for consumers ($16 billion) in developing countries caused by elimination of export subsidies are remarkable compared with the surplus changes in the tariff reduction scenario ($6 billion and $5 billion, respectively). The average price increase resulting from an elimination of export subsidies is higher than the one resulting from the tariff reduction scenario, and so the negative effect on consumers is greater. Producers in developing countries benefit from the higher world price and increased exports. Furthermore, their own markets remain substantially protected. Producers in developing countries as a group would probably gain a great deal from elimination of export subsidies. These gains are not confined to Cairns group countries but, as shown in table 6, also to non-Cairns Group developing country producers. However, they depend on the assumption that changes in world prices are fully transmitted to the domestic market, which is also the reason for their own consumers' losses.

Welfare changes

Eliminating all export subsidies yields global annual welfare gains of $4.3 billion (table 8). The welfare change is the sum of changes of the consumer and producer surplus (including quota rents) and government revenue. As might be expected, if export subsidies are eliminated, the only immediate aggregate winners in terms of welfare are the subsidizing exporters and the net agricultural exporters. In subsidizing countries, the reduction in export subsidy expenditures generates most of the gains. The vast majority of Cairns Group members, developed and developing alike, benefit from the increase in net export revenues and experience a welfare gain. In many of the other developing and developed countries, with the exception of the subsidizing countries, the positive producer surplus does not outweigh consumer losses caused by increasing food prices if equal weights are attached to both groups.

Table 7. Export revenue change impacts

	Reduction 0 per cent $m	Reduction 50 per cent $m	Reduction 100 per cent $m	Difference Elimination and Basic $m
Developed	3 356	4 094	5 291	1 935
Developing	6 987	8 516	10 201	3 214
Least developed	626	722	823	197
World	10 970	13 333	16 315	5 345
Cairns	3 148	4 376	5 685	2 537
Developing, ex. Cairns	4 881	5 786	6 809	1 928
Group of 20	4 857	5 981	7 175	2 318

Table 8. Welfare impacts

	Basic (no exp. sub. reduction) $m	50 per cent reduction $m	Elimination $m	Difference Elimination and Basic $m
Developed	8 870	11 402	14 405	5 535
Developing	717	129	-360	-1 077
Least developed	-116	-172	-226	-110
World	9 471	11 360	13 819	4 348
Cairns	797	1 069	1 369	572
Developing, ex. Cairns	514	-57	-545	-1 059
Group of 20	146	-29	-175	-321

This is especially the case for least developed and net food-importing developing countries. These countries are supply-side-constrained and cannot adequately respond to the higher prices. In ATPSM this is reflected in a low base production (the currently observed production) and supply elasticities as estimated by the FAO. Furthermore, export subsidies are often on temperate product foods imported by food-deficit developing countries. Many of these countries do not have comparative advantages in the production of these commodities and thus suffer from terms-of-trade losses. However, in the longer term, supply capacities could be improved and substitutes increasingly produced. An enhanced effort in technical assistance and support programmes could contribute to mitigating adjustment costs. Neither these possibilities nor potential dynamic gains from increasing investments are reflected in the ATPSM results.

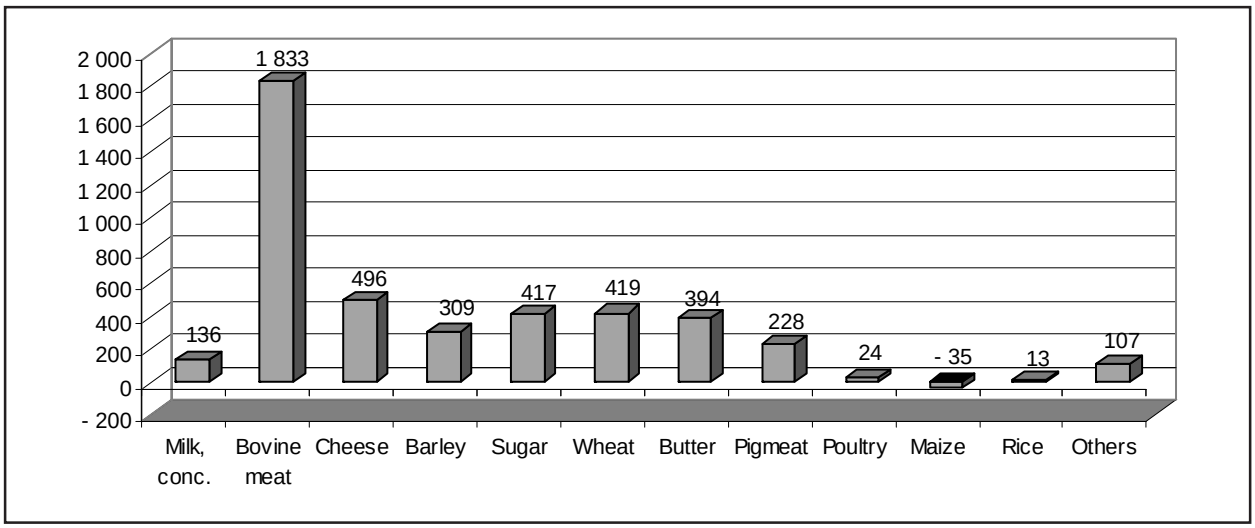
In the current round of negotiations almost all countries, including net food-importing developing countries, demanded the elimination of export subsidies. This is understandable if Governments give more weight to producer welfare than the welfare of consumers. Improving rural development and poverty alleviation among the rural population may be reasons for such an emphasis in some countries. In others, this emphasis may reflect the political power of producers. Furthermore, many countries hope to considerably increase their food production once export subsidies are eliminated and thus to be less dependent on food imports. This makes an improvement of supply-side factors such as strengthening institutions and upgrading the infrastructure very important. Additionally, if increasing domestic production enhances food security, the elimination of export subsidies contributes positively.

Sectoral analysis

The effects of eliminating export subsidies vary for each commodity. Figure 8 shows the difference in the welfare effect of the Elimination scenario and the Basic scenario for the 11 commodities for which export subsidy expenditures are at the bound levels.

In the following the effects of removing subsidies on bovine meat, sugar, wheat, dairy and vegetable oil, oilseeds and tobacco are analysed in greater detail. We will always compare the scenario in which the export subsidies and export credit subsidy

Figure 8. Additional welfare gains, by commodity



Source: ATPSM simulations.

elements for the respective commodity are eliminated with the Basic scenario. It is clear, however, that producers in countries that initially do not provide export subsidies always benefit from reductions of export subsidies.

Bovine meat

On the basis of the model, the elimination of total beef export subsidies of $0.8 billion leads to additional welfare gains of $1.83 billion. The welfare gains exceed the initial expenditure because export prices affect domestic prices and distort production for the domestic market as well as the export market. The world market price for bovine meat increases by an additional 1.86 percentage points. The EU provides 98 per cent of total export subsidies and its additional welfare gain is $1.85 billion. The welfare gain has three components. First, EU consumers gain an additional $5.16 billion from reduced domestic consumer prices; second, producers lose $5.48 billion because of decreasing domestic producer prises and decreasing production; and, third, government revenue increases by $2.17 billion. The latter is composed of a fall in subsidy expenditure and additional out-of-quota tariff revenue of $1.37 billion. The removal of the export subsidy leads to a further decrease in consumer prices in the EU and this generates additional imports. Since the import tariff is the same under both scenarios, the tariff revenue increases when the subsidy is eliminated.

The EU as the provider of most of the beef export subsidies gains most from their elimination. Net exporters of bovine meat such as Australia, New Zealand, Brazil, China, Canada, Uruguay and Argentina also gain.

The changes in consumer and producer surplus and the welfare effects are as in the simplified theoretical model described in section 3. If, in figure 5, the domestic price decreases owing to the policy change from P_D and ends up between P_S and P_w, the tariff revenue would increase, as is the result here. For this, the tariff T and the subsidy would have to be reduced. However, as discussed in section 5, the underlying economic model in ATPSM differs in that there is a composite tariff that combines the three measures – import tariffs, export subsidies and domestic support – because of two-way trade. Thus, separate changes in border measures can be assessed, although there is an interaction between tariffs and export subsidies.

Norway, which also provides export subsidies on bovine meat, gains $26 million, for the same reason as the EU. Other major winners from an elimination of export subsidies on bovine meat are Australia, New Zealand, Brazil, China, Canada, Uruguay and Argentina. These net exporters gain from increased world market prices. The additional gains per gross value of production from the export subsidy elimination on bovine meat are even higher in some African countries. Among the latter are, for example, Botswana, Mali and Namibia. Zimbabwe also gains. However, these ACP member countries may suffer from preference erosion since export subsidies add to the border protection faced by countries that do not benefit from preferential access. In our simulation it has been assumed for bovine meat that quota rents that originate from tariff rate quotas accrue to importing countries. These quota rents do not fully cover all preferential access rents but capture most effects of preference erosion. A simulation in which the initial quota rents accrue to exporting countries shows, indeed, that some of these countries could lose as the result of a liberalization of the bovine meat market owing to preference erosions. However, these losses stem from tariff reductions, and not from export subsidy reductions, because the additional effect of eliminating export subsidies is always positive for these African countries. Table 9 shows that the least developed countries gain as a group from the elimination of export subsidies. The major winners in this group of countries are Mali, Sudan, Myanmar, Burkina Faso and Chad. However, there are also some least developed countries such as Angola with greater losses if export subsidies on beef are removed entirely.

In addition to some least developed countries, net beef-importing countries such as Japan, the United States, the Republic of Korea and Mexico lose as the result of an elimination of export subsidies on bovine meat. The United States does not provide any export subsidies on bovine meat. Japan, with *minus* $61 million, is the biggest loser. Producers in all these countries benefit from higher prices, but their gains do not outweigh the consumers' losses, so that the overall welfare gains concerning bovine meat are smaller in the Elimination scenario than in the Basic scenario.

Table 9. Additional welfare gains from eliminating export subsidies on bovine meat ($m)

Developed	1 861
Developing	-45
LDC	586
World	1 816

Producers in all developing and least developed countries gain from an elimination of export subsidies.

Sugar

When export subsidies on sugar of initially $482 million are eliminated in addition to reducing tariffs, the world price for sugar is additionally increased by 2.3 percentage points. The additional global welfare gain is $417 million. The EU provides 96 per cent of the initial export subsidy expenditures and gains $342 million from the elimination of sugar subsidies. Consumers gain $707 million, producers lose $1,053 million and the additional government revenue increase is $689 million (mainly $460 million in saved export subsidy expenditures and $387 million in additional tariff revenue). Other major winners are Brazil, Mauritius, India, Australia, Thailand, Fiji and Cuba. It is important to note here that we are comparing two simulations that differ only concerning the export subsidy reduction and we report the differences of these two simulations. Mauritius loses from sugar market liberalization in the Basic scenario owing to preference erosion, but it gains from the additional elimination of export subsidies. We assumed in all scenarios that quota rents on sugar accrue to exporters.

Table 10. Additional welfare gains from eliminating export subsidies on sugar ($m)

Developed	4 648
Developing	4 185
LDC	880
World	417

Among the winners are other African countries such as Zimbabwe, South Africa, Swaziland and Côte d'Ivoire and Caribbean countries such as Belize.

However, gains for many developing countries would probably be limited since, on the one hand, access to markets is limited by historical quota allocations, and, on the other hand, it would be difficult in a liberalized market to compete with lower-cost producers such as Brazil.

In major net sugar-importing countries such as the United States, the Russian Federation, Japan, China, Indonesia, Pakistan, the Islamic Republic of Iran, the Republic of Korea and Algeria imports and tariff revenue decrease and the consumer surplus decreases more than offset producer gains.

Both developing and least developed countries gain as a group from removing export subsidies on sugar, whereas developed countries lose (see table 10). Thus, according to our results a development-friendly negotiation round should aim at phasing out all export subsidies on sugar as early as possible.

Dairy products

Subsidies on dairy products amount to almost 40 per cent of total export subsidies. The EU provides almost 80 per cent of subsidies on dairy products. It gains about $1.4 billion and the other countries providing the bulk of subsidies – Norway, Canada, the United States and the Czech Republic – also gain. Countries benefiting from additional exports include Australia, Argentina and New Zealand. Many least developed and developing countries have negative additional welfare effects as the result of removing export subsidies on dairy products (see table 11). This reflects again the fact that producer gains in these countries may be outweighed by consumer losses.

Table 11. Additional welfare gains from eliminating export subsidies on dairy products ($m)

Developed	1 439
Developing	-364
LDC	-39
World	1 036

Wheat

The elimination of export subsidies on wheat has specifically negative impacts on least developed countries. In the ATPSM database all least developed countries are net wheat importers and all except one least developed country lose from elimination of export subsidies of initially $395 million, essentially because of the computed increase in the world market price of 2.55 percentage points. However, since parts of the least developed country imports are provided as food aid and thus are not fully paid for by the beneficiaries, the negative impact may be overstated if food aid is continuing to be provided. The EU provides 84 per cent and the United States 13 per cent of total wheat export subsidies. The EU, the United States, Canada, Australia and Argentina are the five largest beneficiaries of the elimination of export subsidies. Among the developing countries gaining from elimination of wheat subsidies are wheat-producing countries such as Argentina, Kazakhstan and Hungary.

Table 12. Additional welfare gains from eliminating export subsides on wheat ($m)

Developed	843
Developing	-293
LDC	-52
World	498

Table 13. Additional welfare gains from eliminating export subsidies on vegetable oil, oilseeds and tobacco ($m)

Developed	5
Developing	-6
LDC	-2
World	3

Thus, although there are efficiency gains from eliminating export subsidies on wheat, such a policy is expected to cause some hardship for many developing country consumers (table 12). Since supply responses are taken into account by ATPSM, the results suggest that it would be difficult for most developing countries to increase their wheat production or production of substitutes during the first years after elimination and with this to reduce wheat imports sufficiently to outweigh higher world prices.

Vegetable oil, oilseeds and tobacco

The EU proposal includes the elimination of export subsidies for products of specific interest to developing countries as well as wheat, vegetable oil, oilseeds and tobacco. Export subsidies for these products accounted for only 6.5 per cent of the EU's average export subsidies during the period from 1995 to 2000 ($356 million). In the ATPSM database, export subsidy expenditures, which include export credit subsidy elements, are $459 million for these products. Excluding wheat, expenditures for vegetable oil, oilseeds and tobacco account for only about 1 per cent of total export subsidy expenditures. The United States provides the majority of the subsidies on these products. In line with the relatively small amount of subsidies, the gains and losses also small (see table 13, which shows the results from jointly removing subsidies on vegetable oil, oilseeds and tobacco). Countries such as Argentina, Brazil, Indonesia and Malaysia benefit from elimination of export subsidies on these products. Welfare gains are several million dollars, respectively. However, some developing countries such as China, India and Pakistan may experience initial welfare losses. These countries are currently all net vegetable oil importers.

7. CONCLUSIONS

Agricultural export subsidies are one of the most distorting of the numerous measures distorting agricultural trade, and impose an unreasonable burden on third country producers, many of whom are in developing or least developed countries. Most developing countries cannot afford to pay export subsidies and fear that they are losing some of their export competitiveness relative to developed countries. Our results confirm that producers in developing countries would be the major winners from an elimination of export subsidies.

Export subsidies are interrelated with other policies such as tariffs that maintain high domestic prices and domestic support. The measures may lead to overproduction, which is disposed of through export subsidies onto world markets with adverse effects for producers in non-subsidizing countries. In order to protect their producers against cheap subsidized imports these countries may impose high tariffs. Thus, the elimination of export subsidies, a reform of domestic support policies and reductions in import tariffs are likely to go hand in hand. As shown by Anderson (2003) and others, developing countries would benefit from liberalizing their own markets and the elimination of export subsidies would make this more feasible without costly adjustments.

Furthermore, a reinforcement of the rural population, which heavily depends on agricultural production and is in general disproportionately poor, may contribute to poverty alleviation. Export subsidies can distort local markets in developing countries, causing harmful effects to small agricultural producers and possibly food security.

Using the partial equilibrium model, ATPSM, we estimate global gains from an elimination of all export subsidies of some $4.3 billion.[23] The disaggregated results show that the effects differ greatly by commodity, country and groups within countries. Agricultural exporters such as the Cairns Group members and producers in developing countries are the major winners. Consumers in many developing countries would, however, experience higher food prices. In net food-importing countries producer gains may not immediately outweigh consumer losses. The supply capacity has to be increased in order to be able to adequately respond to the expected increase in international prices. To that end, efforts would need to be made to expand those countries' supply capacity and to provide assistance during adjustment periods.

The biggest gains for developing countries as a group would come from the elimination of export subsidies on sugar. Some least developed countries and Latin American countries would gain significantly from the elimination of export subsidies on bovine meat. It is shown that, in general, preference-receiving countries would also benefit from elimination of beef and sugar export subsidies, although some may lose from preference erosion owing to a reduction of bound tariffs. This conclusion does not hold for all commodities. As nearly every developing country is a net importer of wheat, they would face higher food bills for their wheat imports. Producers and some developing country exporters such as Argentina would, however, benefit from the elimination of wheat export subsidies.

[23] This is in the same order of magnitude as estimates using the GTAP model, version 5.3.

In terms of total welfare, the EU as the largest provider of export subsidies would receive the largest gains from elimination of export subsidies. Producers, however, would lose as the result of such a policy.

All WTO members gave development a central role in the Doha work programme. UNCTAD (UNCTAD, 2003) has designed several development indicators against which progress in the multilateral trading system with regard to development goals can be assessed. With regard to the indicator "Equal opportunity for unequal partners", the elimination of export subsidies would level the playing field, as developing countries are not able to subsidize their exports, and thus make a contribution. A positive contribution to achieving the goals set out in the UN Millennium Declaration, which is a factor contributing to the indicator "Serving the public interest", is also likely, although some developing countries are expected to initially experience welfare losses. The estimated welfare impacts are the sum of gains to producers, exporters, consumers and taxpayers. A problem with such welfare estimates is the presumption of equal weights and the calculation at national levels. In many developing countries agriculture is particularly important because a disproportionately high share of the poor live in rural areas. Thus, since the agricultural sector in developing countries would benefit from an elimination of export subsidies, the framework agreement would contribute to achieving the goals of the Millennium Declaration in countries where the majority of the poor are subsistence farmers or live in rural areas. It may, however, increase the necessity for support to the urban poor. Furthermore, since world commodity prices would increase as a result of eliminating export subsidies, this policy would serve the indicator "Revitalizing the commodities sector". However, since the bulk of the export subsidies is not on commodities, on which many developing countries heavily depend, the contribution is limited. Finally, to benefit from the elimination of export subsidies, developing countries need a "coherent" development strategy which includes improving their supply capacity and reducing transportation costs.

The limitations of the analysis should be kept in mind. The model from which the conclusions are drawn relies on several important assumptions. One is that production quotas are not binding and therefore supply immediately responds to subsidy changes. This assumption leads to an overstatement of the benefits to third country exporters. A second assumption is the focus on budgetary outlay constraints rather than volume constraints. Another limitation is data availability. Here, only official export subsidies were considered and a possible bilateral nature, where subsidies are provided only for exports to specific countries, could not be taken into account. As has been confirmed by recent WTO Dispute Panel decisions, the officially notified export subsidies are lower than actual subsidies; thus our analysis underestimates the result of an elimination of all forms of subsidizing exports. Further limitations that are common to computable equilibrium models were discussed above.

In spite of these limitations, the results provide a useful indication of the likely impacts of a reduction or an elimination of export subsidies. Producers in developing countries would receive considerable gains without high adjustment costs. Least developed countries and net food-importing countries should be aware of the possible impact on consumers resulting from increasing food prices for specific products such as wheat. Although this may be advantageous to their producers, who include some of the poorest sections of society, it may also have consequences for the urban poor. It therefore seems reasonable to develop support mechanisms to help the poorer countries to adjust to the changes that are likely to occur as a result of the current WTO negotiations.

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APPENDIX

Product concordance

Table A1. Product concordance for the calculation of export subsidy rates

SITC	ATPSM	WTO notifications
01100	Bovine meat	Bovine meat
01210	Sheepmeat	Sheepmeat
01220	Pigmeat	Pigmeat
01230	Poultry	Poultry meat
02212	Milk, fresh	
02222	Milk, conc.	Skim milk powder, other milk products
02300	Butter	Butter and butteroil
02400	Cheese	Cheese
04100	Wheat	Wheat and wheat flour
04200	Rice	Rice
04300	Barley	Coarse grains (distributed on sorghum and barley, according to export ratio)
04400	Maize	
04530	Sorghum	Coarse grains (distributed on sorghum and barley, according to export ratio)
05420	Pulses	Vegetables (if not specified in greater detail
05440	Tomatoes	then distributed according
05480	Roots & tubers	to export ratios)
05700	Non-citrus fruits	Fruit
05710	Citrus fruits	
05730	Bananas	
05790	Other tropical fruits	
06100	Sugar	Sugar
07110	Coffee green	
07120	Coffee roasted	
07131	Coffee extracts	
07210	Cocoa beans	
07220	Cocoa powder	
07240	Cocoa butter	
07300	Chocolate	
07410	Tea	
12100	Tobacco leaves	Tobacco
12210	Cigars	
12220	Cigarettes	
12230	Other mfr tobacco	
22100	Oilseeds	Oilseeds
26300	Cotton linters	Cotton
42000	Vegetable oils	Vegetable oils, olive oils

Export subsidies on live animals, eggs, wine, incorporated products and other products were not taken into account. No positive subsidies on oilcakes were reported. Since the WTO members did not adhere to the WTO classification and some notifications are more detailed, there are also subsidies on maize, citrus fruits, bananas, other tropical fruit, coffee, cocoa, chocolate, tea and cigarettes in the ATPSM database. The assignment was not always straightforward. For example, some countries notified subsidies on butter, cheese and other milk products, in which case subsidies on other milk products were assumed to be on skim milk powder. When, however, subsidies on skim milk powder, butter and other milk products were reported, the latter were assumed to be on cheese.

The ATPSM modelling framework

ATPSM is a deterministic, comparative static, partial equilibrium model. This means that there are no stochastic shocks or other uncertainties, and there is no specific time dimension to the implementation of the policy measures or to the maturing of their economic effects. The comparative static nature of the model does not imply that the policies take effect instantaneously. Rather, we are comparing two states at a similar point in time, one with the policy change, the other without. Finally, whereas the model aims at estimating far-reaching details of the agricultural economy, it does not deal with the repercussions of barrier reductions on other parts of the national economy. Thus, effects neither on the government budget (except for tariff revenues and subsidies to exports and domestic production) nor on the industrial and service parts of the economy or the labour market are the subject of analysis. Simplifying the model in these respects allows for detailed specifications of policies in a large number of countries for numerous commodities.

Two versions of ATPSM are available. In the "Armington version" the change in imports is determined through an "Armington" elasticity and exports are the residual of production, consumption and imports. In the "Standard version" the percentage change of exports equals the percentage change of production and imports are determined so as to clear the market (see equation system below). Both assumptions have their advantages and disadvantages. The Armington model is discussed in greater detail in Peters and Vanzetti (2004). This paper focuses on exports and therefore the standard version, where exports are not the residual, has been chosen.

Both versions give qualitatively exactly the same results, but the order of magnitude is very different. Table A2 gives the results from simulating the same scenarios using the Armington version. Presented is the difference between the Elimination scenario and the Basic scenario.

Table A2. Additional gains/losses from eliminating export subsidies simulated with the Armington version

	Consumer surplus	Producer surplus	Welfare
Developed	7 659	-10 494	1 836
Developing	-15 835	14 902	-733
Least developed	-889	782	-96
World	-9 065	5 190	1 007
Cairns	-4 410	4 910	602
Developing, ex. Cairns	-12 743	11 828	-767
Group of 20	-8 895	8 787	-93

Source: ATPSM calculations.

Equation system in the standard version

After a trade policy change, like a change in tariffs, export subsidies and/or domestic support, is specified, the model calculates the new equilibrium. The equation system for all countries has four equations:

1) $$\hat{D}_{i,r} = \eta_{i,i,r}\hat{P}_{Ci} + \sum_{\substack{j=1 \\ j\neq i}}^{J} \eta_{i,j,r}\hat{P}_{Cj};$$

2) $$\hat{S}_{i,r} = \varepsilon_{i,i,r}\hat{P}_{Pi} + \sum_{\substack{j=1 \\ j\neq i}}^{J} \varepsilon_{i,j,r}\hat{P}_{Pj};$$

3) $$\Delta X_{i,r} = \gamma_{i,r}\Delta S_{i,r};$$

4) $$\Delta M_{i,r} = D_{i,r}\hat{D}_{i,r} - S_{i,r}\hat{S}_{i,r} + \Delta X_{i,r};$$

5) $$\sum_{n=1}^{N}(\Delta X_n - \Delta M_n) = 0;$$

where *D, S, X,* and *M* denote demand, supply, exports and imports, respectively;

- ^ denotes relative changes and D absolute changes;
- P_w denotes world price;
- t_c denotes the domestic consumption tariff and t_p denotes the domestic production tariff;
- ε denotes supply elasticity, h denotes demand elasticity, and the ratio of exports to production;
- *i* and *j* are commodities indexes;
- *r* is a country index; and
- *N* is the number of countries.

Equations 1 and 2 specify that the new demand and supply are determined by the price changes, trade policy changes and the corresponding elasticities and cross-price elasticities. Equation 3 requires that the change in exports in each market is some proportion of the change in production. This proportion is determined by the ratio of exports to production. Equation 4 clears the market, so that production plus imports equals domestic consumption and exports. Equation 5 ensures that, globally, the sum of the change in exports equals the total change in imports for each commodity.

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