How significant are export subsidies to agricultural trade?

Trade and welfare implications of global reforms

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Abstract

We analyze the impacts of removing export subsidies with or without reforms to domestic support and tariffs using a multi-country trade model and incorporating comprehensive per-unit export subsidies derived from WTO submissions. The analysis explores both the direct and the second best effects of policy distortions, giving particular focus to net food importers. Results show that the removal of export subsidies alone is welfare improving only for the subsidizing country and net exporters, but welfare reducing for net food importers who experience both worsening terms of trade and loss of allocative efficiency. Higher food prices reduce imports but increase welfare cost of import protection. Under scenario combining removal of export subsides, domestic subsidies and import barriers, most countries show welfare gain, including net food importers due to improved economic efficiency from removing own import barriers. This analysis shows that reducing export subsidies by themselves may not be beneficial for food importing countries as long as import barriers are also not addressed. That is, the potential welfare gains expected from trade liberalization are for a large part contingent on removing the fairly dominant domestic support and import trade barriers.

Key Words: export subsidies, trade liberalization, general equilibrium, WTO.

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The views expressed in this paper are those of the authors and do not reflect the views of their institution.

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1. Export Subsidies and WTO

The Doha WTO Ministerial Meeting has launched a new WTO round to be concluded by January 2005. This important outcome also has implications for the current WTO negotiations on agriculture, initiated in 2000 under the mandate of Article 20 of the Uruguay Round Agreement on Agriculture (URAA). The chance for an agreement on further reduction in agricultural support seems strengthened by the possibility of concessions in areas outside agriculture. In reference to agriculture, the Doha Ministerial Declaration is fairly general in its goals, aiming for "substantial improvements in market access, and substantial reductions in trade-distorting domestic support". The language for export subsidies is more specific, stipulating "reductions, in view to phase out, all forms of export subsidies".

Under the URAA twenty-five members of WTO committed to reduce their export subsidies, and no member country is permitted new export subsidies. Examples of policy responses include Canada's elimination of its rail subsidy program (which had lowered the cost of rail shipments to export positions). Australia eliminated direct export subsidy to dairy and changed its domestic support scheme to milk producers. In the United States, with the passage of the FAIR Act of 1996, spending for the Export Enhancement Program (EEP) was reduced substantially. The European Union (EU) has gone through a new round of policy reform—the Agenda 2000 reform--but may still not be able to live within its WTO commitments on export subsidies beyond 2000 (Swinbank, 1999).

The European Union is by far the largest user of export subsidies. Between 1995 and 1998, global export subsidies amounted to over $27 billion cumulatively, of which over 90 % is from the EU. By comparison, the U.S. spent just over $US 486 million on export subsidies between 1995 and 1999, much of it for dairy exports under the Dairy Export Incentive Program (DEIP) and just over $US 9 million subsidizing poultry under the Export Enhancement Program (EEP). Both DEIP and EEP subsidies are targeted and account for a substantial share of total exports of dairy and poultry. For example, over 94% of all dairy exports for the 1995-1999 period took place under DEIP[1]. Other significant users of export subsidies include Switzerland, which subsidies dairy products, fruits and vegetables, and other processed food, and Norway, which uses export subsidies for dairy and to lesser extent for non-bovine livestock. Table 1 shows the 1998 per-unit export subsidy for selected commodities and countries, calculated as the value of export refunds divided by the *f.o.b.* value of exports.

While the URAA has ushered significant cuts in export subsidies, there are still weaknesses and loopholes in current WTO rules. The WTO has identified some omissions in the notifications of export subsidy expenditures. In one case, a WTO panel found that Canada's price arrangement for dairy products provided export subsidies even though they are not submitted in the notifications. A proposal by Canada in response to the ruling is currently under appeal with the WTO. Another WTO ruling found that the United States' Foreign Sales Corporations do confer a benefit to exporters and therefore constitute an export subsidy. In response, the United States replaced the FSC Provisions with the Foreign Sales Corporation Repeal and Extraterritorial Income Exclusion Act, which is now under appeal at the WTO Appellate Body. The EU also does not report export subsidies for sugar imported under preferential terms from African, Caribbean, and Pacific (ACP) countries and India, and re-exported by the EU. In addition, The EU has used the URAA allowance for "unused" export subsidies

[1] The current Farm Bill under consideration in both House and Senate Versions maintains these two programs under the same level of funding.

in a given year being rolled over to the next. The EU has also used existing URAA ambiguities such as switching between similar commodities. For example, the EU subsidizes cheese exports and reports it under commitments for skim milk powder and butter, thus bypassing its cheese-specific UR bindings on export subsidies.

Achieving a new WTO agreement for export subsidies may not be easy. While current WTO negotiations on export subsidies will focus largely on the European Union, a complicating issue is whether or not to include export credits, food aid and state trading enterprises. This is likely to make agricultural negotiations on export competition difficult, given the variety of policy objectives behind these programs and the difficulty in quantifying the export subsidy equivalent of these policies[2]. In the absence of a new agreement on further cuts in export subsidies, member countries may face disciplines from the 2003/04 deadline when the "Peace Clause" and Special Safeguard provisions expire. After that date, export subsidies could be subject to GATT's Article XVI and the Agreement on Subsidies, permitting countries to challenge a member country's export subsidy policies, if it can be shown to cause injury to another member.

2. How significant are export Subsidies?

An export subsidy provides an incentive for exporters to increase output for sale in foreign markets, which bids up domestic prices and depresses world prices. Hence, export subsidies affect domestic production, consumption, and trade. However, export subsidies are only one of the policy interventions that affect production and trade. Consequently, to examine the significance of export subsidies to agricultural trade, it is important to consider simultaneously the interactions between export subsidies and other farm policies. This interaction is important even if no change is made to other policies, as the removal of one policy may worsen the distortionary effect of the remaining policies. The empirical analysis presented in this paper shows that the removal of export subsidies alone could magnify trade distortions from import tariffs even if these are not changed. Hence, the interaction between export subsidies and other policy distortions can critically affect the direction of welfare change following trade reform. This latter point is important given that any new multilateral agreement on export subsidies will also addresses domestic support and import barriers.

Another important consideration is the differential impact of export subsidy removal on subsidizing regions, other exporters, and net food importers. This is particularly important for the latter group, as food deficit developing countries argue that removing export subsidies will increase their import bill and make them worse off. Other developing countries, with significant agricultural exports argue that their domestic producers are handicapped by export subsidies, which depress prices, or that they face greater competition in the export markets as a result of export subsidies. However, while developing countries could suffer a welfare loss from deteriorating terms of trade following export subsidy removal (owing to an increase in the price of imports relative to exports) economic inefficiency could worsen if export subsidies are removed while other distortions are kept in place.

To sort out the effects of exports subsidies with or without other trade policies trade, the Global Trade Analysis Project (GTAP) general equilibrium model of the world economy was used to examine the

[2] This is shown, for example, by an OECD (2000) study on export credits which highlights the difficulties in estimating their effects. This study concludes that the subsidy equivalent of export credits is very small relative to total trade value.

impact of export subsidy removal. Two scenarios are considered: removing export subsidies with or without other policy reforms. The objective is to assess the relative magnitude of the trade and welfare impact from export subsidy removal in the context of other agricultural policy interventions, and secondly, to assess the welfare implications for net food importers under alternative multi-lateral trade liberalization scenarios.

2. 3. Methodology and Experimental Design

We employ the standard version of the applied general equilibrium model known as GTAP (Hertel, 1997)[6] and the latest GTAP database version 5, calibrated to 1997 for production and trade and to 1998 for protection data. The model represents regional sectoral policies in the form of tariff equivalent of border interventions (import tariffs and export subsidies) and domestic subsidies allocated to output, intermediate inputs and primary factors. Version 5 database has much improved agricultural protection data drawn from the Agricultural Market Access Database (AMAD)[7]. Domestic support data from the PSE tables are distributed into output subsidies, input subsidies and factor-based (land, capital) subsidies. In the EU case, payments are disaggregated separately for wheat, cereal grains, oilseeds and cattle.

The GTAP database version 5 also has an improved representation of agricultural export subsidies based on country submissions to the WTO of export subsidy expenditures, representing the best available compilation of agricultural export subsidies. Using 1998 export subsidy expenditures and the FOB value of exports for 1998 using UNCTAD trade data, effective export subsidy rates were computed[8]. The per-unit export subsidy rate per GTAP sector *i* (omitting regional subscript) is calculated as follows:

$$S_i = \frac{XR_i}{XT_i * T_i}$$

Where *S* is the subsidy rate, *XR* is value of export subsidy in 1998 $US millions, *XT* total value of exports for GTAP sector i[9], and T is the share of exports that is subsidized. In order to be consistent across commodities and regions, a simplifying assumption was to set T to 1 for all commodities and regions in the model. The export subsidy rates for 1998, aggregated to the GTAP commodity classification, are reported in table 1. For example, for each dollar of exported sugar, the EU pays 54.4 cents as subsidies or 54.4 percent export subsidy rate.

The GTAP database distinguishes between 66 regions, 57 commodities and five primary factors. In this analysis, the database is aggregated into a 19-region and 19-commodity aggregation 14 of which are in primary agriculture (table 2). The regional aggregation includes the major agricultural exporting

[6] GTAP is solved using GEMPACK (Harrison and Pearson, 1996)
[7] The AMAD database development is a cooperative effort that involves USDA/ERS, Agri-Food Canada, EU Commission, OECD, UNCTAD and FAO. (for access to the database see the AMAD site: http://www.amad.org.)
[8] In some cases like the US and the EU, export subsidy notifications were taken from 1997 GATT year, in order to ensure a better matching with the 1998 UNCTAD trade data.
[9] excluding intra-European trade in the case of the European Union

Deleted: These policy interactions are also explored in a partial liberalization simulation by examining the EU case of partial cut in sugar export subsidies combined with a partial liberalization of the sugar tariff-rate quota regime.

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Under the Uruguay Round Agreement twenty-five members of WTO are committed to reduce their export subsidies. Each year, WTO members are required to notify to the WTO Secretariat the volume and expenditures of export subsidies by commodity as specified in their country schedules. Appendix table A1 shows the 1995-98 evolution of export expenditures by commodity as reported by WTO members

Deleted: [4], 99.4% for non-bovine meat and 80% for dairy. The USA uses no export subsidies except for dairy products (5% of all global dairy subsidies in 1998) and much smaller amounts for poultry products. The other countries that continue to use export subsidies include Switzerland mostly for dairy products, fruits and vegetables and other processed food. Norway also uses export subsidies for dairy and to lesser extent for non-bovine livestock. ¶
Unlike the agreements on market access and domestic support policies, constraints on export subsidies negotiated during the UR were the most binding (Tangermann, 1999), forcing many member countries to modify their policies to conform to the URAA commitments. For most OECD countries, outside the European Union (EU), the post-UR policy changes to export subsidy commitments were facilitated by a favorable world environment characterized by high world prices especially in 1995 and 1996

Deleted: [5]. Examples of policy responses include Canada's elimination of its rail subsidy program (which lowered the cost of rail shipments to export position) counted toward fulfillment of this commitment. Australia modified the export subsidy on dairy products to be more consistent with the WTO rules. South Africa eliminated all export subsidies after 1997 except for sugar. In the US, export subsidy programs are also subject to the cuts agreed to in the URAA, and since the FAIR Act of 1996, the Export Enhancement Program (EEP) has ... [1]

and importing regions in the OECD (US, EU, Japan, Canada) and the developing world (China, India, Malaysia, Indonesia, Brazil and Argentina).

GTAP measures welfare changes by direct evaluation of the impacts on the expenditure and production revenue functions and government revenues (due to the changes of volumes of import tariffs and domestic taxes). Welfare is calculated at the regional level as an equivalent variation. The overall welfare changes resulting from trade policy are decomposed into components associated with changing the terms of trade, as well as any technological or factor-endowment change (Huff and Hertel, 1996). This decomposition approach may be viewed as a generalization of Baldwin and Venables' analytical decomposition, which accommodates domestic distortions and handles non-marginal changes via numerical integration.

In analyzing the consequences of trade liberalization, the starting point is a projected future state of the world economy in 2005 when all the Uruguay Round provisions are assumed to be fulfilled. For export subsidies, the calculated rates from 1998 submissions are assumed to prevail in 2000 at the end of the Uruguay Round implementation period and therefore were kept unchanged during the protections period. In the projected baseline simulation (PROJ_BASE), the GTAP model is shocked with projections of each region's endowment of physical capital, skilled and unskilled labor, GDP, and population. These are derived from a combination of historical data and World Bank projections for the growth of population, labor force, real GDP and investment (Anderson, *et al.*). Since import trade measures were taken to be constant *ad valorem* tariffs in the baseline simulation, no projections for these variables were required for the projection simulation. For the Multi-Fiber Arrangement (MFA), the elimination of quotas as part of the Uruguay Round was modeled by shocking the export tax equivalent of the quotas. The EU-specific shocks from the Agenda 2000 policy include: a) cuts in tariff-equivalents of intervention prices for coarse grains (20 percent), dairy (15 percent), and bovine meat (30 percent), and b) elimination of wheat export subsidies during the projection simulation, following the OECD (2000a) forecasts that subsidized cereal exports would cease under the assumption that the normally higher domestic prices for cereals would reach world price levels by 2002, as EU support prices are lowered due to Agenda 2000 reforms[10].

Policy experiments are designed as deviations from projected baseline simulations, following the approach developed by Bach *et al*. (2000). Two liberalization scenarios are considered in this study. Each takes as a starting point the equilibrium database generated by PROJ_BASE. The first policy scenario, GLOB_X, consists of a global removal of export subsidies for agricultural commodities by all regions. Results can be interpreted as changes in selected variables in the year 2005, due solely to export subsidy removal. The second scenario, GLOB_XDT, extends trade liberalization to export subsidies, import barriers and domestic support as captured in the model in the form of *ad valorem* tariff equivalents. For domestic subsidies, the shocks consist of removing all subsidies linked to output and primary factor use in agricultural products. These scenarios are similar to the ERS (2001) study that also examined multilateral agricultural reforms. In that study the emphasis was on the broad impacts of developed versus developing countries from multilateral trade liberalization and the potential added gains from long run capital accumulation and technical change. The present study emphasizes medium-term effects and focuses more narrowly on export subsidies and the welfare implications of reforms resulting from interactions with other distortions. While neither of the two

[10] However, these shocks leave out compensated payments to producers as well as land set-aside adjustments

scenarios considered in this study are likely to be the outcome of current WTO negotiations, scenario GLOB_XDT is used to contrast with the export subsidy removal scenario and help quantify the relative significance of export subsidies compared to other policies.

4. Results

Export Subsidies Keep Up EU Production, Keep Down World Prices

The removal of export subsidies alone, keeping in place other policies, lowers domestic prices for subsidizing countries and raises world prices. Under this scenario, world prices increase for sugar (5.6%), dairy (4.3%), and to a lesser extent bovine meat (1.5%) and grains (1.4%) (table 3). World markets for sugar and dairy are more affected by export subsidies because the European Union – the world largest agricultural market and the largest subsidizer-- has high subsidy rate for sugar (54 %) and has substantial export market shares for dairy (over 75% of world exports). For the EU, removing export subsidies lowers domestic prices and lowers output as productive resources are re-allocated from sectors like sugar, dairy, grains and into oilseeds and fiber crops (table 4).

For other exporting countries such as the United States, Argentina and Australia, higher world prices stimulate domestic production, partly offsetting the EU output decline. The extent and scope of output expansion varies among countries. For the United States, there is a modest increase (less than 1 %) for most commodities, notably grain and sugar. For other exporters, output expansion in some sectors requires pulling resources away from other sectors. For example in Australasia, productive resources are shifted away from wheat and fiber sectors and towards higher production of sugar and dairy. Likewise for Argentina, higher world prices shift resources from oilseeds and into grain production (table 4, column 3). For net food importers, higher world food prices following export subsidy elimination stimulate domestic production. For example in the Middle East and North Africa (MENA) region, domestic output increases in dairy, grains and meat products while resources shift away from oilseeds and fibers.

Export Subsidies Expand EU Exports at the Expense of Rival Exporters

Under the export subsidy removal scenario, global agricultural trade declines (table 5, Column 1) with the largest decrease in trade volume in sugar (-8.4%) and dairy (-6.0%), two sectors for which the EU has either a high rate of export subsidy (sugar) or substantial export market share (dairy). EU exports drop significantly, particularly for sugar, grain, dairy and bovine meats. Change in net trade balance (which is the difference in the value of *f.o.b.* exports and *c.i.f.* imports) is also highly negative for sugar, dairy, bovine meat and grains, in that order[11] (Table 5). For other exporters, such as the United States, Argentina and Australia, higher world prices increase the value, and sometimes the volume of exports. The extent of their export response varies across countries and commodities. For the US, exports increase for non-bovine meats (3.6%; $US 1512 M), coarse grains (3.1%; $US 384 M) and bovine meat (2.8%; $US 102 M). On the other hand dairy exports decline (-26% or -$US 383 M) as a result of the US removing its own export subsidies, but the net trade balance is positive since imports

[11] A change in trade balance is relative to the initial trade balance in the benchmark database. For example if MENA initial trade balance for wheat is negative $500 M and shows a net trade balance gain of $200 M in a post-simulation equilibrium (reported in the results table), the MENA region in fact shrink its initial negative trade balance down to -$300 M.

are also decreased. Combining all agricultural sectors, the US net trade balance surplus is over $US 1.6 billion. Australasia (Australia and New Zealand) captures much of the lost dairy exports by the EU and shows the largest increase in dairy exports (23% or $US 1388 M).

For net food importers, higher world prices reduce import demand and boost demand and production for domestic goods. The extent and scope of the decline in imports vary between countries, depending on the degree of import dependencies. For Japan, imports decline for dairy, sugar and meats (table 6). Similar import declines are also shown for Korea, except for sugar. For the Middle East and North Africa, a region highly dependent on imports for a wide a range of products, there is a substantial decline in imports for dairy, sugar and bovine meats (table 6).

Domestic Subsidies and Import Barriers have Larger Impact on Trade than Export Subsidies

Under the scenario where export subsidies, domestic subsidies and import tariffs for agricultural commodities are removed (GLOB_XDT), there is stronger global demand for agricultural products, which drives trade expansion despite increased world prices. Under this scenario global trade expands by $123 billion, of which $63 billion is from primary agriculture. For net food importers this translates into a sharp decline in domestic production as import barriers are dismantled and demand for imports expands (table 6). The EU also shows a decline in production in most agricultural sectors except for fiber products. EU exports also decline for most products except for wheat and fiber (table 5).

Most other exporters benefit as exports expand in response to global demand. U.S. agricultural exports rise substantially, particularly meat products, rice and dairy. Argentina increases its exports of wheat, grains, dairy, and meat products at the expense of oilseeds. Australasia shows a substantial increase in exports of beef and dairy, with no growth in wheat and lower fiber exports. Overall, the substantial global trade expansion under the complete liberalization scenario (GLOB_XDT) shows that export subsidies have much less impact on world agriculture trade than domestic support and import barriers. The overall decline of production and exports of agricultural products by the EU, the largest agricultural market in the world, strongly underscores the EU's reliance of protection policies to maintain its current production and export levels. On the other hand, the United States' positive response to increased market access for most agricultural products underscores the importance of open markets and the potential scope for increased U.S. exports under a liberalized trade regime.

Trade reforms may also affect food self-sufficiency for net importing countries. This is particularly true for developing countries. Table 7 report self-sufficiency ratios in key agricultural commodities for four net food importers under three scenarios: pre-reform, removal of export subsidies only, and global agricultural liberalization. This ratio reflects the net changes in demand and supply and the economy's degree of specialization. For example in the MENA case, under the removal of export subsidies there is a small increase in self-sufficiency ratio for sugar (83% up from 80% prior to reforms), dairy (85% up from 83%) and smaller increases for grains, rice and bovine meats. Under global liberalization (GLOB_XDT scenario), self-sufficiency for MENA is lower for wheat, oilseeds, dairy, and bovine meats and higher for sugar and non-bovine meats. However, with few exceptions, all these changes are within few percentage points, a result consistent with the findings of Shapoori and Trueblood (2001) who report a small impact of global agricultural reforms on self-sufficiency for least developed net import dependent countries.

Export Subsidy Removal Boost Welfare for Exporters but not for Net Food Importers

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Trade expansion requires greater output, which in turn uses additional resources. The removal of trade barriers favors efficient producers and frees up misallocated resources resulting from agricultural support policies. The welfare cost of trade barriers can be assessed by examining the impact of trade liberalization on both the terms of trade and on economic efficiency.

Under the global removal of agricultural export subsidies scenario, welfare change (measured in terms of equivalent variation) is positive for exporters but not for net food importers. The largest welfare gains accrue to the EU ($US 2,837 M), which eliminates the bulk of the multilateral export subsidies. Exporting countries such as the United States, Australia-NZ, Argentina and Brazil also show a net welfare gain. Much of these welfare gains by the EU and other major exporters are due to improved terms of trade. However, net food importers such as Japan, Mexico, and MENA show a welfare loss due to both worsening terms of trade and allocative efficiency loss (table 8). The latter stems from second-best effects resulting from interactions of export subsidies (removed) with other remaining distortions. These interactions or second-best effects are also captured individually by the GTAP model and require further explanation.

The last 5 columns of table 8 show a decomposition of allocative efficiency by policy instrument, namely: import tariffs, export subsidies/taxes, output subsidies/taxes, input subsidies/taxes, and other distortions. From the EU row, we see that the "export subsidy" component contributes positively to allocative efficiency by the amount of $US 1227 M. Of this welfare gain, half come from sugar ($US 611.5 M) and the remaining from grains ($US 173.6 M), dairy ($US 155.5 M), and bovine meat ($US132.3M). These positive gains represent the (negative) change of exported quantities times the (negative) change in the rate of export subsidy. Hence removing export subsidies by themselves is welfare improving for the EU.

However, there are also indirect effects owing the (unchanged) import barrier distortions and given by the reduction in import volume times the (unchanging) tariff rates. That is, with the removal of export subsidies, and keeping import barriers unchanged, higher world prices reduce imports, thus increasing the welfare cost of import barriers and lowering welfare. Aggregated over all commodities, this welfare loss amounts to $US 1625 M. Taken together, all the allocative efficiency components amount to $US 192 M loss for the EU under the export subsidy removal.

Similarly net food importers (such as Japan and MENA) show a negative impact on allocative efficiency. This stems from the same second-best effects, which increase the burden from import barriers even though these are not changed. Hence for the MENA region, welfare losses due to changes in import volume account for $US 987.1 M, representing the largest share of the overall allocative efficiency loss ($US 1229.3 M) under the export subsidy removal scenario.

Multi-policy Reforms, Including Tariff Reductions are key to maximizing regional welfare gains

When all export subsidies, domestic support, and tariff barriers are removed (GLOB_XDT scenario), global welfare increases by over $US 56,395 M and most countries, including net food importers, show a welfare gain (table 8, column 1 lower panel). The EU's substantial welfare gain of $US 14380 M comes largely from improved allocative efficiency, as opposed to terms of terms of trade gains as in scenario GLOB_X (export subsidy removal only). The US welfare gain of $US 7,192 M on the other hand, is mostly from improved terms of trade, which underscores the importance of open markets for US exports and the scope for US export expansion under a liberalized global trade regime. Net food

importers also show welfare gains as welfare allocation gains outweigh terms of trade losses. In this case, allocative efficiency gains arise as higher imports replace high-cost domestic production leading to a better reallocation of domestic resources. For example the MENA region shows a welfare gain of $ 2,314 M; this reflects an allocative efficiency gain ($7,969 M) combined with a terms-of-trade loss ($US – 5055.5 M). For the MENA case, this illustrates that domestic trade liberalization may be as critical to welfare improvement as reforms in foreign markets.

3. 4. Conclusions

Many WTO member countries have called for a complete removal of export subsidies. The latter are increasingly seen as incompatible with the internationalization of agriculture. In particular, the URAA has made it more difficult for countries to resort to direct export subsidies to shore up domestic prices or manage excess supplies.

This analysis shows that export subsidies have smaller impact on global agricultural trade than import barriers and domestic export subsidies, a result similar to the findings of the ERS (2001) study. We also find that that removing export subsidies has differential effects on exporting and importing countries. As the largest user of export subsidies, the EU has a substantial welfare gain despite lower exports and significant adjustments in production among agricultural sectors. In other net exporters such as the US, Australia and Argentina, both production and exports expand, offsetting reductions in the EU. Their welfare also increases largely from improved terms of trade. However, most net food importers show a welfare loss from a deterioration of terms of trade and decreased economic efficiency. The latter is the result of combined effects of higher world prices and substitution domestic production for imports. This suggests that removing export subsidies by themselves may not be beneficial for the food importing countries as long as import barriers are also not addressed.

This is clearly born out in the alternative scenario that combines export subsidies, domestic support and import tariffs removal. This leads to substantial production shifts toward efficient producers and away from high cost producing regions. The result is global trade expansion of $US 122,700 M, of which $US 63,367 M is for primary agriculture. Global welfare also increases by $US 56,395 M, with most regions gaining, including net food importers who benefit as improved allocative efficiency outweighs losses in terms of trade.

These results underscore that gains from trade from multilateral trade liberalization are largely contingent on removing domestic support and import trade barriers. Indeed, removing export subsidies alone without eliminating other distortions may lead lower welfare for net food importers, as increased inefficiencies from misallocated resources are added to terms-to-trade losses. What is critical for food importers, particularly developing countries, is that their own trade liberalization may be at least as important to their economic welfare as reforms in foreign markets. The key to improving global welfare and to extending the gains to a maximum of countries is to reduce remaining import barriers.

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The EU sugar program operates under a combined intervention policy to restrict imports via a TRQ regime and to dispose of excess supplies via export subsidies. The EU sugar intervention price is kept above the world price with high tariffs on over-quota imports plus additional duties under the special safeguard provisions both of which aim to prevent the intervention price from being undermined by import competition. Moreover, the EU sugar TRQ regime is implemented under a preferential treatment, under which import quota allocation is targeted mostly to the ACP countries as well as India. Under this preferential regime, the ACP sugar receives the same support price as internally produced EU sugar and enters the EU duty free, therefore generating economic rents for ACP sugar exporters. ¶
Under this policy regime, the economic impacts of a partial EU sugar trade liberalization under a new WTP agreement would operate via changes in both prices as well as quota rents. The reduction of export subsidies not only reduces the excess supply for the EU as an exporter but also reduce the quota rents generated from sugar imports to the EU, from rising world prices and lower wedge with the domestic price. To explore the trade and welfare effects from a simultaneous cut in sugar export subsidies, over-quota tariffs and expansion of quotas, we consider three scenarios of partial liberalization of EU sugar: export subsidy rate cut by 1/2 (SUG_X50), export subsidy rate and over-quota tariff cut by 1/2 (SUG_XT50), and export subsidy rate, over-quota tariff cut by ½ and increase in import quota by 1/2 (SUG_XTQ50). ¶
The comparison of results between from the three scenarios show that over-quota tariffs has greater production and trade impacts than export subsidy cuts alone, while the expanding quota add little to trade responses (table 10). For example EU sugar output decline by less than 1 percent under SUG_X50 compared to –7.6% decline under SUG_XT50. For the latter scenario (combined cuts in export subsidy rates and over-quota tariffs), sugar production shifts towards the sugar supplying countries of Latin America and Caribbean (+3%) and Africa (by 4.1%). Trade effects under SUG_X50 show lower sugar exports by the EU (-3.5%). By comparison, under SUG_XT50 and SUG_XTQ, the EU not only show a substantial decline in sugar exports but also show an increase in sugar imports from lower OQTR. ¶
The last three columns in table 3 s ... [2]

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Table 1. Effective export subsidy rate (trade-weighted ratio of export outlays over value of exports) (percent)

Sector	Colombia	Czech Rep.	EU	Hungary	Norway	Poland
Wheat	0.00	0.00	**9.11**	0.00	0.00	0.00
Coarse grains	0.00	0.00	**34.22**	0.00	0.00	0.00
Vegetables & fruits	**2.72**	0.00	**0.81**	**2.29**	0.00	0.00
Sugar	**1.61**	0.00	**54.41**	0.00	0.00	**6.21**
Dairy	0.00	**27.99**	**24.24**	0.00	**97.35**	0.00
Bovine meats	0.00	**65.42**	**27.14**	**0.47**	**32.60**	0.00
Non-bovine meats	0.00	0.00	**4.16**	**1.80**	**56.88**	0.00

	Slovakia	S. Africa	Switzerland	Turkey	USA	Venezuela
Wheat	0.00	0.00	0.00	0.00	0.00	0.00
Coarse grains	0.00	0.00	0.00	0.00	**0.02**	0.00
Vegetables & fruits	0.00	**1.04**	**65.59**	**0.93**	0.00	**1.69**
Sugar	**1.88**	**2.61**	0.00	0.00	0.00	**7.52**
Dairy	**26.74**	0.00	**80.12**	**0.05**	**18.59**	0.00
Bovine meats	**45.19**	0.00	0.00	0.00	0.00	0.00
Non-bovine meats	0.00	0.00	0.00	**0.33**	**0.02**	0.00

Source: Authors' calculations from WTO submissions and UN trade data.

Table 2: Model commodity and regional aggregation (GTAP Version 5)

Commodity Aggregation:			**Regional Aggregation:**	
1	Wheat	Wheat	ANZ	Australia_NZ
2	grain	Coarse grains	JPN	Japan
3	rice	Rice	KOR	Korea
4	vegfrt	Vegetables-fruits	IDN	Indonesia
5	oilsd	Oil seeds	MYS	Malaysia
6	sugar	Sugar	TWN	Taiwan
7	fiber	Plant-based fibers	CHN	China
8	bovlk	Bovine animals	RSA	Rest of South Asia
9	othlk	Non-bovine animals	IND	India
10	bovmt	Bovine meat	CAN	Canada
11	nbvmt	Non-bovine meats	USA	United States
12	dairy	Milk and dairy products	MEX	Mexico
13	vgoil	Vegetables, oil and fat	ARG	Argentina
14	othag	Other agriculture	BRA	Brazil
15	othfp	Other food products	RLA	Rest of Latin America
16	othps	Other primary sectors	E_U	European Union
17	txtap	Textile and clothing	CEA	Central European Associated
18	mnfct	manufacturing	MENA	Middle East & North Africa
19	srvcs	Services	ROW	Rest of World

Table 3. Global Export Subsidy Removal: world and producer price effects

	World import price	Domestic producer price- selected countries						
		Australia/NZ	USA	Argentina	EU15	Japan	Korea	MENA
	(%)							
		Scenario: GLOB_X						
Wheat	0.3	0.9	0.4	0.6	-0.4	0.2	0.4	0.4
Coarse grains	1.4	1.1	0.5	1.2	-0.7	0.2	0.4	1.0
Rice	0.6	0.7	0.3	0.5	-0.3	0.1	0.2	0.1
Oilseeds	0.3	0.9	0.4	0.5	-0.4	0.2	0.3	0.4
Fiber	0.2	0.9	0.3	0.5	-0.2	0.3	0.3	0.3
Edible oils, meals	0.2	0.5	0.3	0.5	-0.1	0.4	0.3	0.4
Sugar	5.6	0.6	0.4	0.6	-0.2	0.3	0.3	0.5
Dairy	4.3	1.1	0.3	0.6	-0.2	1.2	0.5	0.9
Live cattle	0.2	1.1	0.4	0.7	-0.4	0.4	0.2	0.5
Non-cattle animals	0.1	0.8	0.3	0.6	-0.3	0.1	0.2	0.4
Bovine meats	1.5	0.8	0.3	0.6	-0.3	0.2	0.2	0.3
Non-bovine meats	0.9	0.8	0.2	0.6	-0.2	0.2	0.2	0.4
		Scenario: GLOB_XDT						
Wheat	9.8	12.6	11.2	11.3	1.8	-9.1	6.5	-6.5
Coarse grains	5.8	15.1	6.8	10.7	2.6	-4.4	-29.0	-5.9
Rice	1.2	15.0	5.8	4.6	-6.0	-6.6	-0.9	-3.0
Oilseeds	3.5	10.6	4.1	8.5	4.8	-0.3	-0.7	-8.8
Fiber	-0.1	8.9	2.1	6.7	-2.2	-10.5	-5.0	-4.7
Edible oils, meals	0.4	4.6	1.9	6.6	-0.1	-33.9	-10.2	-9.4
Sugar	5.7	6.0	-2.5	6.4	-3.0	-18.4	-1.9	-5.4
Dairy	6.4	8.9	1.5	4.4	-1.3	-18.6	-5.1	-6.7
Live cattle	3.2	15.4	3.9	12.4	0.6	-17.5	-11.8	-7.0
Non-cattle animals	-0.1	9.6	2.3	8.2	-1.4	-5.5	-12.1	-5.8
Bovine meats	4.5	9.6	3.2	10.0	-0.7	-8.5	-9.8	-6.4
Non-bovine meats	0.5	9.7	1.9	6.8	-1.2	-5.5	-6.7	-12.9

Source: authors' simulation results

Table 4. Global Export Subsidy Removal: Output responses (percent change)

	Australia/NZ	USA	Argentina	EU15	Japan	Korea	MENA
	Scenario: GLOB_X						
Wheat	-0.7	0.4	0.1	-0.7	0.9	0.8	0.4
Coarse grains	0.8	0.7	1.8	-4.8	1.1	0.8	2.9
Rice	-0.3	0.5	0.2	-4.1	0.1	0.0	0.6
Oilseeds	-0.8	0.1	-0.5	0.4	0.6	0.1	-0.3
Fiber	-1.7	0.0	-0.4	1.4	0.2	0.1	-0.3
Edible oils, meals	0.1	0.3	-0.5	-0.1	0.0	0.2	-0.5
Sugar	1.8	0.9	0.3	-11.1	0.8	3.9	5.9
Dairy	11.9	0.2	1.0	-1.4	2.3	1.7	4.4
Live cattle	0.6	0.2	0.1	-1.0	0.2	0.1	0.6
Non-cattle animals	-1.0	0.2	0.0	-0.1	0.2	0.2	-0.4
Bovine meats	1.0	0.2	0.0	-1.5	0.2	0.1	2.2
Non-bovine meats	0.0	0.3	0.1	-0.4	0.3	0.9	1.3
	Scenario: GLOB_XDT						
Wheat	2.9	13.8	9.9	-7.5	-84.5	35.3	-10.9
Coarse grains	16.7	4.5	6.1	-7.2	-20.3	-84.2	-4.9
Rice	93.2	34.7	4.3	-33.5	-26.5	2.5	-1.9
Oilseeds	3.7	7.2	-0.2	-1.5	-43.9	4.7	-10.8
Fiber	-18.9	0.1	-5.8	4.1	53.3	-4.7	6.8
Edible oils, meals	-5.0	2.9	1.7	-0.5	21.7	14.0	-3.6
Sugar	5.4	-15.8	-0.3	-30.1	-20.8	22.0	3.9
Dairy	65.8	0.5	4.2	-1.5	-24.3	-2.6	-16.7
Live cattle	22.5	4.6	8.4	-14.7	-14.8	3.7	-11.6
Non-cattle animals	-7.6	1.6	-0.2	-0.9	-3.0	8.2	1.0
Bovine meats	40.1	4.2	10.7	-19.5	-6.1	3.7	-17.2
Non-bovine meats	1.6	1.6	0.8	-2.0	-9.3	8.9	-2.5

Source: authors' simulation results

Table 5. Multilateral agricultural liberalization: Changes in trade flows for selected exporters

	World import price (%)	Change in global trade (%)	European Union Export change (%)	European Union Trade Balance ($US M)	Australia/NZ Export change (%)	Australia/NZ Trade Balance ($US M)	United States Export change (%)	United States Trade Balance ($US M)	Argentina Export change (%)	Argentina Trade Balance ($US M)
			Scenario: GLOB_X [Export subsidy removal]							
wheat	0.3	-0.1	0.6	67.8	-1.3	-10.0	0.3	36.0	-0.3	4.8
grain	1.4	-1.9	-14.4	-558.8	1.7	6.5	3.1	296.0	3.6	65.6
rice	0.6	-1.0	-7.2	-76.0	-1.2	-1.2	0.7	12.8	0.5	3.5
oilseeds	0.3	-0.2	2.0	72.7	-1.6	-2.1	-0.3	4.5	-1.0	-2.1
fiber	0.2	0.1	1.4	-1.3	-2.0	-12.8	0.0	13.4	-0.8	-0.9
oilseed products	0.2	-0.1	0.3	106.0	-1.0	-3.7	0.1	2.1	-1.1	-26.8
sugar	5.6	-8.4	-45.6	-1357.7	5.0	44.6	6.4	11.3	3.8	3.3
dairy	4.3	-6.0	-6.2	-1160.6	23.0	1162.3	-26.0	61.7	12.7	59.2
Bovine meat	1.5	-2.7	-6.9	-702.2	1.8	154.9	2.8	148.5	0.3	10.3
Non-bovine meants	0.9	-1.0	-2.4	-219.3	-0.1	1.7	3.6	212.7	0.3	1.7
			Scenario: GLOB_XDT [Export subsidy, Domestic Subsidy and Import Tariffs removal]							
			(%)	T. Bal	(%)	T. Bal	(%)	T. Bal	(%)	T. Bal
wheat	9.8	21.7	3.2	-927.6	1.2	367.8	25.5	2186.0	21.6	567.4
grain	5.8	11.6	-15.3	-580.6	147.7	424.1	15.9	1825.9	12.0	308.0
rice	1.2	73.1	-37.9	-565.7	232.6	538.8	125.0	1573.8	10.5	55.0
oilseeds	3.5	14.8	0.3	-226.7	16.7	45.4	15.2	1743.3	-11.0	-96.6
fiber	-0.1	5.9	4.5	57.1	-23.8	-185.6	1.5	147.8	-14.5	-26.8
oilseed products	0.4	17.8	8.6	170.3	-28.6	-60.7	20.0	520.4	5.0	471.0
sugar	5.7	32.2	-64.9	-4275.9	21.6	225.3	87.9	-1270.4	28.1	13.6
dairy	6.4	25.6	3.2	1831.0	129.1	7050.0	107.9	459.5	66.0	290.8
Bovine meat	4.5	24.6	-43.5	-9866.9	69.8	5075.4	71.6	3205.6	120.8	1313.6
Non-bovine meants	0.5	28.6	-2.9	-1572.6	33.0	99.7	28.4	1441.0	33.4	54.9

Source: authors' simulation results

Table 6. Multilateral agricultural liberalization: Changes in trade flows for selected importers

	World import price (%)	Change in global trade (%)	Japan		Korea		Mexico		MENA	
			Import change (%)	Trade Balance ($US M)	Import change (%)	Trade Balance ($US M)	Import change (%)	Trade Balance ($US M)	Import change (%)	Trade Balance ($US M)
	Scenario: GLOB_X [Export subsidy removal]									
wheat	0.3	-0.1	0.1	-7.8	0.8	-8.3	0.3	-4.9	0.1	-20.8
grain	1.4	-1.9	0.5	-39.0	0.7	-14.1	0.2	-10.4	-5.7	19.9
rice	0.6	-1.0	-0.4	0.9	-0.3	0.1	0.3	-1.1	-1.1	4.1
oilseeds	0.3	-0.2	0.1	-11.9	-0.1	-5.3	0.0	-7.0	0.1	-3.6
fiber	0.2	0.1	0.0	-2.4	0.1	-2.7	0.0	-2.2	-0.1	0.7
oilseed products	0.2	-0.1	0.4	-6.1	0.6	-6.4	0.3	-3.0	-0.1	-16.1
sugar	5.6	-8.4	-1.2	-0.1	3.1	8.1	-2.1	15.8	-24.8	324.3
dairy	4.3	-6.0	-11.2	39.4	-15.7	23.7	-14.3	38.9	-15.8	185.9
Bovine meat	1.5	-2.7	-0.8	6.9	-0.6	0.3	-0.3	-2.2	-14.8	98.0
Non-bovine meants	0.9	-1.0	-0.5	-26.9	-1.9	12.5	0.0	-0.4	-1.8	0.9
	Scenario: GLOB_XDT [Export subsidy, Domestic Subsidy and Import Tariffs removal]									
			(%)	T. Bal	(%)	T. Bal	(%)	T. Bal	(%)	T. Bal
wheat	9.8	21.7	22.2	-446.3	34.8	-334.0	46.1	-184.7	32.7	-1675.0
grain	5.8	11.6	-8.9	121.3	48.2	-615.8	43.6	-792.7	12.1	-493.0
rice	1.2	73.1	1199.7	-4610.4	7.6	86.9	10.6	-28.8	9.6	-89.3
oilseeds	3.5	14.8	19.0	-625.8	6.2	-138.4	-4.6	9.0	23.5	-177.2
fiber	-0.1	5.9	0.7	-14.6	-1.5	6.5	1.9	-19.0	5.9	102.7
oilseed products	0.4	17.8	-45.4	610.9	22.0	-148.3	22.8	-134.3	20.6	-420.4
sugar	5.7	32.2	118.9	-483.0	23.5	-46.0	3.9	111.1	-4.6	-58.4
dairy	6.4	25.6	283.4	-3490.0	121.3	-226.1	23.5	-314.8	109.7	-3883.6
Bovine meat	4.5	24.6	34.1	-1292.7	7.4	-15.2	46.2	-481.3	141.2	-1782.8
Non-bovine meants	0.5	28.6	23.6	-1010.1	27.0	92.5	124.0	-916.3	78.7	-71.2

Source: authors' simulation results

Table 7. Agricultural Reforms and Food Sufficiency ratios for net importers

(Percent)	Japan	Korea	Mexico	MENA
	Pre-reforms			
wheat	0.13	0.01	0.56	0.75
grain	0.10	0.08	0.84	0.73
rice	0.97	1.00	0.66	0.75
Oilseeds	0.00	0.20	0.07	0.65
Oilseed products	0.83	0.64	0.74	0.55
sugar	0.90	0.73	1.01	0.80
dairy	0.86	0.94	0.83	0.83
Bovine meats	0.78	0.86	0.88	0.83
Non-bovine meats	0.58	0.95	0.92	0.50
	Export subsidy Removal			
wheat	0.14	0.01	0.56	0.75
grain	0.10	0.08	0.84	0.74
rice	0.97	1.00	0.66	0.76
Oilseeds	0.00	0.20	0.07	0.65
Oilseed products	0.83	0.64	0.74	0.55
sugar	0.90	0.74	1.01	0.83
dairy	0.87	0.94	0.84	0.85
Bovine meats	0.78	0.86	0.88	0.84
Non-bovine meats	0.58	0.96	0.92	0.51
	Global Agricultural Liberalization			
wheat	0.05	0.01	0.57	0.72
grain	0.10	0.03	0.82	0.73
rice	0.88	1.01	0.65	0.75
Oilseeds	0.00	0.20	0.07	0.63
Oilseed products	0.92	0.62	0.72	0.57
sugar	0.86	0.75	1.05	0.82
dairy	0.79	0.92	0.82	0.77
Bovine meats	0.75	0.88	0.86	0.75
Non-bovine meats	0.61	1.03	0.88	0.65

Source: Authors' simulation results

Table 8. Regional welfare effects of removing agricultural distortions (change in millions of $US per year; 1997 constant prices)

	Regional welfare			Allocative efficiency components				
Country/region	Total welfare	Terms of trade	Allocative efficiency	Import tariffs	Export subsidies	Output subsidies	Input subsidies	Other
	Removal of export subsidies only							
European Union	2836.9	3029.2	-192.3	-1625.2	1227.2	-90.0	54.2	241.6
United States	194.0	423.8	-229.8	-157.2	-57.2	-40.9	44.1	-18.6
Australia_NZ	419.3	430.3	-11.0	20.7	-11.2	-33.1	-7.7	20.4
Argentina	241.4	132.5	108.9	6.9	0.1	0.0	0.1	101.8
Brazil	470.8	265.9	204.9	36.1	-18.1	-2.3	113.5	75.7
Canada	-335.9	-102.7	-233.2	-121.3	-0.5	-29.6	-56.0	-25.8
Japan	-1097.1	-681.4	-415.7	-460.5	-5.1	35.1	48.3	-33.4
Korea	-95.1	-87.6	-7.6	-18.4	0.0	32.3	-6.7	-14.7
Mexico	-202.7	-136.3	-66.4	-46.9	0.0	-16.4	-1.4	-1.7
Middle East & North Africa	-2768.1	-1538.8	-1229.3	-987.1	22.1	-35.0	-40.6	-188.7
	Removal of export subsidies, domestic farm subsidies & import tariffs							
European Union	14380.0	984.3	13395.7	8661.9	3813.0	122.9	-485.7	1283.7
United States	7192.2	6413.2	779.0	988.2	-328.8	-544.6	409.7	254.4
Australia_NZ	4767.5	4895.8	-128.4	269.4	-79.6	-295.0	-125.0	101.7
Argentina	2791.2	1633.7	1157.6	104.8	0.3	0.0	-1.0	1053.5
Brazil	3808.6	1648.4	2160.3	310.8	-98.1	-15.3	1180.4	782.5
Canada	1394.9	667.1	727.8	1056.8	1.4	112.7	-534.2	91.1
Japan	8629.8	-3107.1	11736.8	8891.7	176.5	2438.0	-266.1	496.7
Korea	2252.1	-543.9	2796.0	1382.3	0.0	1367.0	125.3	-78.5
Mexico	-563.8	-1323.2	759.3	636.8	0.0	83.3	9.3	29.8
Middle East & North Africa	2313.2	-5055.5	7368.7	6151.3	-13.5	183.3	515.5	532.0

Source: authors' simulation results

[1]. Examples of policy responses include Canada's elimination of its rail subsidy program (which lowered the cost of rail shipments to export position) counted toward fulfillment of this commitment. Australia modified the export subsidy on dairy products to be more consistent with the WTO rules. South Africa eliminated all export subsidies after 1997 except for sugar. In the US, export subsidy programs are also subject to the cuts agreed to in the URAA, and since the FAIR Act of 1996, the Export Enhancement Program (EEP) has not been used to any extent. The only export subsidies by the US are for dairy and minimal amounts for poultry exports (Leetmaa and Ackerman, 1998).

However, as early as 1998 the EU had to face up to a new round of CAP reform. This was motivated by the combination of the UR export subsidy bindings due to take effect in the year 2000 and the prospects of EU enlargement to Eastern Europe and the resulting constraint on EU budget (Swinbank, 1999). The result was a reform package referred to as "Agenda 2000" and adopted in March 1999. However, this reform package turned out to be modest and insufficient to meet the current UR obligations (Swinbank). Even with a reformed CAP under "Agenda 2000", export subsidies for some commodities, like coarse grains and beef, will likely continue to hit the UR ceiling. Moreover, the implementation of dairy price cuts is scheduled to begin no sooner than 2005, while other highly subsidized commodities like sugar is completely excluded from the reform package.

Clearly, Agenda 2000 will not even allow the EU to live comfortably with its existing URAA commitments, let alone prepare the EU to enter into any further reductions that will be

targeted in the current WTO negotiations started in 2000 under the mandate of the Marrakech Agreement. Many countries including the United States, the Cairns group and other developing countries are calling for outright elimination of trade-distorting export subsidies. There are also calls to strengthen rules to prevent circumvention of export subsidy commitments. A case in point is Canada's establishment of two-tier price system for milk, which lowers the price for exported milk. This initiative was criticized as disguised export subsidies for milk by the U.S. and New Zealand.

4.3 Partial Export Subsidy cuts and TRQ liberalization: the EU sugar case

The EU sugar program operates under a combined intervention policy to restrict imports via a TRQ regime and to dispose of excess supplies via export subsidies. The EU sugar intervention price is kept above the world price with high tariffs on over-quota imports plus additional duties under the special safeguard provisions both of which aim to prevent the intervention price from being undermined by import competition. Moreover, the EU sugar TRQ regime is implemented under a preferential treatment, under which import quota allocation is targeted mostly to the ACP countries as well as India. Under this preferential regime, the ACP sugar receives the same support price as internally produced EU sugar and enters the EU duty free, therefore generating economic rents for ACP sugar exporters.

Under this policy regime, the economic impacts of a partial EU sugar trade liberalization under a new WTP agreement would operate via changes in both prices as well as quota rents. The reduction of export subsidies not only reduces the excess supply for the EU as an exporter but also reduce the quota rents generated from sugar imports to the EU, from rising world prices and lower wedge with the domestic price. To explore the trade and welfare effects from a simultaneous cut in sugar export subsidies, over-quota tariffs and expansion of quotas, we consider three scenarios of partial liberalization of EU sugar: export subsidy rate cut by 1/2 (SUG_X50), export subsidy rate and over-quota tariff cut by 1/2 (SUG_XT50), and export subsidy rate, over-quota tariff cut by ½ and increase in import quota by 1/2 (SUG_XTQ50).

The comparison of results between from the three scenarios show that over-quota tariffs has greater production and trade impacts than export subsidy cuts alone, while the

expanding quota add little to trade responses (table 10). For example EU sugar output decline by less than 1 percent under SUG_X50 compared to –7.6% decline under SUG_XT50. For the latter scenario (combined cuts in export subsidy rates and over-quota tariffs), sugar production shifts towards the sugar supplying countries of Latin America and Caribbean (+3%) and Africa (by 4.1%). Trade effects under SUG_X50 show lower sugar exports by the EU (-3.5%). By comparison, under SUG_XT50 and SUG_XTQ, the EU not only show a substantial decline in sugar exports but also show an increase in sugar imports from lower OQTR.

The last three columns in table 3 show the aggregate welfare for the EU and selected sugar exporters. When the EU cut both export subsidy and over-quota tariff, total tariff revenue due the expansion of the import volume increase ($US 350.6 M) by far more than quota rent loss ($US 119.5 M) and showing a net welfare gain for the EU. For non-EU sugar exporters, the scenario SUG_XT lead to lost quota rents as over-quota tariffs are reduced and a decline in aggregate welfare. Since over-quota tariff is binding initially, expanding quotas offer a counterbalance to reduced per-unit quota rents from lower over-quota tariffs. Expanding quotas by one-half (SUG_XTQ) only affect welfare via changes in quota rents and rents transfers from the importer EU to sugar exporters. As a result the welfare gain to the EU under SUG_XTQ is half way between SUG_X50 (export subsidy rate cut only) and SUG_XT (export subsidy and import tariff cuts). For non-EU sugar exporters welfare improves only under SUG_XTQ, due to much smaller loss of quota rents.