

DOHA PROPOSALS FOR DOMESTIC SUPPORT: ASSESSING THE PRIORITIES*

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* Presented at the Conference of the International Agricultural Trade Research Consortium, Capris, 24-26 June 2003. Financial support from the New Zealand Foundation for Science, Research and Technology contract number IERX0001, and the C. Alma Baker Trust is gratefully acknowledged.

Abstract

The current WTO agricultural trade negotiations began in March 2000, and became part of the Doha Round in late 2001. Reaching agreement over reductions in domestic support to farmers is complicated by a number of factors, such as the extent to which such support impacts on production decisions, the wishes of governments to support farmers for pursuing multifunctional and 'non-trade' outcomes from agriculture, and the categorisation of a myriad of policy instruments into green, blue and amber boxes. It therefore poses the risk of considerably extending the negotiations and diverting attention away from other areas of reform, such as market access and export competition. The GTAP applied general equilibrium model is used to quantitatively assess and analyse trade reform scenarios based on some proposed thus far, including specific changes in domestic support. The latest GTAP database is used, which allows greater detail in modelling domestic support than did previous versions of this database. Initial analyses are conducted to measure the extent to which trade and production are 'coupled' with domestic support payments in this model and its data. Computed elasticities of trade volumes with respect to support payments are compared with some others reported in the literature, as they are vital parameters in the analysis of domestic support. These results indicate greater responsiveness of trade to 'non-exempt' payments than to 'exempt' payments. From the analyses of alternative trade liberalisation scenarios, it is concluded that substantial trade expansion and welfare gains can be achieved even when domestic support is excluded from the multilateral agreement, and that liberalised trade policies make a far greater contribution to welfare gains than reforms to domestic policies. Developing countries, who are proposing to the WTO stricter limitations on domestic support in developed countries, are actually worse off when such subsidies are reduced. Once substantive reforms to border policies have been achieved, attention may then be turned to the lower-priority task of reforming domestic support.

Introduction

The Uruguay Round Agreement on Agriculture (URAA) grouped reform commitments under the major headings of market access, export competition and domestic support. Inclusion of the latter was an important breakthrough, since it indicated recognition that domestic agricultural policies do link to international trade. The qualifying domestic support policy instruments were grouped into three categories: ‘amber’ box (programmes that do impact on production and trade, as defined by the Aggregate Measure of Support), ‘blue’ box (programmes that would qualify for the ‘amber’ box were it not for associated production-limiting instruments) and the ‘green’ box (programmes that have no, or at most minimal, trade-distorting effects or impacts on production) (Kennedy *et al.* 2001). The agreed expenditure reductions applied only to those expenditures included in the amber box (such as output price support and input subsidies). However, compared with market access and export competition commitments, the agreed reductions in domestic support in the URAA (as set out in Articles 6 and 7 and the Schedules of each Member) have been the least effective in contributing to any subsequent liberalisation of global food and agricultural markets. For example, the OECD (2001) concludes that “for many OECD countries the impact of the domestic support discipline has been imperceptible”.

The Doha agricultural negotiations and domestic support

A new WTO Round of agricultural trade negotiations began in March, 2000. These talks have now been incorporated into the broader negotiating agenda set at the 2001 Ministerial Conference in Doha, Qatar. The agricultural “modalities” were due to be established by 31 March 2003. The chairperson of the Committee on Agriculture issued a first draft of the modalities paper on 12 February 2003, and a revised first draft on 18 March. The latter states “overall, while a number of useful suggestions emerged, positions in key areas remained far apart”. Agreement on modalities was not achieved by the 31 March deadline with the chairperson noting that the “lack of movement reflects the fact that broadly acceptable

compromises in key areas were not found". Further meetings are scheduled for September 2003, and the Round is to end by 1 January 2005.

WTO negotiations over domestic support include whether and how to categorise support instruments into various 'boxes', and the scope of reduction of such categories of support. Some developing countries propose no categorisation but that the total domestic support of industrial countries be substantially reduced or eliminated. Other developing countries favour retention of the various 'boxes' but require developed countries' spending in the blue and amber boxes to be substantially reduced and eventually cut to zero, with reduction commitments specified at a disaggregated commodity level. Regarding the green box, amongst the developing countries' proposals can be found requirements that the criteria be tightened, or that total spending on this category of support be capped in developed countries. Many developing (and other) countries favour a 'development' box that would include additional domestic support policies that would be for them exempt from reductions, such as those policies that address support of small-scale subsistence farmers.

Of the developed countries, the US has proposed the merging of the amber and blue boxes, with aggregate spending in this combined box limited to five percent of the value of agricultural production and larger *de minimis* exemptions for developing countries. The US proposed maintaining the basic criteria for the green box.¹ The Cairns Group proposes the reduction of amber box spending to zero over five years (nine years for developing countries) with a 50 percent down-payment by developed countries in the first year of implementation, and the elimination of the exemptions on blue box spending. It also proposed eventual elimination of the developed countries *de minimis* provisions and a substantive revision of green box criteria to ensure such support does not distort production and trade.² The EU has proposed retention of all three existing boxes and current definitions

¹ <http://www.fas.usda.gov/itp/wto/proposal.htm>

² <http://www.cairnsgroup.org/proposals/inex.html>.

of domestic support, with amber box support being further reduced by 55 percent and *de minimis* provisions abolished for developed countries.^{3 4}

Another negotiating issue is accommodation of the non-trade concerns of several member countries – including the so-called multifunctionality issues.⁵ In particular, better definitions are sought of minimally-trade-distorting policies that might be used by countries in their pursuit of important societal objectives. Both developed and developing countries have proposed that the scope and criteria of the green box be adjusted so as to reflect the multifunctionality of agriculture, for example by including compensatory supports for multifunctionality, or measures aimed at meeting important societal goals (e.g. protecting the environment, rural vitality and poverty alleviation). Several other countries have also noted the right of members to address non-trade concerns, provided this is achieved in minimally-trade-distorting ways.

The above conflicting positions and related analytical complexities (both economic and political) may prolong the negotiations, and perhaps even pose a threat to a successful completion that would incorporate a meaningful liberalisation of agricultural trade. This raises the question of whether a successful outcome could be agreed in the absence of disciplines on domestic support (Blandford 2001, Sumner 2000) - the subject of the remainder of this paper.

Because the amber, blue and green boxes of domestic support categories may be treated differently in the current trade negotiations (as they were in the URAA), it is useful to our analysis to provide a mapping from these boxes to domestic support as measured in the

³ http://europa.eu.int/comm/agriculture/index_en.htm

⁴ Kennedy et al. (2001) presents a summary of proposals made in the early stages of the Round, while Brink (2002) discusses more recent proposals from the US, Cairns Group and Canada.

⁵ These argue that farming produces outputs in addition to food and fibre, such as environmental protection and enhancement and increased vitality of rural areas, and that domestic support payments are justified for the provision of such externalities (Anderson, 2000).

GTAP database used below (see Technical Annex). The components of the Aggregate Measure of Support (AMS) are not exactly the same as those of domestic support as measured within the OECD's Producer Support Estimate (PSE), but the latter are available in the GTAP version 5 database (see Annex Table 3). For example, the AMS also includes market price support delivered through administered price schemes, but since these are often applied in combination with tariffs or export subsidies, such support is accounted for in the GTAP database by the relevant trade policy instrument. The chosen mapping is:

- amber (non-exempt) box – proxied here by output subsidies and intermediate input subsidies
- blue and green (exempt) boxes – proxied here by land-based and capital-based payments.

Linkages between domestic support and trade

Given that farmers are generally risk-averse, even apparently fully-decoupled direct payments including those to reduce risk or to compensate for climatic disasters would appear to have some impact on production through reducing revenue variance, through relaxing debt constraints, and by increasing wealth and moving farmers to less risk-averse regions of their utility functions. Tying direct payments to past levels of inputs or outputs may impact current farm decisions since they may persuade farmers to increase output to influence possible future base production/area data (such as in the 2002 US Farm Bill which gave farmers the opportunity to update their base acreages). Direct payments may also influence future output through new investments, or may protect some farm businesses from bankruptcy (Rude 2000, Young and Westcott 2000, Burfisher *et al.* 2000).

What contribution can reductions in non-exempt domestic support payments make to improving global agricultural trade relative to reforms in trade policies? What would be the impact on global trade if certain governments responded to trade reforms by increasing their green box spending? These beg other questions – how distortive of production and trade *are*

amber box payments, and how decoupled is green box spending from output and trade? In reality exempt payments may not be completely decoupled from production and trade for reasons mentioned above, though the limited evidence currently available suggests the degree of coupling is not strong. Young and Westcott (2000) examined the links from four US programmes⁶ to exports. They concluded that exports were marginally increased as a result of these programmes and that production flexibility payments were the least directly coupled to production. Burfisher *et al.* (2000) modelled direct farm payments programmes in Canada, the US and Mexico and simulated that a 50 percent increase in direct payments would increase output of major crops by 1 percent or less. They concluded that the effects of increased direct payments on output were relatively small. Burfisher and Hopkins (2003) concluded that decoupled payments in the US allowed farm household well-being to improve with minimal distortion of production and trade, but that a substantial portion of the payments was lost to higher land rentals.

Hoekman *et al.* (2002) examined non-exempt as well as exempt payments, through estimation of a net import demand function with import tariffs and exempt and non-exempt domestic support payments included amongst the explanatory variables. Using cross-section data covering many countries and commodity groups, elasticities of net import demand with respect to both exempt and non-exempt support payments were computed. Over all commodities and countries the elasticity for non-exempt support was estimated as -0.10 (i.e. a 10 percent increase in non-exempt support would encourage a 1 percent decrease in net import demand). The non-exempt support elasticities were also separately estimated for the EU, US and Japan as -0.08, -0.09 and -0.12 respectively. The elasticity with respect to exempt support was also negative, but not significantly different from zero.

⁶ Production Flexibility Contract payments, crop and revenue insurance, marketing loans and disaster assistance.

How responsive is trade to changes in domestic support payments in the standard GTAP model⁷ employed here (see Technical Annex)? Increases in the output subsidy will enlarge the gap between producer and market prices, and encourage an increase in commodity supply. Increases in subsidy payments to land and capital will increase the quantity demanded and lower the price of those factors to producers, depending *inter alia* on the elasticity of factor supply. While the total supply of land is exogenous in the GTAP model we use, its supply is not fixed for individual agricultural commodities. The resultant changes in land allocated to the agricultural sectors will be influenced by the ‘sluggishness’ of the resource and the degree of substitution among land and other factors.⁸ To answer the question, we ran six simulations by increasing the total spending on either non-exempt or exempt support payments across all farm sectors by 10 percent for the EU, the US and Japan. From the results we computed the percentage changes in total agricultural and food exports, imports and therefore net imports.⁹

Results are given in Table 1 and, for net import elasticities of non-exempt support, compared with the econometric estimates of Hoekman *et al.* For non-exempt support, the net import elasticities are all negative and, like the elasticities of Hoekman *et al.*, are very inelastic. Net import elasticities with respect to exempt domestic support payments are even closer to zero than those for non-exempt payments, and in this respect results are again consistent with the Hoekman *et al.* findings.¹⁰

⁷ Recently published work by Dimaranan *et al.* (2003) includes modifications to the standard model, said to make it more appropriate for the analysis of domestic support.

⁸ We should also point out that, at least for the commodities and regions examined, land and capital comprise relatively small shares of total costs.

⁹ Individual commodities were weighted by base period prices.

¹⁰ This elasticity for the US is positive, due to increased net imports of ‘other crops’ which domestically receive very little exempt support payments relative to the other US farm sectors.

Design of policy simulations

The objective of our analytical work is to indicate how some possible outcomes of the current Doha Round agricultural negotiations with regard to domestic support might impact on agricultural trade and national welfare, and the size of such impacts relative to those due to possible liberalisation of border (trade) policies. The findings will then be directed at assessing the negotiating priorities with respect to agriculture.

Three agricultural reform scenarios are constructed. All will include an identical reform of import tariffs and export subsidies, so as to facilitate comparison of different reform options for domestic support even though this rules out the possibility of analysing negotiated trade-offs between the three pillars of market access, export competition and domestic support. A wide range of options for tariff reductions has been proposed. As a compromise we use here the modalities put forward in the Committee on Agriculture's First Draft of Modalities (WTO 2003). These include graduated tariff reductions, differing between developed and developing countries¹¹, that make larger percentage cuts the larger the base tariffs. While some countries have proposed the elimination of export subsidies, we use here a 45% reduction in such expenditures, which is the proposal of the European Union.

With respect to non-exempt trade-distorting support, three options are modelled.¹² The first requires developed countries to reduce such spending by 55%, but no commitment required of developing countries¹³ (this is a component of the EU proposal). The second draws from the WTO draft modalities document that includes 60% reductions in developed country

¹¹ See the note to Annex Table 1 for our definition of developed and developing countries.

¹² These reductions are applied on a commodity-by-commodity basis, rather than to their sum over the farm sector as a whole, and the different kinds of non-exempt support (output and input subsidies) are reduced by the same percentage.

¹³ In fact, we refrain from reducing developing countries domestic support in all scenarios, since the domestic support data in the GTAP database is most reliable for the developed countries.

amber box expenditures, and 50% cuts in expenditures in the blue box¹⁴. The third scenario includes the Cairns Group proposal to eliminate non-exempt spending of developed countries, but we retain the 50% reduction in blue box spending. Details of each of the scenarios are given in Table 2.

Results

The modelled cuts to import tariffs, export subsidies, and non-exempt domestic support (developed countries only) in simulation #1 increased global welfare, as measured by an equivalent variation in income, by around US\$26 billion. The majority of this welfare gain accrued to developed countries (Figure 1), of which over one-third was received by the EU. The second and third scenarios introduced deeper cuts to non-exempt domestic support and reductions in 'blue' box support, which in total increased global welfare by another \$4 billion. Increasing the reduction in non-exempt support from 60% to 100% (scenario #3 compared with #2) had very little impact on the level of global welfare gains. With their deeper reductions in domestic support expenditure, the EU's share of the total developed country welfare gain increased to almost half in the second and third scenarios.

Many developing country proposals to the current Round of multilateral trade negotiations call for reductions in developed-country use of domestic support payments. It is interesting to note, therefore, that reductions in these types of farm subsidies appeared to have very little impact on the welfare gains of developing countries (Figure 1). The welfare gain of this group of countries actually fell slightly in the third scenario, compared with the earlier two. Why do the reductions in domestic support payments appear to impact negatively on some developing regions' welfare? There are at least two possible reasons. One is that some developing regions are net importers of food, and increased import prices that might result

¹⁴ Of total blue box spending by WTO members in 1998, 94% was by the EU (WTO 2001). Therefore, we simulate changes only to EU blue box spending, recognising the area payments to cereals and oilseeds, and the headage payments to beef cattle and sheep.

from reductions in domestic support will impact negatively on such countries' terms of trade. The second reason may be that commodity price increases could dampen downward farm output adjustment or augment output expansion in those developing economies where output is subsidised. Consequently too many resources may be retained in sectors where these countries do not have a comparative advantage and allocative efficiency losses will be incurred. These possibilities are explored below.

In Figure 2, the global welfare gain is decomposed (Huff and Hertel, 2000) into that due to reforms in trade policies in all countries (i.e. import tariff and export subsidy reductions) and those due to the reductions in domestic support expenditures in the developed countries. In the first scenario, it was the trade policy reforms that were responsible for nearly all of the global welfare gain. These policy liberalisations still dominated in the other scenarios that included deeper and broader reforms in domestic support, accounting for about 80% of the global gain in welfare. Thus, reforming trade policy would appear to be much more important than reforming the developed world's domestic subsidy programmes, if increased global welfare is the goal. Figure 3 presents the results of the same welfare decomposition, but attention is on the total welfare gains of developing countries. A similar result to the above is found in terms of the dominance of trade policy liberalisation, but in addition the reform of domestic farm subsidies in developed countries actually resulted in a reduction in developing countries' welfare. The same applied to each of the four developing regions taken separately. Remaining Figures 4-6 explore this phenomenon more deeply.

Of the total gain in welfare of the developing regions as a group, the gains from increased allocative efficiency were responsible for well over 90% of the total gain, with gains due to terms of trade effects being relatively minor (Figure 4). Next, Figures 5 and 6 show the decomposition of these welfare gains (i.e. the allocative efficiency and terms of trade components), further decomposed into the separate contributions of the trade policy and domestic support reforms. It is clear that the trade policy liberalisation makes the major

contribution to not only total welfare gains of the developing country group, but also to its improved welfare due to improved allocative efficiency and terms of trade. However, the modelled reduced spending on domestic farm subsidies in the developed world impacts negatively on developing countries' welfare, whether it arises from allocative efficiency (in the cases of all four developing country regions) or terms of trade effects (all developing regions except C_Sth_Amer).

Looking first at the terms of trade effects, we note that three of the four developing country groups in our aggregation (Asia, Korea and the ROW) are net food importers, with Korea a net importer of each agricultural or food commodity and Asia a net importer for eight of the ten commodities (Table 3). Only the C_Sth_Amer region is a net exporter of food. We next note that while trade policy reforms made the major contribution to the simulated increases in global trade volumes (Table 4) it was the reduced spending on domestic subsidies that dominated in terms of increased global prices (Table 5). Only for dairy and rice (which commodities attract some of the highest import tariffs) do the trade policy reforms have a generally greater impact on global price changes, and reduced spending on domestic support was noticeably the more important cause of higher grains and oilseeds prices – commodities that also are important imports for many developing countries.

Table 6 gives the terms of trade component of total welfare gain, for each developing region. The C_Sth_Amer region (and to a much lesser extent, Asia) experienced a positive terms of trade contribution. Increased prices for their own exports (largely due to domestic support reforms), and the status of these South American countries as net food exporters, explains this outcome. But for the ROW region and Korea, both net food importers, higher world prices in general and their import prices in particular (again due mainly to developed country domestic support reforms), had negative terms of trade effects on total welfare.

Why might reductions in domestic subsidies in the developed countries also bring about reduced allocative efficiency in the developing countries? Liberalisation of trade policies puts downward pressure on producer prices in the reforming countries, for example as countries lowered their own tariff barriers to imports. But simultaneously in our simulations, such pressures were countered to an extent by upward movements in prices due to reduced domestic subsidies in the developed world. Thus any contraction in farm production levels that would follow reductions in import tariffs, occurred to a lesser extent. For example in Korea (scenario #3) trade policy reforms reduced the producer price of other grains by 11%, whereas the domestic subsidy reforms gave a 1% boost to this price. Consequently, the reduction in output from this sector in Korea was 3% less than that due to the trade policy liberalisation alone. Since the GTAP database indicates a number of input subsidies to this sector, the output expansion encouraged by domestic subsidy reforms would worsen resource allocation and result in a loss of welfare. The database includes input subsidies to a number of farm sectors in Korea, as well as in the ROW and C_Sth_Amer, and output subsidies to farming in Asia, C_Sth_Amer and the ROW, where outcomes similar to that described above were found.

Conclusions

Negotiating meaningful reductions in domestic support is one of the more contentious issues in the current WTO agricultural negotiations. Yet our analyses showed that most of the global welfare gain from agricultural liberalisation was due to lowering of trade barriers. To the extent that increased global welfare is a goal, reforming trade policy would appear to be much more important than reforming the developed world's domestic subsidy programmes. This study therefore supports the view that market access and removal of export subsidies are central to the current Round of trade negotiations.

Many developing country proposals to the current Round of multilateral trade negotiations call for reductions in developed-country use of domestic support payments. We conclude, however, that reductions in these types of farm subsidies would actually result in a reduction in developing countries' welfare. Reductions in domestic farm subsidies make the greatest contribution to global commodity price increases in our liberalisation scenarios, and these higher prices produce negative terms of trade effects on developing countries that are net importers of food. But those higher prices also encourage production expansion in some developing regions and where such production is subsidised, allocative efficiency losses also arise.

As further restrictions on domestic support continue to be pursued in the current Round, some negotiators may seek to trade these off against reforms to import and export policies (eg to allow further policy re-instrumentation in some OECD countries). Tightening domestic support constraints (especially on blue and green box spending), quite apart from providing little gain to developing countries, could therefore have a negative impact on agricultural trade, whereas relaxing the constraints could be a way of 'buying' improved access to developed country markets and finally achieving significant reductions to tariffs and the elimination of export subsidies. Once substantial progress has been made in the latter areas, then negotiators can turn their attention to the less distorting domestic support policies (Josling, 2000). As did Dimaranan *et al.* (2003) we conclude that it would be in the interests of developing countries to focus on negotiating increased access to industrial country markets, rather than on reigning in domestic subsidy spending in the developed world.

Crucial to our conclusions are the modelled responses to changes in the various domestic subsidies. Those observed in our results are a consequence of the interactions between the various components and parameters of the GTAP model. At the analytical level, the green/blue box land and capital payments are modelled as input subsidies and linked to farm sectors in GTAP, rather than paid directly to, say, farm households, so the model retains a

linkage between such largely-decoupled payments and farm output. Further analytical and empirical work (including sensitivity analysis), will enable us to better judge the trade-distortion effects of coupled and decoupled policies, to determine whether the GTAP-generated responses are reasonable. However, the responses and elasticities derived from our modelling are broadly comparable with some others reported in the literature.

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Table 1 GTAP Agricultural & food trade volume¹ elasticities with respect to domestic support payments

	EU	US	Japan
<i>Exempt ('blue/green')</i>			
Net imports	-0.122	0.125	-0.003
<i>Non-exempt ('amber')</i>			
Net imports ²	-0.133 (-0.08)	-0.151 (-0.09)	-0.005 (-0.12)

¹ Aggregated over all agricultural and food commodities using base-period prices.

² Elasticity estimates of Hoekman *et al.* (2002) in parentheses.

Table 2 Definition of Liberalisation Scenarios

Item	Modality
Change in Tariffs: All scenarios^a	
Developed regions	<i>If</i> $t_o \geq 90\%$, $t_1 = t_o * 0.4$ <i>If</i> $15\% \leq t_o < 90\%$, $t_1 = t_o * 0.5$ <i>If</i> $t_o < 15\%$, $t_1 = t_o * 0.6$
Developing regions	<i>If</i> $t_o \geq 120\%$, $t_1 = t_o * 0.6$ <i>If</i> $20\% \leq t_o < 120\%$, $t_1 = t_o * 0.67$ <i>If</i> $t_o < 20\%$, $t_1 = t_o * 0.73$
Change in Export subsidy spending: All scenarios	
Developed regions	-45%
Developing regions	-45%
Change in domestic support spending^b	
<i>Scenario #1</i>	
Amber box ^c	-55%
Blue box ^d	No change
<i>Scenario #2</i>	
Amber box	-60%
Blue box	-50%
<i>Scenario #3</i>	
Amber box	-100%
Blue box	-50%

- a. None of the scenarios incorporates changes in non-agricultural tariffs.
- b. Developed countries only.
- c. Defined for modelling purposes as output and input subsidies.
- d. EU only, payments to land (wheat, other grain and oilseeds) and to capital (cattle). Modelled percent reductions were less than 50%, since these payments in the GTAP database also include green box spending.

**Table 3 Net Exports^a of Agricultural and Food Commodities: Developing Regions
1997(US\$million)**

Commodity	Asia	Korea	C_Sth_Amer	ROW
RICE	482	-10	-164	-119
WHEAT	-3544	-626	-680	-5108
OTHER GRAIN	-881	-1254	-460	-2779
OILSEEDS	-2404	-644	746	139
OTH_CROPS	-723	-1119	15953	6984
CATTLE	-307	-11	-10	161
OTH_ANIM	-1023	-1089	1627	-3751
BEEF	-1116	-577	974	-2106
OTH_PROCFOOD	7348	-1413	17624	-18971
DAIRY	-2609	-223	-1782	-3641
Total	-4777	-6966	33828	-29191

a. Exports less imports

Source: GTAP 5 database

Table 4 **Changes in Global Export Volumes**

Commodity	#1			#2			#3		
	Total change	Due to trade policies	Due to domestic support	Total change	Due to trade policies	Due to domestic support	Total change	Due to trade policies	Due to domestic support
RICE	17.38	17.59	-0.21	17.13	17.69	-0.56	16.88	17.63	-0.75
WHEAT	4.05	5.59	-1.55	3.85	5.65	-1.8	2.73	5.76	-3.04
OTHER GRAIN	1.48	2.96	-1.48	1.37	2.99	-1.61	0.39	3.02	-2.63
OILSEEDS	3.18	3.43	-0.25	3.51	3.48	0.03	3.28	3.48	-0.2
OTH_CROPS	5.38	5.57	-0.18	5.16	5.67	-0.51	5.05	5.65	-0.6
CATTLE	7.48	7.44	0.04	7.43	7.63	-0.19	7.64	7.8	-0.16
OTH_ANIM	7.28	7.64	-0.36	7.21	7.63	-0.42	6.93	7.61	-0.68
NAT_RES	-0.03	-0.03	0	-0.02	-0.03	0.01	-0.02	-0.03	0.01
BEEF	8.87	9.07	-0.19	9.19	9.4	-0.21	9.07	9.44	-0.37
OTH_PROCFOOD	12.91	12.97	-0.06	12.9	12.96	-0.06	12.84	12.95	-0.11
DAIRY	6.34	6.4	-0.06	6.38	6.35	0.03	6.37	6.41	-0.04
TEXTILES	0.12	0.13	-0.01	0.13	0.12	0.01	0.12	0.13	0
MANUF	0.09	0.1	0	0.12	0.1	0.02	0.11	0.1	0.02
SERV	0.3	0.31	-0.01	0.32	0.31	0.02	0.32	0.31	0.01

Source: Authors' simulations

Table 5 **Changes in Average World Prices**

Commodity	#1			#2			#3		
	Total change	Due to trade policies	Due to domestic support	Total change	Due to trade policies	Due to domestic support	Total change	Due to trade policies	Due to domestic support
RICE	1.22	0.84	0.37	1.23	0.9	0.33	1.43	0.79	0.64
WHEAT	4	1.55	2.45	4.4	1.39	3.01	6.3	1.38	4.92
OTHER GRAIN	4.29	1.15	3.14	4.66	1.04	3.62	6.96	1.07	5.89
OILSEEDS	2.77	0.99	1.78	3.16	1.02	2.13	4.47	0.99	3.48
OTH_CROPS	0.06	0.1	-0.04	-0.18	0.28	-0.46	-0.15	0.28	-0.43
CATTLE	1.37	-0.03	1.4	5.6	-0.29	5.9	6.62	-0.3	6.91
OTH_ANIM	0.5	-0.2	0.7	0.68	-0.19	0.86	1.21	-0.17	1.38
NAT_RES	0.02	0	0.02	0.07	-0.03	0.1	0.08	-0.03	0.11
BEEF	2.04	1.15	0.89	3.87	1.04	2.83	4.53	1.04	3.49
OTH_PROCFOOD	-0.21	-0.44	0.23	-0.16	-0.44	0.28	0.01	-0.44	0.45
DAIRY	3.89	3.22	0.67	3.78	3.36	0.42	4.3	3.38	0.93
TEXTILES	-0.06	-0.11	0.05	0	-0.13	0.13	0.03	-0.13	0.16
MANUF	-0.05	-0.07	0.02	-0.02	-0.1	0.08	-0.02	-0.1	0.09
SERV	-0.03	-0.06	0.03	0	-0.08	0.08	0.01	-0.08	0.09

Source: Authors' simulations

Table 6 Developing Region Welfare Changes: Terms of Trade Components (US\$million)

	Total ToT	Terms of Trade Components		
	Contribution	World price	Export price	Import price
<i>Scenario #1</i>				
Asia	290	-350	845	-204
Korea	-58	-124	97	-32
C_Sth_Amer	1063	1	1489	-427
ROW	-947	-278	-215	-455
<i>Scenario #2</i>				
Asia	317	-378	974	-278
Korea	-60	-141	121	-40
C_Sth_Amer	1121	-5	1562	-436
ROW	-851	-323	-103	-425
<i>Scenario #3</i>				
Asia	263	-456	977	-257
Korea	-108	-193	119	-35
C_Sth_Amer	1161	57	1542	-437
ROW	-962	-500	-88	-374

Source: Authors' simulations

Figure 1 Global Change in Welfare

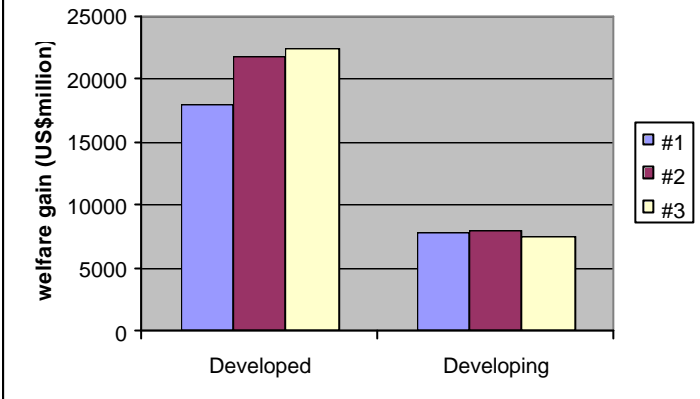


Figure 2 Global Change in Welfare: reform of trade policies vs domestic support

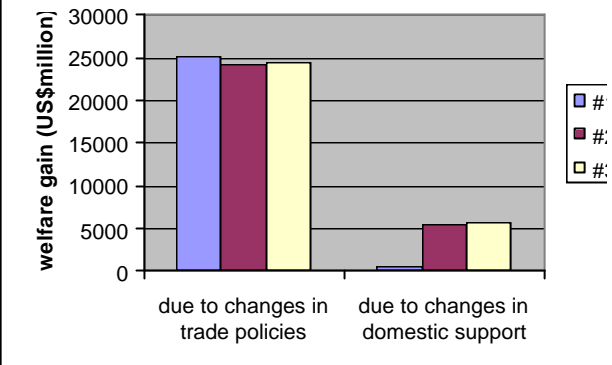


Figure 3 Developing Countries' Change in Welfare: reform of trade policies vs domestic support

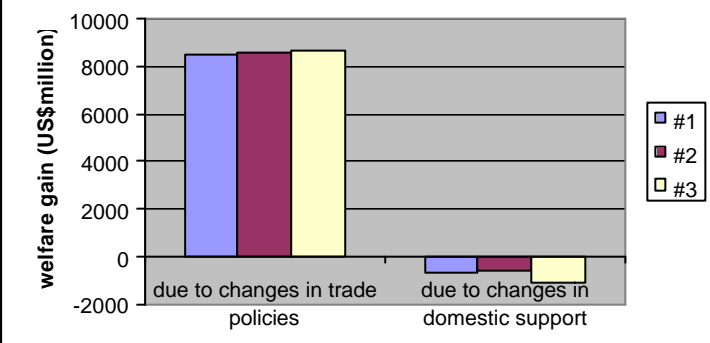


Figure 4 Developing Countries Change in Welfare: Allocative & Terms of Trade Contributions

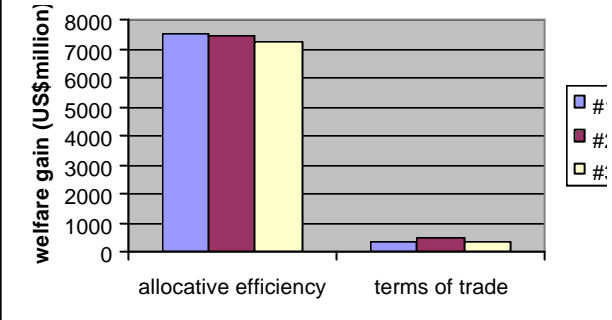


Figure 5 Developing Countries Change in Welfare: Allocative Efficiency

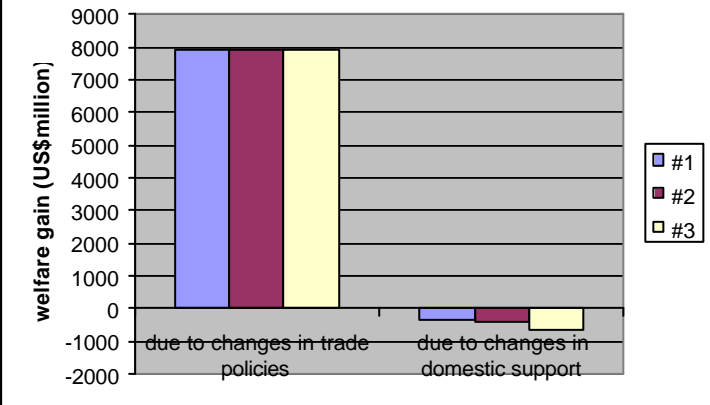
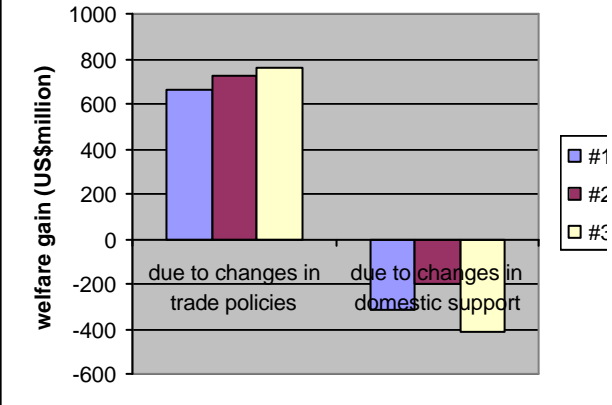


Figure 6 Developing Countries Change in Welfare: Terms of Trade



Source: Authors' simulations

Technical Annex

Simulation methodology and data

The GTAP applied general equilibrium model (Hertel, 1997) was used to quantify some interactions between reforms in trade policies and those relating to domestic support. This is a multi-region model built on a complete set of economic accounts and detailed inter-industry linkages for each of the economies represented. The GTAP production system distinguishes sectors by their intensities in five primary production factors: land (agricultural sectors only), natural resources (extractive sectors only), capital, and skilled and unskilled labour. In trade, products are differentiated by country of origin, allowing bilateral trade to be modelled, and bilateral international transport margins are incorporated and supplied by a global transport sector. The model is solved using GEMPACK (Harrison and Pearson 1996). Data was from the version 5 GTAP database, which is benchmarked to 1997, and was aggregated up to the level of 11 regions and 15 sectors (Annex Tables 1 and 2).

The incorporation and disaggregation of domestic support data has been considerably enhanced in the version 5 GTAP database, compared with earlier versions (Jensen, 2002). Using the OECD PSE tables (1999 edition), the domestic support payments and value of production, by commodity, were aggregated to map with the GTAP agricultural commodities. The various OECD categories (OECD 2000, p.143) of domestic support payments (excluding market price support) were next grouped within each GTAP commodity into the four categories of output subsidies, intermediate input subsidies, land-based payments and capital-based payments (Annex Table 3). Again using the OECD data, the share of the total value of domestic support payments in the total value of production was calculated.¹⁵ The power of support was then applied to the value of output at market prices as recorded in the *GTAP database* to determine the GTAP value of domestic support payments.

¹⁵ Calculated by dividing the total value of domestic support payments by the value of production.

Such total payments were finally allocated across the four categories of Annex Table 3 according to each category's share of total support payments as recorded in the OECD data.

Annex Table 1 Regional Aggregation

Acronym	Regions
AUS	Australia
NZL	New Zealand
JPN	Japan
KOR	South Korea
ASIA	China/Hong Kong/Taiwan, South Asia, Southeast Asia
CAN	Canada
US	US
C_STH_AMER	Central & South America
EU	European Union 15
EFTA	European Free Trade Area (Iceland, Norway, Switzerland)
ROW	Rest of World

Note: Developing regions are KOR, ASIA, C_STH_AMER and ROW.

Annex Table 2 Sectoral Aggregation

Acronym	Sectors
<i>Farm sectors</i>	
Rice	Paddy rice
Wheat	Wheat
Other grain	Cereal grains nec
Oilseeds	Oil seeds
Oth_crops	Vegetables, fruits, nuts, sugar cane/beet, crop fibres, crops nec
Cattle	Ruminant livestock
Oth_Anim	Non-ruminant livestock & meats, animal products nec, wool
Milk	Raw milk
<i>Other sectors</i>	
Nat_Res	Forestry, fishing, coal, oil, gas, minerals nec
Beef	Meat of bovine cattle, sheep & goats
Oth_Procfood	Rice, sugar, vege. oils/fats, beverages, tobacco, food products nec
Dairy	Processed dairy products
Textiles	Textiles, clothing & leather
Manuf	All other manufactured products
Serv	Services

Annex Table 3GTAP Categorisation of OECD Domestic Support Classification

GTAP Category	OECD Classification
Output subsidies	Payments based on limited/unlimited output; misc. payments
Intermediate input subsidies	Payments based on input use – variable inputs & on-farm services
Land-based payments	Payments based on limited/unlimited area planted; Crop payments based on input constraints; Payments based on historical entitlements and on overall farming income
Capital-based payments	Payments based on limited/unlimited animal numbers; Animal payments based on fixed input constraints; Payments based on use of fixed inputs