THE CURRENT ROUND OF AGRICULTURAL TRADE NEGOTIATIONS: SHOULD WE BOTHER ABOUT DOMESTIC SUPPORT?*

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SUMMARY

The current WTO agricultural trade negotiations began in March 2000, and became part of the Doha Round in late 2001. The previous Uruguay Round reached agreements in the areas of market access, export competition and domestic support. The current Round is seeking agreements under similar headings. 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 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. But the sustainabilility of many domestic support policies requires imposition of trade barriers so reform of trade barriers may force governments into reforming domestic support without requiring specific international agreements. Quantitative assessment, using the GTAP applied general equilibrium model is used to analyse trade reform scenarios, with and without specific changes in domestic support. 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 improved market access makes a far greater contribution to welfare gains than reforms to domestic policies. Once substantive reforms to border policies have been achieved, attention can then be turned to the lower-priority task of reforming domestic support

Keywords: WTO, agriculture, trade reform, domestic support, decoupled policies

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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. However, the agreed reductions in domestic support in the URAA have been the least effective in contributing to any subsequent liberalisation of global food and agricultural markets. There are several reasons for this.

While the URAA specified 20% reductions in domestic support expenditures from an agreed base (13.3% for developing countries), as calculated in the Aggregate Measurement of Support (AMS), qualifying policy instruments were grouped into three categories (the 'amber', 'blue' and 'green' boxes) depending upon their perceived abilities to impact on production and to distort trade flows. The agreed expenditure reduction applied only to those expenditures included in the amber box (such as output price support and input subsidies), and with few exceptions countries have adjusted their domestic support policies so as to comply with this Agreement. In addition to this policy-switching that took place, the general achievement of country commitments was facilitated by the fact that they were computed from the extremely high domestic supports of the1986-88 base period. However over 60% of domestic support in OECD countries falls outside the amber classification and has therefore been exempt from the reduction commitments, and overall levels of domestic support in OECD countries have remained high and indeed increased (Figures 1 and 2).

A contributing factor to this outcome was the invention of the blue box towards the end of the Uruguay Round, allowing the EU and USA to exempt their major domestic support programmes from cuts. These are payments associated with production-limiting programmes where payments are based on fixed crop areas and yields, or fixed livestock numbers. While such exemptions have been claimed mainly by the EU and USA, in early 2001 Japan claimed blue box exemption for certain support to rice from 1998, referring to policy changes that would allow it not to measure in the AMS considerable support previously notified as market price support (Kennedy *et al.*).

While the AMS was calculated on a product-by-product basis, it was the *sum* of those expenditures that was to be reduced. Hence countries could make larger cuts in support to non-sensitive sectors allowing support levels to be maintained or even increased in the more politically-sensitive sectors. Also, the *de minimus* provision allowed the exclusion from the AMS of domestic commodity support that comprised less than 5% of the total production value of the relevant commodity (10% for developing countries).

Qualifying for the green box, and therefore exempt from reductions, are expenditures associated with programmes that have no, or at most minimal, trade-distorting effects or impacts on production. These include such instruments as government-funded general services, direct payments to producers, and payments associated with disaster relief, income insurance, environmental programmes and structural adjustment. Developing countries have been able to include a somewhat larger set of policies in the green box. The question of whether all payments reported in the green box have few or no production or trade effects requires further investigation (OECD 2001). Some would argue that the green box policies, as defined by current criteria, do in some cases result in production and/or trade distortions.
In the 1986-88 base period, domestic support was dominated by amber box measures. During the implementation period, however, green box expenditures increased as amber box measures declined. For the OECD countries as a whole, green box spending was around one-quarter of total domestic support in the base period, but had increased to almost half by 1996 (OECD 2001).

The URAA domestic support measures have been successful to the extent that countries have reformed some policies and have shifted their support emphasis from the amber box instruments to those of the blue and green boxes. This should have reduced somewhat the production and trade distortions due to domestic farm supports. However, the overall level of domestic support has in some countries actually increased. For example, domestic support levels in the EU and USA were higher in the late 1990s than in the 1986-88 base period. In the EU and USA, not only has the total PSE increased from 1986-88 to 1997-99, but the share of domestic support spending in the PSE has also risen (Figures 1 and 2). Domestic agricultural support payments remain concentrated in the EU, Japan and USA, together accounting for over 90% of total domestic support for the OECD as a whole (OECD 2001).

THE CURRENT AGRICULTURAL NEGOTIATIONS & 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. In the first phase, which ended in March 2001, there were 45 proposals and technical papers from 126 countries[1]. Positions taken by some countries reflect recent policy changes. The 1996 US FAIR Act replaced target prices, deficiency payments and set-aside with Production Flexibility Contracts and associated direct payments to farmers. Declining prices in the late 1990s, however, persuaded Congress to substantially increase domestic support expenditures. While a consequence of the FAIR Act was that the US could move its main crop payments from the blue to the green box, leaving the EU and Japan as the major players proposing a continuation of the blue box, part of the additional payments were notified to the WTO as ‘amber’ and placed in jeopardy the ability of the US to meet its URAA commitments. The EU’s reforms of Agenda 2000 included a continuation of previous reductions in support prices and continued use of direct payments to compensate farmers for reductions in price support. Such payments remain exempt from cuts so long as the blue box is retained. Agenda 2000 also promoted the concept of ‘multifunctionality’ (Anderson). This argues 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. Japan (in 1999) and South Korea (in 2000) have both introduced new agricultural laws that emphasise the multifunctional nature of agriculture. In both countries, greater emphasis is now placed on maintaining farm incomes through direct payments.

WTO member countries face two basic choices in their negotiations over domestic support. The first is whether to categorise support instruments into various “boxes”, and the second is the scope of reduction of such support. Regarding the first of these, several developing countries propose no categorisation, but that the total domestic support of industrial countries be capped. While some members (as indicated above) argue for the retention of the blue box, the USA proposes just two categories of support instruments - “exempt” and “non-exempt” - with the former having no, or at most, minimal, trade distorting effects.

A number of modalities have been proposed for reducing the level of domestic support. The Cairns Group proposes a formula approach that through major reductions in support would eventually lead to the elimination of amber and blue box programmes. The EU and Japan, in addition to the retention of the green and blue boxes, propose further reduction in amber box payments using the final levels bound in the URAA as the starting point. The USA proposal for reducing amber box support also starts with the levels bound in the URAA, but reductions would be such that non-exempt support would be reduced to a fixed percentage of the member’s value of total agricultural production in some base period. Japan’s proposal labels such a procedure as “unreasonable”.

[1] These can be viewed on the WTO website, http://www.wto.org.

While most countries support the continuation of green box measures, there seems little doubt that one of the thorniest negotiating issues will be accommodation of the non-trade concerns of several member countries – the so-called multifunctionality issues. In particular, better definitions are required of minimally-trade-distorting policies that might be used by countries in their pursuit of important societal objectives. Korea proposes 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. The EU proposes that measures aimed at protecting the environment, rural vitality and poverty alleviation should be accommodated. Several other countries have also noted the right of members to address non-trade concerns, provided this is achieved in minimally-trade-distorting ways. In contrast, ASEAN and other developing countries have suggested an overall cap on developed country expenditures on total green box supports.

Reaching political agreement on multifunctionality and other green box concerns would seem to require, *inter alia*, additional and probably rather complex political and economic analyses. What *is* an acceptable minimum level of trade distortion? How *do* various 'multifunctional' programmes impact on production? *Should* we be concerned if an efficient public policy to provide a positive externality increases farm output as a by-product? And more generally in regard to green box policies, what is the nature of "de-coupling"? 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 (the new US Farm Bill gives 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, Young and Westcott, Burfisher *et al.*).

Since domestic support forms part of the current agricultural trade negotiations, the above conflicting positions and analytical complexities 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 meaningful outcome could be agreed if the whole issue of domestic support was left out of the negotiations (Blandford). This is the subject of the remainder of this paper. The next section briefly outlines linkages between domestic support and border (trade) protection. A quantitative analysis of some possibilities then follows, in an effort to quantify the extent to which the benefits of trade liberalisation might be curtailed should domestic support be omitted from the final agreement.

LINKAGES BETWEEN DOMESTIC SUPPORT AND TRADE POLICIES

The linkage between the levels of border protection and domestic (output) support payments is shown in Figure 3. The left panel shows supply, demand and prices in the domestic market for some commodity, while the right panel depicts the parallel quantities and prices in the international market. Dd and Sd are the domestic demand and supply curves, respectively. Imagine the government wishes to support producer prices at the level PS, so the resultant domestic output is S. This could be achieved with a deficiency payment, for example, equal to the difference between the support price and the domestic market price. Such a domestic support policy would qualify for the WTO amber box. The government also imposes a tariff on imports of the commodity, equal to the difference between the market price (PM1) and the price at the border (PW1). D1 is therefore the level of domestic demand, and imports are given by the distance between D1 and S. This is equivalent to the amount M1 in the right panel. There, Dx and Sx are the excess demand and supply curves, respectively. Note that the excess demand curve has a kink at the price PS.

Now imagine that a reduction in the import tariff is negotiated in the WTO, so that price in the domestic market falls to PM2 and demand rises to D2. Also imagine that *no* disciplines on domestic support are agreed. Government could then maintain producer prices at the level PS, if that was thought necessary to help achieve its domestic objectives such as the supply of multifunctional outputs. In this case imports would increase to M2 (D2 – S) and the world price rises to PW2. The new (lowered) tariff is therefore PM2 – PW2. However, government would find it necessary to *increase* its domestic support expenditures from (PS-PM1)*S to (PS-PM2)*S. Whether they would decide to do so would depend *inter alia* upon domestic politics, public spending priorities and the state of the government budget. But it is conceivable that, for these types of reasons, the support price PS and therefore total domestic support would in fact be lowered, even though domestic support disciplines *were not part* of the agricultural agreement. Hence import volumes and world prices would rise by more than would have resulted from the negotiated tariff reduction alone. The quantitative work that follows includes a scenario in which we aim to measure the extent to which selected countries' domestic support expenditures would increase should they choose to maintain existing support prices in the face of reductions in border protection. We also compare the extent of market opening that occurs in this situation, with the increased access that would result from reductions in both border protection and domestic support.

SIMULATION METHODOLOGY AND DATA

The GTAP applied general equilibrium model (Hertel) was used to quantify some interactions between reforms in trade policies and 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). 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 (Appendix 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). 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 of domestic support payment were next grouped within each GTAP commodity into four categories (Table 1). Again using the OECD data, the total value of domestic support payments and the total value of production were used to calculate the power of domestic support[2]. 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. Such total payments were finally allocated across the four categories of Table 1 according to each category's share of total support payments as recorded in the OECD data.

Tables 2 and 3 summarise some of these data. Total domestic support payments were around 5%, 12% and 20% of the value of farm output in Japan, the US and the EU respectively. Those payments also contributed 9%, 50% and 37% of the total policy transfers to farmers (the PSE) in Japan, the US and the EU respectively. Hence market price support (as indicated by the gap between farmgate prices and border

[2] The power of support was calculated by dividing the total value of domestic support payments plus the value of production, by the value of production.

prices, which is a component of the PSE not included in the above domestic support payments) is an important component of total assistance to farmers in these countries, and particularly in Japan. Domestic support is a major contributor to total assistance to grains farmers in the US and the EU, and to EU beef and sheep producers. From Table 3 it is seen that land-based payments make up the bulk of this support ('historical entitlements' in the case of the US, and area-based payments in the EU). Capital-based payments dominate domestic support to beef/sheep farmers in the EU, being the various payments and premia based on livestock numbers.

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 provide a mapping from these boxes to the domestic support measures in the GTAP database. While the components of the AMS are not exactly the same as those of domestic support as measured within the PSE, the latter are the available data in the GTAP database. The chosen mapping is:

'amber' box – output subsidies and intermediate input subsidies
'blue' and 'green' box – land-based and capital-based payments

In our quantitative analyses, differential shocks will be applied to these various domestic support policy variables.

A basic question is "what would be the impact on global trade if certain governments responded to trade reforms by increasing their green/blue box spending AND such increased spending impacted on production and trade"? This begs another question – "how 'decoupled' is green/blue box spending from output and trade in GTAP?" In reality such payments may not be completely decoupled from production and trade for reasons already discussed. The elasticities of Table 4 were generated for the regions and sectors shown, by increasing the power of the output subsidy by 10% (which increases the subsidy payment) and decreasing the powers of the land and capital endowment subsidies by 10% (which increases the subsidy payments to the factors), one commodity and one region at a time. Table 4 records the effects on real output. The table also includes estimates of some wealth elasticities, measured as the percentage change in real output relative to a given (50%) increase in total spending on land and capital subsidies in the relevant sector.

Increases in the output subsidy will enlarge the gap between producer and market prices, and encourage an upward shift along commodity supply curves. Increases in subsidy payments to the endowments will increase demand for and lower the price of those factors to producers, depending *inter alia* on the elasticity of endowment supply. While land in GTAP is in fixed supply to agriculture, its supply is not fixed to individual commodities, and the resultant increase in land allocated to the 'using sectors' will be influenced by the 'sluggishness' of the resource and the degree of substitution among land and other factors[3]. In this experiment we did not explore how the elasticities were influenced by changes in these parameters, which were kept at their standard settings. The output responses to increases in factor subsidies are all above zero, but they are generally of a much smaller magnitude than in the case of output subsidies, reflecting that the standard GTAP model and parameters capture green/blue box support (relative to 'amber' supports) as substantively decoupled from production. Certainly, the computed wealth elasticities with respect to spending on land and capital subsidies are rather small. While few empirical estimates have been reported for comparison, Chavas and Holt report such elasticities for the USA as 0.087

[3] We should also point out that, at least for the commodities and regions examined, land and capital take small shares of total costs.

(corn acreage) and 0.270 (soybean acreage). Young and Westcott believe that the soybean elasticity may be more representative of wealth effects under the current US policy environment, in which case the GTAP elasticities would underestimate somewhat the degree to which such payments are coupled to production.

DESIGN OF POLICY EXPERIMENTS

The objective of our experimental work is to indicate how some assumed alternative outcomes of the current Round, with regard to domestic support, might impact on global and regional agricultural trade, and the levels of domestic support payments, and national welfare. The findings will then be used in an attempt to answer the question posed in our subtitle – "should we bother about domestic support?"

Experiment #1

The first experiment incorporates one possible approach to reforming agricultural trade policies, but includes no reforms of domestic support policies. Despite the reductions agreed in the UR, agricultural tariffs currently average over 64% (Gibson *et al*), compared with about 4% for non-agricultural items. Of the current proposals for tariff reform (Meilke *et al.*), that of the Cairns Group is the most aggressive. It argues for deep cuts, using a formula approach that reduces high tariffs by more than low ones. The USA also seeks substantial tariff reductions or elimination of tariff disparities among countries, but does not indicate a particular formula. The EU proposes the same formula as was used in the UR, to give countries the needed flexibility required in lowering tariffs. Japan is not in favour of a formula-based approach to tariff reductions, and proposes modest reductions on a product-by-product basis with allowance to exempt some commodities from any reduction.

Of the US$27 billion spent in total by WTO members subsidising exports between 1995 and 1998, the EU accounted for nearly 90%. Over this period, the EU subsidised almost all its exports of coarse grains, butter and skim-milk powder and beef, as well as the majority of its other dairy exports and wheat[4]. Country position papers submitted to the WTO as part of the current negotiations indicate a high level of commitment to reduce the levels of export subsidies (Young *et al.*). The Cairns Group and the USA are pressing for the complete elimination of export subsidies. Several developing countries also propose this outcome, in recognition of the depressing effect of such subsidies on domestic prices and therefore their own production incentives. A somewhat different position is adopted by the EU and Japan. These countries are in favour of such subsidies being reduced provided that *all* export measures are disciplined, including implicit export subsidy components of export credits (primarily used by the USA), state trading enterprises (STEs) and food aid.

Drawing from these proposals, and recognising that the final outcome might well converge in the vicinity of the reductions agreed in the URAA, this experiment incorporates 36% reductions to both import tariffs and export subsidies[5]. Total spending on 'blue/green' box domestic support is held constant for all farm sectors in the EU, Japan and USA, which countries accounted for 90% of total OECD expenditures on these categories of subsidies in 1996 (OECD 2001). This was achieved by specifying new variables in the GTAP model to measure the change in total subsidy payments to land and capital. These variables were made

[4] More recently, wheat and much pork and poultry has been exported without subsidisation due to a more favourable Euro/$ rate and lower EU support prices (that latter is a good example of the link between domestic support and border policies).

[5] It is the gap between domestic and export prices that is reduced here, rather than the total subsidy expenditures or the subsidised volumes that were addressed in the URAA. Instances in the database of export taxes or import subsidies were left unchanged.

exogenous and the corresponding variables representing the powers of these subsidies were made endogenous.

Experiment #2

All remaining experiments include the border policy reforms as described in Experiment #1, but introduce various approaches to dealing with domestic support policies. In the second experiment, 'amber' box support (output subsidies and intermediate input subsidies) will be cut by 20%. These cuts will be applied on a commodity-by-commodity basis, rather than to their sum over the agricultural sector as a whole. While this is not the same as the approach agreed in the URAA, it has been proposed by some countries during the current Round[6]. As in the first experiment, no changes are made to the total level of 'blue' and 'green' box payments.

Experiment #3

This experiment incorporates the same reforms to border policies and 'amber' box support as in the second experiment. In addition, it recognises the likelihood that at least some countries could respond to these reforms by *increasing* their payments in the 'blue' or 'green' boxes that are currently not subject to limitation. This is of relevance to the current Round as some developing countries have proposed that 'blue' and/or 'green' box payments be capped and reduced, with the Cairns' Group supporting a similar proposal with regard to the 'blue' box. The experiment simulates 50% increases in *total* 'blue' and 'green' box payments within selected farm sectors in the EU, Japan and the USA. These sectors were wheat, other grains and oilseeds in the USA, the same sectors plus cattle in the EU, and rice in Japan, these being the sectors that are the major recipients of such payments. Substantial gains from trade liberalisation may still be achieved should these 'green' payments be largely decoupled from production.

Experiment #4

This scenario attempts to address a situation in which agreement is reached on the above cuts to agricultural tariffs and export subsidies, but neither reforms nor caps to *any* category of domestic support are negotiated. Some countries could respond to this situation by increasing support payments to farmers as compensation for any income reductions that might result from the trade policy reforms. As an extreme case, we assume that countries choose to provide compensation with increased levels of *output* subsidies ('amber' box), which have a greater impact on production than the other types of domestic support instruments considered here. What might be the gains to trade in such a situation, and how might they compare with gains resulting from the previous experiments? To the extent that significant benefits from the remaining (border) policy reforms are achieved under the latter scenario, it might be concluded that the troublesome 'domestic support' component of the current negotiations might be given a lower negotiating priority.

We consider only developed countries to be candidates to apply such compensation, and we restrict such action to the EU, the USA and Japan. We also permit such compensation only in selected sectors. Results from the trade policy reforms of Experiment #1 will be examined, and any reductions in output in the above countries for the selected commodities will be noted. In all such cases, compensation will be permitted in Experiment #4 such that base period levels of output can be maintained. Such compensation is incorporated by modifying the GTAP model closure to allow output to be fixed (exogenised) while

[6] Strictly speaking, it is the output subsidy as a percentage of the market price that will be reduced by 20% in the case of output support, and the input subsidy as a percentage of the market price that will be reduced by 20% in the case of input subsidies.

endogenising the ratio between support and market prices[7]. Total output support expenditure will be computed as the difference between the supply price and the market price, times the volume of output (as illustrated in Figure 3)[8]. Therefore output subsidies are allowed to endogenously adjust, and no policy shocks are applied to remaining categories of domestic support in this experiment.

RESULTS

Trade flows and domestic support expenditures

Experiment #1

The modelled reductions in import tariffs and export subsidies resulted in an expansion in the volume of global trade of all agricultural and food commodities of the order of 3%-11% (Table 5). This was accompanied by modest increases in global export prices, of which the largest was for dairy products. Exports of wheat and coarse grains expanded from Canada and the US, and the EU switched from a net exporter to a net importer of wheat. Most Asian regions increased their imports of grains, as did the EU and C_Sth_Am for coarse grains. Total beef and live cattle exports increased from Australia, New Zealand, US and C_Sth_Am, while the EU, Japan and the rest of Asia increased their beef imports. For dairy products, exports from Australia and New Zealand increased, the EU decreased its net exports, and Japan, C_Sth_Am and the rest of Asia increased their dairy imports. The total agricultural and food trade balance increased substantially for the USA, C_Sth_Am, Australia and New Zealand, and noticeably declined in the EU and Japan (Table 6). The powers of the domestic support subsidies were untouched in this experiment, so the minor changes in total support expenditures (Table 7) resulted from changes in the sectoral composition of farm output (note the zero changes in total land and capital payments).

Experiment #2

In addition to the reforms of the above experiment, introduced here are reductions in amber box (output and intermediate input) domestic subsidies. Recall these were modelled as 20% cuts to the per unit subsidy relative to the market price of the output or input. Compared to experiment #1, further changes to global and regional trade were minor (Tables 5 and 6). The cuts in domestic (amber) support further reduced grains outputs in the EU and EFTA regions compared with experiment #1, global export prices of grains (and oilseeds) increased by 2% rather than 1% as in the first experiment, and the volume of global trade in these commodities expanded somewhat less than in the first experiment. These cuts to domestic support also produced minor increases in exports of grains from Canada, beef from Australia, New Zealand and C_Sth_Am, and dairy products from Australia and New Zealand. Compared with the base data, total spending on output and intermediate input subsidies fell by around 50% in the EU and Japan, and by almost 20% in the US. Total spending on all domestic support fell by 2% in the EU, by 5% in the US and by 15% in Japan (Table 7).

Experiment #3

To illustrate a scenario of support-switching from ‘amber’ to ‘green’ box instruments, 50% increases were made to total land and capital payments to selected sectors in the EU, US and Japan. Trade policy reforms, and those to the ‘amber’ box, were as in the previous experiment. Because payments in other farm sectors of the above regions were left unchanged, these resulted in increases in total land and capital payments in the EU, Japan

[7] That is, we swap the variable *to* (percentage change in the ratio of the supply price to the market price) for *qo* (percentage change in quantity of output) in the closure for Experiment #4. While the idea is to maintain constant producer revenue (PS*S in Figure 3, or VOA in GTAP notation), this is not exactly achieved in the simulation because of general equilibrium impacts on the supply curve.

[8] In GTAP notation, this is estimated as VOA(i,r) – VOM(i,r), where the former is value of output i in region r at agent’s prices, and the latter is value of output in region i at market prices.

and the US of 43%, 39% and 47%, respectively, of base expenditure levels (Table 7). The elasticities of Table 4 suggest that the increases in land and capital payments could have relatively minor impacts on production and hence trade, and this is broadly confirmed by our results[9]. In the EU, most sectors where output declined in the second experiment (including wheat, oth_grains and cattle) also declined here, but by less. Oilseeds output expanded by 5% compared with a small contraction in the previous experiment. Output of all farm sectors declined in Japan, but usually by less than in the second experiment. Grains output in the US expanded by more in this scenario, compared with the second. These output changes are also generally reflected in the commodity trade balances of the EU, the US and Japan. Globally, the combination of increased US exports and weakened EU import demands contributed to downward pressure on world grains prices.

What effect might such increases in 'green' box payments have on other exporters of these commodities? Australia (oth_grain) and Canada still improved their grains trade balances, as did Australia, New Zealand and South America for beef, but by less than in the second experiment. Summed over all agricultural and food commodities (Table 6), the declines in net export earnings of Australia and New Zealand due to the increases in land and capital payments in the EU, US and Japan amount to less than 1% of their total net exports in the previous experiment and for Canada this decline was around 2%of their total net export earnings under experiment #2. C_STH_AM's agricultural and food trade balance increased by 1%, again compared with the second experiment.

Experiment #4

What if the agricultural trade negotiations can reach agreement only on trade reforms? Although such an outcome could also include agreement to cap future domestic support spending at the levels that were bound at the end of the URAA implementation period, we take a more extreme position here. Our scenario involves cuts to tariffs and export subsidies as in previous experiments, but allows governments to increase spending in any or all categories of domestic support, should they wish. More specifically, we allow the EU, US and Japan to increase output subsidies (the most 'coupled' kind of domestic support). While the use of such coupled payments to provide income support might appear unlikely given the recent emphasis in many countries on direct payments, the 2002 US Farm Bill includes a substantial political shift back to the use of coupled policy instruments. Our strategy is as follows: should the border policy reforms of the first experiment have resulted in output declines in selected sectors in the EU, US and Japan, then output subsidies were allowed to increase such that base output levels were maintained[10]. This may be viewed as compensation to producers for loss of revenue due to border reforms.

It is useful to compare our results from this experiment with those of experiment #1, which included reforms only to border policies. Global export volumes of wheat, oth_grain, cattle and dairy expanded more than in experiment #1, and usually by more than in any experiment. Also, global export prices for wheat, oth_grain, cattle and beef declined (they rose in the first two experiments) and the dairy export price rose by much less than in the first experiment. Why is this? Not surprisingly, those regions now permitted to pay (coupled) compensation to farmers may reduce their demands for imports. This was the case for the EU trade in wheat, oth_grains and beef. The EU's net imports of cattle and beef, and Japan's of dairy products and cattle plus beef, still increased, but by less than in the first experiment.

[9] It should be noted that Rude, Young and Westcott and Burfisher *et al*. examined some decoupled or quasi-decoupled farm programmes in North America and all concluded that production impacts, while present, were small.

[10] This applied to milk in the USA, to wheat, oth_grain, ctl and milk in the EU and the same sectors plus rice in Japan.

Because the majority of domestic support expenditures in the EU and Japan are land or capital payments (Table 7 base data), their spending on output subsidies increased hugely in this experiment. But since under this scenario the *total* level of domestic support expenditure may be more relevant to a government than how it is allocated across types of expenditure, Table 7 indicates that total spending would increase by 13% in the EU and by 425% in Japan compared with base expenditures. In the event that governments did not wish to increase farm spending by such an amount, then additional reforms would have been achieved (eg by reductions to support prices) – not through multilateral negotiations but through individual governments reacting in recognition of their fiscal and other objectives.

Under this scenario, traditional grains and livestock exporters experienced reduced export opportunities and lower global prices. For Australia, Canada, New Zealand, the US and South America, volumes of many of their major exports increased under this scenario but by less than under experiment #1. Developing countries, often net importers of agricultural products, experienced increased net imports under experiment #4 compared with the first experiment (Table 6). However, there was very little impact on self-sufficiency ratios in the developing countries.

Welfare Outcomes

The modelled cuts to export subsidies and import tariffs of experiment #1 increased global welfare by almost US$20 billion (Table 8). Adding reductions in 'amber' box domestic subsidies to those reforms had little impact on the global welfare gain, and the latter increased by less than 1%. When, in addition to these reforms, the EU, US and Japan increased their 'green' box payments, the gain in global welfare was about one half that from the second experiment. The US experienced a gain in welfare of only about one-third of that gained under the second experiment. In the case of the EU, welfare actually fell by over $5 billion compared with a gain of $4.5 billion under the second experiment. Japan's welfare gain under this scenario was similar to that of the second due in part to lower food import prices impacting positively on their terms of trade. In the final experiment, wherein some producers in the EU, Japan and the US received compensation through increased output subsidies, the increase in global welfare was 9% less than when such compensation was not made (experiment #1). Compared with the first experiment, such compensation contributed to a 35% decline in the EU's welfare gain.

Many developing country submissions 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 we estimated the highest welfare gains for developing countries as a whole in that scenario where 'amber' box domestic subsidies had been *increased* (experiment #4). For example, comparing the fourth with the second experiment, the increased use of output subsidies in some developed countries has increased the developing regions welfare by about $0.3 billion, or 4%. A major contributor is trade taxes – under the fourth scenario developing regions increased their agricultural and food imports, so their tariff reductions were applied to larger import volumes.

Since all our simulations incorporated shocks only to tariffs and various subsidies, it is informative to decompose welfare changes by such tariffs and subsidies (Huff and Hertel). Results are given in Table 9. Before addressing the decomposition by tax instruments, it is apparent from the table that the welfare gains of the EU and developing regions, and to a lesser extent Japan, are driven primarily by improved allocative efficiency. This source of gain is much less important in the case of the US, where terms-of-trade effects dominate. Focussing now on the contributions of allocative efficiency gains to welfare in the EU, Japan and developing regions, practically all of those allocative gains were generated by the modelled reductions in import tariffs, no matter which scenario is examined (with the exception of the third scenario in the case of the EU). It follows, therefore, that the various shocks made to domestic agricultural subsidies (with few exceptions) made relatively small welfare contributions.

The greatest changes in domestic support spending occurred in the third and fourth experiments. In experiment #3, 'green/blue' box subsidies were permitted to increase in some farm sectors of the EU, the US and Japan and in total made a negative contribution to national welfare in (especially) the EU but also in the US. Experiment #4 allowed for no shocks to 'green/blue' box subsidies, but did allow compensation to some EU, US and Japanese farmers through increased output subsidies. Hence shocks to 'amber' box policies, that had made very little contribution to the EU's allocative gains in the second experiment, now contribute a welfare loss. The contributions of reductions in import tariffs to allocative efficiency gains in the EU and Japan are substantially less than in the other experiments. While the tariff (and export subsidy) shocks were the same over all experiments, the tariff reductions were applied on generally smaller volumes of imports in the fourth experiment, hence generating smaller gains.

CONCLUSIONS

Negotiating meaningful reductions in domestic support is one of the more contentious issues in the current WTO agricultural negotiations. The domestic support instruments used in some countries are linked to trade policy in the sense that reductions in tariffs may be accompanied by compensating increases in domestic support. The question therefore arises, if countries agree to reduce border protection, what would be their responses with respect to domestic support? Should the agricultural negotiations mandate specific reductions in domestic support, then that provides the answer. But because of the political and economic complexities of the negotiations on domestic support and the so-called non-trade issues such as multifunctionality, what if no agreement were to be reached on domestic support? Some countries could conceivably increase domestic support spending, but our results suggest that the impacts in terms of further distortions to world markets would not be great.

The decomposition of welfare gains by policy instrument clearly indicates that by far the major contributor to national welfare gains from agricultural trade reforms, for both developed and developing countries, is the reform of import and (to a lesser extent) export policies. This study therefore supports the view that market access and removal of export subsidies are central to the current Round of trade negotiations, a view evident in the US and Cairns Group positions, for example. Should further restrictions on domestic support continue to be pursued in the current Round, these may be traded off against reforms to the more trade-distorting policies. Tightening domestic support constraints could therefore have a negative impact on agricultural trade, whereas relaxing the constraints could be a way of "buying" more market access 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).

Our analyses assumed the EU and others would agree to the tariff and export subsidy cuts modelled here. But if domestic support was excluded from the negotiations, they could be amenable to accepting deeper cuts in protection since they will be able, should they so choose, to maintain or even increase domestic support payments as compensation. Further, more ambitious trade reforms would increase required compensation to farmers to maintain the returns they receive. This would increase the likelihood that some countries may not be prepared to fund domestic support payments to such an extent, hence generating reforms to domestic support even in the absence of an explicit agreement to do so. Such eventualities would strengthen our conclusions.

Crucial to our conclusion 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. It is this contrived linkage that results in the observed responses, rather than the commonly suggested reasons for a coupling between such subsidies and output, for example through wealth effects or risk reduction. There is no doubt that further analytical and empirical work is required so we can better judge the trade-distortion effects of decoupled and quasi-decoupled policies, and to determine whether the GTAP-generated responses are reasonable. But in saying that, our results are not too incompatible with those presented by Rude, Burfisher *et al.* and Young and Westcott.

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Table 1 GTAP 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

Table 2 Power of Domestic Support – Selected Regions and Commodities

Region	Total agriculture		Power of domestic support		
	Power of domestic support	Domestic support as % of total PSE	Wheat	Coarse grains	Beef & sheep
Japan	1.058	9	1.118	1.141	1.036
USA	1.121	50	1.612	1.354	1.034
EU15	1.199	37	1.867	1.925	1.326

Source: Jensen (2001)

Table 3 Use of Domestic Support Categories – Selected Regions and Commodities

Categories of domestic support	Wheat	Coarse grains	Beef & sheep
USA			
-output subsidies	12.7	19.3	19.5
-intermediate input subsidies	3.9	6.6	61.4
-land-based payments	82.6	72.8	13.5
-capital-based payments	0.7	1.3	5.7
EU			
-output subsidies	0.5	0.2	0.9
-intermediate input subsidies	9.3	10.7	6.1
-land-based payments	73.4	69.4	0.9
-capital-based payments	16.8	19.6	92.1
Japan			
-output subsidies	0.0	0.0	14.7
-intermediate input subsidies	45.0	40.7	62.7
-land-based payments	41.0	48.2	0.0
-capital-based payments	14.0	11.1	22.7

Source: Jensen (2001)

Table 4 Own-production response (%) to increase in domestic support

	EU	US
TO_L(i,r) shocked by +10%:		
Wheat	4.44	11.00
Oth_grain	3.63	3.24
Ctl	3.2	4.94
Milk	1.2	1.25
TF_L("land",j,r) shocked by –10%:		
Wheat	0.17	1.42
Oth_grain	0.15	0.28
TF_L("capital",j,r) shocked by –10%:		
Ctl	0.28	0.31
Milk	0.14	0.08
Wealth elasticities: land & capital subsidies		
Wheat	0.073	0.125
Oth_grain	0.069	0.023
Oilseeds	0.147	0.032

Notes: TO_L and TF_L measure, in GTAP notation, the power of the relevant tax/subsidy. The former measures the value of output at agent's prices relative to the value at market prices. TF_L is the ratio of the value of the firm's purchases of the relevant resource at agent's prices relative to the value of those purchases at market prices.

Wealth elasticities are computed as the percentage change in sector output divided by a 50% percentage increase in the relevant total subsidy expenditures.

Table 5 Impacts on Global Prices and Export Volumes (% change from base)

	Change in volume of global exports				Change in price of global exports			
	Exp#1	Exp#2	Exp#3	Exp#4	Exp#1	Exp#2	Exp#3	Exp#4
RICE	10.7	10.6	9.8	7.9	0.5	0.7	1.7	0.2
WHEAT	5.3	5.1	6.6	6.1	1.3	2.2	-0.3	-0.6
OTH_GRAIN	3.4	2.9	4.1	4.4	0.9	2.0	-0.7	-0.8
OILSEEDS	3.9	3.6	2.0	4.2	0.7	1.6	1.1	0.7
OTH_CROPS	5.6	5.6	6.0	5.8	0.1	0.1	0.9	0.0
CTL	6.3	6.2	7.5	7.9	-0.1	0.4	-2.2	-4.6
OTH_ANIM	6.9	6.8	6.8	7.1	-0.2	0.1	-0.2	-0.8
BEEF	7.1	7.0	7.2	6.6	0.9	1.2	0.1	-1.0
OTH_PROCFOOD	10.9	10.9	10.9	10.7	-0.3	-0.2	-0.4	-0.5
DAIRY	5.2	5.2	4.9	5.8	2.2	2.5	2.9	0.5
TEXTILES	0.1	0.1	0.1	0.1	-0.2	-0.1	-0.2	-0.2
MANUF	0.1	0.1	0.0	0.0	-0.1	-0.1	-0.2	-0.1
SERV	0.3	0.3	0.2	0.3	-0.1	0.0	-0.2	-0.1

Table 6 Change in the Trade Balance – All Agriculture & Food (US$million)

	Trade Balance Base Data	Change in Trade Balance			
		Exp#1	Exp#2	Exp#3	Exp#4
AUS	11539	1235	1278	1197	946
EU	-14858	-7301	-7464	-6872	-5132
NZL	5939	1106	1143	1094	891
CAN	6236	813	884	722	563
USA	17406	4337	4181	2767	3329
ASIA	-6700	561	668	844	-19
JPN	-43700	-5741	-5841	-5608	-4282
KOR	-7013	-12	-32	2	-51
EFTA	-272	1040	985	990	974
C_STH_AM	29635	3871	4063	4414	3408
ROW	-29241	-3067	-3002	-2679	-3747

Table 7 Domestic Agricultural Support Expenditure

	Base Data (US $million)	Exp#1	Exp#2	Exp#3	Exp#4
		(% change from base data)			
EU					
Output subsidies[a]	816	-2.5	-21.6	-22.3	1209.4
Int. input subsidies[b]	2104	-5.4	-62.0	-57.9	-4.1
Land/capital payments[c]	69196	0.0	0.0	43.0	-0.5
Total domestic support	72116	-0.2	-2.1	45.1	13.1
JAPAN					
Output subsidies	316	-7.0	-24.7	-24.7	2359.4
Int. input subsidies	192	-23.4	-100.0	-100.0	-13.5
Land/capital payments	1228	0.0	0.0	39.0	-2.0
Total domestic support	1736	-3.9	-15.6	12.0	426.6
USA					
Output subsidies	5363	3.0	-17.0	-18.2	10.3
Int. input subsidies	3840	1.8	-18.6	-19.2	1.3
Land/capital payments	18409	0.0	0.0	46.8	6.8
Total domestic support	27612	0.8	-5.9	25.0	6.7

Notes:

a. In GTAP notation, this is equal to VOA(i,r) – VOM(i,r), summed over all farm sectors (i)

b. Equal to the absolute value of [VIFA(i,j,r) – VIFM(i,j,r)] + [VDFA(i,j,r) – VDFM(i,j,r)] summed over all tradeable commodities (i) and all farm sectors (j).

c. Equal to the absolute value of VFA(i,j,r) – VFM(i,j,r) summed over all farm sectors (j) and endowments (i).

Table 8 Changes in Welfare due to Trade Liberalisation (US$mill)

	Exp#1	Exp#2	Exp#3	Exp#4
AUS	424	475	415	309
EU	4405	4475	-5162	3006
NZL	443	460	446	358
CAN	672	750	629	616
USA	1478	1726	605	1112
ASIA	1605	1534	1443	1418
JPN	2228	2088	1951	2043
KOR	700	666	667	690
EFTA	2389	2448	2354	2477
C_STH_AM	1848	1847	1895	1717
ROW	3142	3002	2999	3461
All developed	12039	12422	1239	10312
All developing	7295	7049	7004	7348
Global	19334	19471	8243	17660

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

Table 9 Decomposition of Allocative Efficiency Gains by Tax Instrument (US$million)

Tax Instrument	Exp#1	Exp#2	Exp#3	Exp#4
EU				
Primary factor taxes [a]	392	436	-8885	-42
Output & int. input taxes [b]	-26	-8	-368	-219
Export & import taxes	4067	4089	3781	3283
Total Allocative gain [c]	4676	4766	-5783	3176
ToT gains [d]	-274	-310	650	-151
USA				
Primary factor taxes	-27	-11	-625	-108
Output & int. input taxes	-144	-89	-88	-119
Export & import taxes	520	518	537	515
Total Allocative gain	349	418	-175	287
ToT gains	1046	1252	803	709
Japan				
Primary factor taxes	30	30	24	-2
Output & int. input taxes	-115	-123	-115	213
Export & import taxes	3163	3167	3128	2310
Total Allocative gain	3193	3183	3147	2820
ToT gains	-1018	-1161	-1335	-362
Developing regions [e]				
Primary factor taxes	13	5	27	22
Output & int. input taxes	244	225	186	275
Export & import taxes	7118	7056	7061	7221
Total Allocative gain	8200	8101	8082	8355
ToT gains	-838	-977	-1041	-987

Notes:

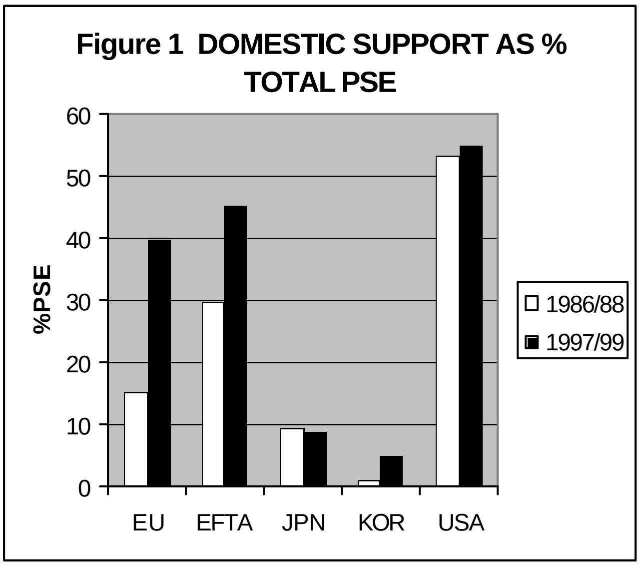
a. These are exclusively the 'green/blue' box subsidies to land & capital in farm sectors.
b. Includes 'amber' box subsidies in agriculture.
c. Contribution of allocative effects to total welfare gain. (Also includes effects of taxes not mentioned above).
d. Contribution of terms-of-trade effects to total welfare gain.
e. ASIA, KOR, C_STH_AM and ROW.

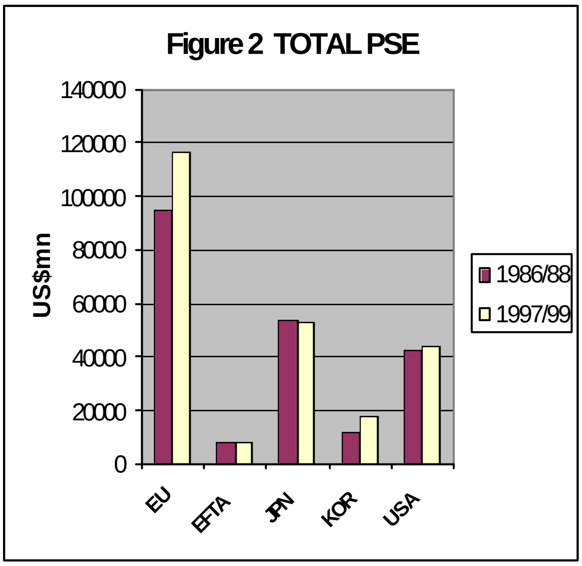
Appendix Table 1 Regional Aggregation

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

Appendix Table 2 Sectoral Aggregation

Acronym	Sectors
Farm sectors	
Rice	Paddy rice
Wheat	Wheat
Oth_grain	Cereal grains nec
Oilseeds	Oil seeds
Oth_crops	Vegetables, fruits, nuts, sugar cane/beet, crop fibres, crops nec
Ctl	Bovine cattle, sheep & goats
Oth_anim	Non-ruminant meats, animal products nec, wool
Milk	Raw milk
Other sectors	
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	Dairy products
Textiles	Textiles, clothing & leather
Manuf	All manufactured products
Serv	Services





Source: OECD (2000)

Figure 3 Linkages Between Domestic Support and Trade Policies