



**No. 13. GLOBAL IMPACTS OF AGRICULTURAL TRADE REFORMS.
Why users need to be more vigilant when interpreting
quantitative estimates**

SUMMARY

- ▶ *Quantitative models are increasingly being used to analyze the potential impacts of complex multilateral agricultural trade policy reforms. Although they tend to reach similar conclusions on the direction of change, their results vary considerably due to underlying assumptions which need to be more carefully explained and appreciated while interpreting the results.*
 - ▶ *In general, estimates of the global impact of multilateral trade reform are positive, but they have recently become smaller and less significant, in large part due to improvements in modelling approaches and to the use of more comprehensive databases.*
 - ▶ *Greater caution is required in the use of global models to support arguments that a more liberal trade policy stance is optimal for all countries, no matter what their current level of development, or the trade policy stance of their trading partners.*
 - ▶ *Assumptions required to allow trade to occur in models where countries and products are aggregated can mask the true impact on individual countries.*
 - ▶ *Difficulties in implementing "Doha Round scenarios" in simulation models can limit their usefulness in assessing the merits of different proposals that have been tabled during the negotiations.*
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1 What types of questions have global trade models been used to address?

Analysts have attempted to answer several questions using quantitative models¹:

- *Will global trade liberalization result in significant net gains?*

Most model-based simulations of complete liberalization of trade policies produce aggregate welfare gains at the global level. Until recently, estimates of gains of up to US\$500 billion were not uncommon. These estimates were typically generated from models that reflected the policy situation in the mid 1990s. However, using updated databases which represent more comprehensively the more recent policy

situation, new model estimates of annual welfare gains from complete liberalization tend to be significantly smaller², suggesting that earlier studies had significantly overestimated the potential gains from further liberalization of trade policies.

- *Will all countries gain, and in particular will liberalizing developing countries all gain?*

Many simulation models estimate that the gains from global trade liberalization will be shared approximately equally between developed and developing countries. It has also been contended that developing countries will gain more from reform of their own agricultural policies than from increased market access to, and reductions in the support to domestic production and exports provided by, developed countries.

¹ This Policy Brief draws upon a Technical Note that was prepared on the basis of an Informal Consultation of Experts involved in the development and use of global trade policy simulation models held at FAO, Rome on 7-8 July 2005. The Technical Note and Policy Brief are available at: http://www.fao.org/trade/policy_en.asp

² For example, using the GTAP5 database, the World Bank's LINKAGE model estimated gains of US\$413 billion in 2015. But using the GTAP 6 database, the gains fall to US\$287 billion, a reduction of 30 percent, and only US\$160 billion when discounted back to 2001 values, a relatively insignificant fraction of global GDP.

But what do the welfare numbers upon which these conclusions are based actually mean? At a basic level, the simulated welfare effect of trade liberalization comprises a number of key components, the most important of which are: (i) the change in efficiency of resource use as resources shift between sectors and which accrue mainly to the liberalizing country, and (ii) the change in the terms of trade facing a country as the relative prices that it receives or pays for traded goods change.

Although reform is generally supported on the basis of simulated efficiency gains, these gains are *not* always the most important in driving the welfare results in trade policy simulation models. Relative prices change following reforms and this is reflected in the terms of trade (ToT) effect which results from changes in a country's export prices relative to its import prices. The ToT effect is critically important in the interpretation of model results because the net effect of multilateral agricultural reform varies across countries. This is largely due to the different composition of exports and imports of commodities and to the price sensitivity of these commodities to liberalization. Net exporting countries that liberalize can gain for two reasons (a) their terms of trade improve if they are exporting commodities for which the relative prices rise in comparison with the prices of their imports and, (b) they realize efficiency gains. Net importing countries would be expected to suffer a terms of trade loss, but these could be offset by the efficiency gains from improved resource allocation.

Most developing, and especially Least Developed Countries (LDCs), are importers of basic food commodities, which currently have the highest levels of domestic support globally and for which the price impacts of global trade liberalization are likely to be greatest. These countries also tend to be producers and exporters of primary agricultural commodities, the prices of which are not as heavily distorted in world markets. If the ToT effect is sufficiently negative, then liberalization can make the country worse off. However, by aggregating and reporting many of these countries as parts of larger regions, the results of many model based analyses often lead to suggestions that even those net food importing countries in more vulnerable regions will gain.

The relevance of the estimates of global gains is not well communicated. An underlying logic is that if the potential gains and losses of all countries add up to a total which is positive, then in principle it would be possible for the winners to make transfers to the losers that would leave the latter as well off as before the trade liberalization and still have enough left over for the winners to experience net gains.³ However, studies based on these models do not communicate what the compensating transfers to each losing country should be, nor do they caution that if the transfers do not in fact take place then, for the reasons explained above, some countries could sign up to a multilaterally agreed policy change in which they are net uncompensated losers.

- *Is agriculture sector liberalization most important?*

Gains from agricultural policy reforms are often estimated to be disproportionately high, given the sector's relatively low share of global GDP. This is generally explained as being due to higher levels of protection as compared to the manufacturing sector. However, assumptions made in different studies about market structure can be an important determinant of how large the relative gains from agricultural liberalization are. In models where non-agricultural sectors are assumed to have increasing returns to scale, agricultural liberalization tends to produce small gains and even losses. For example, as the agriculture sectors of developing countries expand due to better access to OECD markets at higher prices, resources are drawn away from their industrial sectors, which contract in consequence. This produces a proportionately greater decline in welfare because the

³ Further complicating the interpretation of welfare results is the fact that the balance between the ToT and efficiency gains effects is to a large extent a result of the modelling approach. For reasons of tractability, global trade models cannot investigate the impact of reform at the tariff line level and therefore work with aggregate product groups. A commonly adopted approach to overcoming this limitation (the so-called Armington assumption) brings with it the difficulty that individual countries can influence the price of traded goods and hence their own ToT and unilateral changes in trade policy can therefore induce significant ToT effects in the model, which may not be expected in reality.

industrial sector cannot now achieve cost effective scales of production. In contrast, models that do not make this assumption produce estimates where the largest welfare gains come from agricultural liberalization.

- *Is there full employment after liberalization?*

The gains from agricultural sector liberalization can also be inflated by an assumption that full employment of labour (and other resources) will take place. However, in the context of understanding the impacts of trade reforms, this assumption leads to an overstatement of the consumer gain and an understatement of the producer loss. When relative prices fall, consumers gain through access to cheaper goods. However, under the assumption that full employment will always be maintained, producers will not become unemployed, but will find employment in another activity and their loss, if any, will be limited to the difference in the wage rate before and after liberalization. Since there is no such limitation on consumer impacts, it is not surprising that consumer benefits often dominate the results, but this may be due to this strong modelling assumption. Focusing only on consumer price benefits also underpins the message that gains through reductions in border protection greatly exceed gains from reductions in domestic support. But in terms of indicators other than consumer welfare, this conclusion does not necessarily hold.

- *What scenarios of liberalization to model?*

Quantitative analysts often do not model the precise package under negotiation. For example, in attempting to estimate the impact of reductions in tariff levels,⁴ modellers are faced with a number of issues, e.g. what formula to use for tariff reduction; whether cuts in bound tariffs will result in reductions in applied tariffs;

whether and how to take into account existing trade preferences and free trade areas; and how to deal with the fact that, whilst reductions will be made at the tariff line level, the products in the models are specified at a much higher level of aggregation. Some modellers have attempted to estimate the impacts of liberalization on the basis of reductions in the applied duties. However, recent studies suggest that even significant reductions in bound tariffs may not cut through to applied tariffs and reduce them significantly. Importantly, estimates of the impact of the tiered approach to tariff reduction, currently under consideration in WTO, could vary widely, depending upon the way in which the flexibility given to countries in determining which tariff lines to exempt from agreed levels of reduction is modelled. Finally, ignoring existing reciprocal (e.g. free trade areas) and non-reciprocal trade preferences will overestimate the gains from reductions in WTO bound tariffs and not take into account losses from preference erosion.

Similar questions face modellers regarding reductions in domestic support. For example, what level of effective cut will be faced by different countries? How will countries respond by re-instrumenting policies? Will the reconfigured policies really be less production- and hence trade-distorting?⁵ Even with regard to export subsidies, for which modelling the agreed reductions may appear to be simpler, analysts are still faced with the difficulty that countries can choose how to meet either the value or volume commitments of scheduled export subsidies. The other components of export competition, export credits, state trading enterprises (STEs) and food aid, have not been adequately represented in models, primarily because the absence of data has made assumptions regarding the potential impacts of their reform highly speculative.⁶

⁴ See FAO Trade Policy Technical Note No.2 for further detail on tariff reduction formulae, available at: http://www.fao.org/trade/policy_en.asp. Bound tariffs are the maximum tariff levels that a country can apply to a given product. An applied tariff is the level of tariff that a country actually applies to a given product.

⁵ See FAO Trade Policy Technical Note No.5 for further details on the trade distorting nature of domestic support policies, available at: http://www.fao.org/trade/policy_en.asp.

⁶ See FAO Trade Policy Technical Note No.4 for further details on disciplining the use of instruments used to support exports, available at: http://www.fao.org/trade/policy_en.asp.

2. Conclusions: interpreting model based results

Both users and modellers need to be aware of the limitations in using simulation model results to inform debates as to the benefits of further agricultural trade liberalization. It is not clear that all countries or regions will gain from substantive agricultural trade liberalization, as is commonly portrayed, but there is a significant danger that model results can be misleadingly used to argue that this would be the case. Modellers need more fully to explore and explain the reasons why their results are of the magnitude and direction estimated.

Improved use of simulation models requires, in addition to more transparency and better explanations of the model results, a better appreciation of the numerous technical difficulties and subjective assumptions that can confound the generation of realistic insights. Results of simulation models should not therefore be taken as the only, or even dominant, source of information.

Alternatives exist in the form of other types of models, and in reviews of experiences of trade policy reform, both of which can contribute to understanding how countries may actually fare in a more liberal global trade context. For example,

econometric time series based models which provide statistical estimates of key structural relationships and parameters such as quantity and price linkages, and supply and demand price response elasticities may provide a better approach at the individual product level. But even these models have limitations in terms of technical econometric problems, data difficulties and associated analyst-introduced biases in assumptions. Lessons from case studies of actual experiences of the impact of trade liberalization can also provide useful insights. For example, case studies undertaken by FAO show that trade liberalization can contribute positively to reducing hunger and poverty where basic market institutions and infrastructure are in place before opening national agricultural markets to international competition.

Although a number of difficulties in the use of simulation models and in the interpretation of their results have been highlighted in this brief, the aim is not to discredit trade modelling per se. Rather, it is to caution both users and modellers with respect to the limitations involved in using simulation model results, as the only or main empirical basis to inform debates or negotiations regarding the benefits of further liberalization.