

Liberalising Border Trade in Agriculture:

Implications for South Asian Countries

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An Assessment of the Agreement on Agriculture

Implementation of the UR over the period 1995 to 2006 has led to little reduction in agricultural protection. Although the UR commitments have not resulted in large reductions in agricultural protection, the UR made a breakthrough in establishing a framework for more meaningful reductions in the Doha Round (DR) and subsequent WTO discussions.

Some specific points on which the AoA came under criticism, and which are also disadvantageous to developing countries like India, may be summarised as follows:

- The selection of the base year, for the conversion of non-tariff measures (NTMs), as 1986-88 (period of low world prices and generally high rates of protection) instead of the years immediately preceding the conclusion of the round, resulted in much higher levels of tariff barriers than the tariff equivalents applicable at the end of the Round. In addition the method used for the calculation of the tariff equivalent resulted in higher initial tariffs than what more objective calculations would have given thereby leading to the so-called 'dirty tariffication' (Hathaway and Ingco, 1996).
- Many developing countries set tariff bindings completely unrelated to previous levels of protection.
- The rules requiring average reduction of 36 per cent in tariffs with a minimum reduction of 15 per cent also constrained the degree of liberalisation wherein, tariffs on items protected very little were cut by much higher percentage to offset the minimum cuts in protection of sensitive items.
- Although minimum access commitments were to be established on MFN basis, industrial countries were permitted to include special arrangements as part of their minimum access commitments. As a result, little new market access opportunities come about for efficient exporters from the modalities related to minimum access commitments.
- The agreements related to domestic support commitments were weakened by the exemption of some important forms of protection used by the EU and USA resulting in actual increases in the Aggregate Measure of Support (AMS) in OECD.
- Domestic support commitments were also weakened by elimination of the need to cut subsidies on a commodity-by-commodity basis. Instead the US and the EU agreed to

an aggregate measure of support for all products and to reduce the AMS without reference to specific commodities.

The actual impact of the AoA was limited by the extent of the reductions and the way in which the reductions were implemented. The average global agricultural tariff (unweighted) 62 per cent in comparison to 4 per cent for manufacturing (Burfisher, 2003). There is also substantial dispersion in tariff rates across commodities leading to high levels of distortions. Meat, dairy, sugar and tobacco face some of the highest tariffs. Diakosavva (2003) finds that (i) although nominal protection has declined in the OECD countries as a whole, domestic prices continue to be much higher than world prices; (ii) market openness in the OECD countries in the post-AoA period (1995-2000) is not discernibly significant from the pre-AoA period (1989-94); (iii) reduction in total AMS was accompanied by an increase in exempt support and while the composition of support has shifted from measures that support higher farm prices financed by consumers to payments financed by taxpayers, market price support and output related payments still dominate.

Agenda for Current Negotiations: Doha Development Round

The WTO negotiations on agriculture were resumed in Geneva in March 2000 in accordance with the provisions of Article-20 of the AoA. Negotiations were to continue the process of reform on market access, domestic support and export subsidies, taking into account the experience with the implementation of the UR commitments, effect of reduction commitments on world trade, non-trade concerns (NTCs) like environmental issues, rural development, and food security and provisions for S&D treatment of less developed countries. The Fourth Ministerial meeting of the WTO, held in Doha, Qatar in November 2001 led to the launch of the broader new Round of negotiations to be concluded by January 2005 and agriculture became part of the single undertaking.¹ The new Round had been labelled the "Doha Development Round" putting interests of the developing countries in agriculture at the forefront of negotiations. The Doha Declaration provides for "substantial improvements in market access; reductions of, with a view to phasing out, all forms of export subsidies; and substantial reductions in trade distorting domestic support." Other issues related to agriculture include state trading, sanitary and phytosanitary rules, and environmental considerations. The Declaration sets a series of deadlines with a concluding date of no later than 1 January 2005. However, the same has not been finalised till date.

In the July Package (2004) the General Council reaffirmed the Ministerial Declarations and Decisions adopted at Doha and the full commitment of all Members to give effect to them.

¹ Agriculture negotiations were to be resumed by December 31, 1999 but ultimately began in March 2000. The attempt to launch a new comprehensive round of multilateral trade negotiations had been aborted at the previous ministerial meeting in Seattle in November 1999.

The Council emphasised Members' resolve to complete the Doha Work Programme fully and to conclude successfully the negotiations launched at Doha. Taking into account the Ministerial Statement adopted at Cancún on 14 September 2003, and the statements by the Council Chairman and the Director-General at the Council meeting of 15-16 December 2003, the Council took note of the report by the Chairman of the Trade Negotiations Committee (TNC) and agreed to take various actions. The Hong Kong Ministerial held in December 2005 could not reach a consensus and postponed final discussions to 30 April 2006. Nothing much could be achieved in April 2006 with discussions further postponed to July 2006. There continues to be a stalemate even after July 2006 and the indications are that the negotiations on Doha Development Agenda have reached a dead end or a near failure.

With regard to the agricultural liberalisation, the three pillars of agricultural protection, namely domestic support, export subsidies and market access were expected to be bound and reduced in phases. Export subsidies are to be eliminated. The most complicated of these are the domestic support measures (Panagariya, 2005). The member countries can use four types of domestic subsidies, namely “green” and “blue” boxes, “development measures” and “de minimus” subsidies. The “green-box” subsidies are supposed to have little or no impact on production and trade. These include measures that are “decoupled” from output such as income support payments, safety-net programmes, payments under environmental programmes and agricultural research. The “blue-box” covers direct payments under production-limiting programmes and might affect current output decisions. However, these subsidies are expected to be reduced in future with a maximum cap of 5 per cent of agricultural production in some historical period other than 1986-88. Subsidies under “development measures” cover direct or indirect assistance for encouraging agricultural and rural development in developing countries. These include investment subsidies for research and development, extension programmes, soil and water conservation programmes; and agricultural input subsidies, including fertiliser, water, electricity, etc. available to low-income or resource poor farmers. Under “de minimus” measure the developed countries are allowed other subsidies of up to 5 per cent of total value of domestic agricultural production (10 per cent for developing countries). All other subsidies fall under “amber box” and are trade distorting. These include support prices, input subsidies, and output subsidies. The URAA introduced the concept of Aggregate Measure of Support (AMS) defined as amber-box subsidies net of de minimus subsidies. The member countries were required to report their total AMS for the period 1986-88, bind it and reduce it in an agreed phased manner. Such reductions have now been implemented but there remains a large gap (overhang) between the bound and the applied rates.

The OECD reports the “producer support estimate” (PSE) as a measure of agricultural support (OECD, 2004). It is an estimate of the annual monetary transfers to farmers from policy measures that:

- Maintain domestic prices for farm goods at levels higher (and occasionally lower) than those of the country's border (market price support); and
- Provide payments to farmers, based on criteria such as the quantity of a commodity produced, the amount of inputs used, the number of animals kept, the area farmed, or the revenue income received by farmers (budgetary payments).

While the PSE monitors and evaluates progress in agricultural policy reform, the AMS is the basis for legal commitments to reduce domestic support in the WTO Agreement on Agriculture. While the PSE and the AMS are closely related there are some important differences.

The PSE covers all transfers to farmers from agricultural policies, whereas the AMS covers only domestic policies deemed to have the greatest production and trade effects (amber box) and excludes trade policies that are covered under the WTO market access and export subsidy regimes. The AMS also excludes production-limiting policies (blue box), those policies deemed non or least trade distorting (green box) and certain trade distorting policies (e.g. input subsidies) when the level of domestic support is smaller than a specified *de minimus* level.

The “budgetary support” component of the PSE includes payments to farmers and budgetary revenue foregone through lowering the cost of farm inputs. The “market price support” component of the PSE arises through tariffs, quotas and other restrictions on imports as well as subsidies on exports, together with government intervention to boost domestic prices through providing support prices and stock building. However, the operational costs of acquiring, holding and disposing of public stocks are a budgetary cost to implement market price support policy but do not provide support to farmers over and above market price support and are thus not included in the PSE but in TSE (total support estimate).

The subsidies computed by OECD (2005) do not take into account two types of additional subsidies, namely the indirect subsidies extended through inadequate pricing of water, and fiscal deductions on profits and incomes granted to agricultural households (Messerlin, 2005). One or both types of subsidies may be very large for some OECD countries. It has further been pointed out that the URAA granted a reverse “special and differential” treatment to OECD WTO members by allowing them to “adopt many exceptions to the traditional WTO rules: export subsidies (the so-called “Peace Clause” which lapsed in January 2004); production subsidies having significant impact on trade flows; “specific” tariffs (denominated as a fixed sum of money per unit of product, in contrast with ad valorem tariffs expressed in percentage terms of the import price) which are highly protectionist when world prices are low (precisely when protection is very much sought after by domestic farmers); tariff-rate quotas (restrictions combining a lower (in-quota) tariff rate for a specified volume of imports

and a higher (over-quota) tariff rate for imports above this volume) often used as a way to maintain existing preferences; etc.”

The critics of the PSE have argued that this measure is not a proper reflection of changes in agricultural policies and, in particular, of their effects on trade. Secondly, variations in the PSE over time reflect not only the changes in policy settings by a country but also the changing world market conditions and exchange rates. Thirdly, it has been pointed out that in the measurement of the market price support (MPS), accounting for about 60 per cent of the PSE for OECD countries, domestic prices should not be compared with actual world market prices but with undistorted world market prices that might prevail in the absence of all policies.

Caution about reliance on OECD’s PSE as a measure of agricultural support as well as an indicator of a country’s agricultural policies has been pointed out by OECD’s own staff (Tangemann, 2005). It has been pointed out that, apart from computing PSE, OECD has much wider scope of work on agricultural analysis relying on a number of different methodological tools. Thus the PSE measure must be used in a proper context while keeping in view other complementary analytical work simultaneously reported by OECD.

Agricultural Support Measures in GTAP Database

The Global Trade Analysis Project (GTAP) of the Centre for Global Trade Analysis, Purdue University represents an integrated database as well as a static, one period, computable general equilibrium model of the world economy.² GTAP-6 (Release 6.2) database has 2001 as its base year and is composed of three integrated components for 87 countries/regions and 57 commodities/sectors of production and contains information on:

- Input-output model for each of the countries / regions;
- Bilateral trade data across countries / regions; and
- Trade protection data

The analysis is based on evaluation of three agricultural policies: import tariffs, export subsidies and domestic support. The GTAP-6 database has much better data on agricultural tariff protection, the MACMap database which is compiled from UNCTAD TRAINS data, country notifications to the WTO, AMAD, and from national customs information (Bouet et al 2005). Data on agricultural export subsidies is based on the information from country submissions to the WTO on export subsidy expenditures. The estimates of domestic support are based on the 2001 Producer Support Estimates (PSE) data for the OECD countries. The GTAP database provides data on the PSE as overall measure including border support as well

² Refer to www.gtap.org for details, Hertel (1997).

as domestic support measures. Domestic support measures are classified into four categories, namely

- Output payments
- Input payments
- Land based payments
- Capital payments

GTAP draws upon the OECD database to compute “domestic support” and hence the two numbers are nearly equal. However, apart from \$90 billion worth of domestic support in the OECD countries in 2001, there is additional \$7 billion worth of domestic support extended to the farmers in the non-OECD countries. About 81 per cent of the global agricultural support in the GTAP database is provided through the market price support (MPS). It includes 75 per cent support through market access (import duty) barriers and 6 per cent through export subsidies. at the borders through market access barriers. Only 19 per cent of the support is in the form of domestic subsidies (**Table 1**).³

The “market support” is computed by OECD through domestic-to-border price comparisons to capture the combined effect of all trade measures, both tariffs and such non-tariff barriers as quarantine restrictions. However, the GTAP database does not capture the protective effects of non-tariff barriers (NTBs) such as Sanitary and Phyto-Sanitary (SPS) measures or other technical barriers to imports that have the potential to provide additional economic protection to OECD countries.⁴ Thus the GTAP database relies on applied tariff rates including preferential rates applicable. Contrary to the domestic support, the market support is provided through trade measures.

Despite the success of the URAA in bringing agriculture under multilateral trade discipline, little progress has been made in the reduction of actual agricultural protection rates by the end of the implementation period of the AoA for industrial countries. A lot remains to be accomplished before agriculture trade becomes as liberal as world trade in manufactures. One of the most important objectives of the Doha Round of multilateral negotiations is to provide for substantial reductions in agricultural tariffs, domestic support and export subsidies. In this section, we quantify the potential impact of further liberalisation of agricultural protection.⁵ We present the possible trade and welfare effects for India and other countries/regions with a view to assessing the relative magnitude of the impact for India. The analysis provides an

³ Anderson et al (2006).

⁴ Such NTBs are left out of Doha modelling analyses since the same are not being negotiated in this WTO Round.

⁵ Martin and Winters (1996) quantified the gains arising from the Uruguay Round for individual countries and country groups including developing countries and South Asian economies. The focus of this analysis is the post-UR negotiations.

insight into the potential costs and benefits for the country from negotiations on alternative agricultural protectionist policies.

Trade barriers lead to inefficient allocation of resources in the domestic economy and reduce demand for exports of more efficient producers in the rest of the world. Product subsidies create domestic oversupply, which when disposed off in the world market, through export subsidisation, lower world prices and increased (concocted) competition for more efficient producers and reduce incomes. Thus elimination of such policy induced distortions in agricultural trade and production would increase agricultural trade and world incomes. However, the extent of the gains would vary across countries and agricultural-commodities based on a number of factors including initial levels of protection and trade pattern.

Analysing Agricultural Trade Liberalisation using GTAP

An excellent review of the use of GTAP database for analysing implications of domestic support disciplines on agricultural trade using computable general equilibrium (CGE) models is provided in Walsh et al (2005). Other relevant papers referred to by us during our current general equilibrium work include Dimaranan et al (2004), Keeney and Hertel (2005), Aksoy (2005), Anderson and Martin (2006), Hertel and Keeney (2006), Valenzuela et al (2006), Jha et al (2006) and Razzaque et al (2006).

The developing countries, including India, would be affected by the removal of current distortions in agricultural trade through two main channels (Hertel and Keeney, 2006). Firstly, a country would reap *efficiency gain* from elimination of its own trade distortions. The efficiency effect originating from global trade reform is expected to be generally positive for participating countries. Secondly, a country may gain from improved *terms of trade*. Trade liberalisation of agricultural products is expected to raise international prices through squeezing out the erstwhile subsidy element. This is expected to happen for some of the temperate-zone products that are currently heavily protected in the high-income countries. Improved terms-of-trade are expected to benefit the net-exporting countries of the protected farm products provided they are not currently enjoying duty-free access to protected markets.

The net food-importing countries might lose unless they become net-exporters during the course of transition leading to a new set of conditions. Many of these countries have become dependent on cheap agricultural imports resulting from long-term subsidies for such agricultural products in high-income countries as well as from continued agricultural disincentives in many developing countries (Dimaranan et al, 2004).

There have been various approaches using GTAP database for analysing potential impacts of liberalising trade in agriculture through reduced domestic and market support extended to various agricultural commodities both by developed and developing countries. Some studies

have analysed the impact of eliminating domestic agricultural support, as provided in the GTAP database without differentiating between WTO permissible and non-permissible subsidies (Francois *et al*, 2003 and Hertel and Keeney, 2006). Some others have modelled reduction in agricultural support on the basis of assumptions closer to the WTO disciplines. For example, Rae and Strutt (2003) consider land- and capital-based payments as proxies for *green* and *blue* WTO boxes and output and intermediate subsidies as measures of *amber* box payments. This may, in fact, be an overestimate of the *amber* box given that half of the *green* box support is modelled as output and input subsidies in GTAP database (Jensen, 2005).

Agricultural Trade Liberalisation: Impact on South Asia

We use the standard modelling framework of the CGE model known as the Global Trade Analysis Project (GTAP) Model Version 6.2 with the latest available GTAP database Version 6.2. This database is calibrated to 2001 for production, trade and for the data on protection. As such, the data set that we work with is a representation of a notional world economy with realisation of policy reforms implemented until 2001. The model describes how this representation would change in a single long-run end-point, due to the policy experiments undertaken. The multi-region model, though relatively standard in its components, has some distinguishing features, which include treatment of private household behaviour, international trade and transport activity along with the global savings/ investment statements.⁶

Methodology and Experimental Scenarios

We simulate the impact of alternative agricultural trade liberalisation scenarios on South Asia's agricultural sectors. The basic theoretical features of the model are as follows: Regional household behaviour is represented by an aggregate utility function specified over composite private consumption, government purchases and savings. The composite household owns endowments of factors of production and receives income from selling them to firms. The household also receives income from government revenue/subsidy. On the production side, firms employ domestic factors (land, labour and capital) and intermediate inputs from domestic and foreign sources to produce output. Throughout it is assumed that there exists perfect competition and constant returns to scale in production activities. Prices on goods and factors adjust until all markets clear. The GTAP measures welfare changes, resulting from changes in trade and domestic taxes and subsidies, by direct evaluation of the impacts on the expenditure and production revenue functions and government revenues. Welfare changes are measured in terms of changes in equivalent variation. Equivalent

⁶ A complete description of the formal model, which is based in Purdue University, is available in Hertel (1997). The special features of the GTAP version 5 data base can be found in Dimaranan and McDougall (2002). The model is solved using the software GEMPACK (Harrison and Pearson 2005).

variation is the dollar equivalent of an effective change in national income, or purchasing power, due to policy change.

As mentioned earlier, the GTAP database distinguishes between 57 commodities/sectors of production and 87 countries/regions. In our experiments, the sectors have been aggregated into 26 sectors and 30 countries/regions (**Tables 2 and 3**).

The 26 sectors of production include 14 primary agriculture sectors (including forestry) and 8 processed agriculture sectors. The remaining four sectors are minerals, textiles and wearing apparel, other manufactures and services.

The regional aggregation takes into account major agricultural exporting and importing countries/regions and those accounting for the highest levels of agricultural trade and production distortions. The high-income countries/regions include EU-15, EFTA, Canada, the United States, Mexico, Japan, South Korea, Hong Kong, Taiwan, Singapore, and Australia and New Zealand.

The high income countries provide supports its primary and processed agriculture in various forms. Within the high income countries the domestic subsidies in primary agriculture are relatively high in EFTA, EU-15 and the United States but relatively low in Japan and South Korea. Export subsidies are relatively high in EU-15 followed South Korea and EFTA. Import duties on primary agriculture, among the high-income countries, are extremely high in South Korea. Japan and EFTA also have relatively high import duty rates. Within the developing countries, China has the highest import duty rate on primary agricultural products followed by Malaysia and India.

In the case of processed agriculture, very high export subsidies are provided by the EU-15 with a rate more than double of what this region provides to primary agricultural commodities. EFTA countries also provide relatively high export subsidies. The high-income countries, except the United States, protect their domestic markets imposing high import tariffs. The high import-duty users include EFTA and Japan followed by South Korea, Taiwan and EU-15. Within the developing countries, India protects its processed agriculture by the highest rate of import tariff. Thailand also uses relatively high import tariff rate though much lower than that of India.

The United States and the EU-15 provide very high amounts of domestic support to their agricultural sectors. While the United States provides half the domestic support in the form of land- and capital-based payments, EU-15 provides about four-fifths of its domestic support in these two categories.

We undertake alternative policy experiments to offer an assessment of the opportunities and challenges provided by liberalisation of international trade in agriculture. Like Keeney et al (2005), we eschew the current debate over what exact protection reduction formulas might

result from the forthcoming discussions in Doha round of negotiations. In this exercise, we simulate complete liberalisation of global agricultural trade through a combination of assumptions of complete dismantling of the three pillars of agricultural support by the high-income developed countries and dismantling of tariff barriers by the developing countries. Thus we sidestep the difficult issues of dealing with binding overhang and tariff rate quotas (TRQ). Our simulations are expected to generate results that may be upper bounds of impacts of the various alternative formula-based scenarios which might emerge from the forthcoming WTO AoA negotiations.

Policy Simulations and Results

We have conducted 10 simulation experiments of agricultural border trade liberalisation (**Table 4**). All our experiments are based on 100 per cent dismantling of the particular pillars of support. Our database corresponds to the year 2001 when the Agreement on Textiles and Clothing (ATC) was still being implemented with its final due date as December 31, 2004. All of the 10 simulations are conducted using the updated database generated from a “pre-simulation” of the ATC implementation.

Simulations 1-0 are in the nature of multilateral trade liberalisation with individual countries of the region choosing to or restricting on providing market access to other countries. In Simulation-1 the high-income countries remove two types of domestic support, viz. output and input based payments. Like in Rae and Strutt (2003), we consider land- and capital-based payments as proxies for *green* and *blue* WTO-AoA boxes and output and intermediate subsidies as measures of *amber box* payments. This may, in fact, be an overestimate of the *amber box* given that half of the *green box* support is modelled as output and input subsidies in GTAP database (Jensen, 2005). Simulation 2 represents the scenario when the high income completely eliminate export subsidies in agriculture. Complete market access is given by the high income countries in Simulation 3, while all the three pillars of support are dismantled in Simulation 4. Simulation 5 represents a hypothetical Regional Trade Agreement (RTA) formed in the South Asian Region for primary and processed agriculture. The following Simulation 6, postulates the liberalisation by high income countries in presence of an South Asian RTA. Simulation 7 is conducted with an assumption that India autonomously dismantles its tariff barriers in primary and processed agricultural sector. Similar liberalisation is admitted separately by Bangladesh, Pakistan and Sri Lanka under Simulations 8, 9 and 10 respectively.

Results

The welfare loss/gain (equivalent variation) results of Simulations 1-10 are presented in **Table 5**. The roles of *allocative efficiency* and *terms-of-trade* in the welfare loss/gain for each of the South Asian countries are highlighted in **Table 6-9**.

Table 5

We proceed with a discussion on the net changes in welfare under different experiments. Piecewise dismantling of the three pillars of agricultural support by the high income countries leads to rise in global welfare. Between the three forms of support, maximum welfare is conditioned upon giving complete market access by the high-income countries.

By dismantling only their domestic subsidies, the high income countries gain about \$1 billion. Maximum benefits accrue to the United States, followed by the EU-15. However, some participants such as Mexico, Japan, Korea, Hong Kong, Taiwan and Singapore stand to lose. Within the south Asian region, India and Sri Lanka gain, though the benefits of remaining members of the region are high enough to result in net welfare loss for the region.

By purging their export subsidies, the high income countries gain \$2.3 billion. Under this scenario, EU-15, the largest subsidies of agricultural exports, earns as much as \$3 billion, though all other participants lose. Amongst the South Asian region only India gains, while all other countries incur losses.

Market access emerges as the strongest deterrent to trade. Most regions/countries reap benefits when the high income countries provide complete market access in agriculture. While the South Asian region loses out when the high income countries eliminate their domestic or export subsidies, it reaps benefits from increased access to their markets. While India, Pakistan and Sri Lanka gain from enhanced market access, Bangladesh is net loser.

Complete opening up of the agricultural markets in high income countries brings global gains worth \$52 billion, of which 83 per cent accrues to the participant members. The collective gains of south Asian region are \$0.6 billion, with only Bangladesh a net losing economy.

Under a stand alone RTA in the South Asian region, the regional welfare goes up by \$0.062 only. It may be noted that not all participants benefit from the formation of the RTA. While the gains/ losses to individual countries in this region are small, gains are highest for Rest of South Asia.⁷

⁷ Rest of South Asia includes Afghanistan, Bhutan, Maldives and Nepal

Complete liberalisation by the high income economies in presence of a South Asian RTA results in highest global welfare. Gains to the participant regions, namely high income countries and south Asia, are enhanced under this scenario. Bangladesh emerges as a strong exception in the South Asian region as it losses \$0.69 billion. This is perhaps due to the preference erosion.

Autonomous agricultural liberalisation by India results in a global welfare to the tune of \$1.3 billion. Of this 54 per cent accrues to the South Asian region only. Much of the regional gains are due to gains made by India itself.

While both Bangladesh and Pakistan gain with their respective autonomous liberalisations, Sri Lanka loses when it provides complete market access to its agriculture.

Tables 6-9

The global trade liberalisation of agriculture, both primary and processed, would have consequences on welfare losses/gains in terms of *equivalent variation* (EV) for various countries/regions. The decomposition of the EV measure for GTAP models has been derived by Huff and Hertel (1996). The welfare loss/gain would arise mainly from *allocative efficiency* and *terms of trade* (TOT) effects (Hanslow, 2000). The allocative efficiency effects arise from reallocation of existing resources resulting from trade liberalisation. The terms of trade effects arise from changes in domestic versus international prices. In effect, welfare gains can also arise from *endowment effects* and *technology effects* but these are not meaningful in a typical GTAP simulation since the endowment and technology variables are treated as exogenous (Pant et al, 2000).

The break-down of the economic welfare for India under Simulations 1-10 is provided in **Table 6**. It may be observed that market access by the high income countries and/or the South Asian region is of critical importance to India. While India gains when both these blocks give market access, India's net gains and allocative efficiencies become highest when she provides market access autonomously. While India's TOT remain positive under most scenario, they exhibit deterioration under India's autonomous liberalisation.

As shown in **Table 7**, Bangladesh generally loses on account of its allocative inefficiencies or declining TOT or both in most simulations. However, both the effects turn positive with India's unilateral elimination of import tariffs in primary and processed agriculture. Though Bangladesh exhibits most efficient allocation resources with its own tariff elimination, the decline in TOT is strong enough to substantially mitigate the advantage.

The table of decomposition of Pakistan's welfare changes highlights the significance of market from the high income countries as well as the south Asian region due to improvement of its own TOT (refer **Table 8**). Under unilateral elimination of agricultural tariffs, Pakistan's allocative efficiencies lead to a gain of \$0.2 billion, though the TOT diminishes very much.

The decomposition of welfare changes in Sri Lanka highlights the importance of market access. From **Table 9**, it may be noted that the allocation of resources remain inefficient in simulations except under unilateral tariff elimination. However, while liberalising autonomously, Sri Lanka's decline in TOT effect offsets the advantage due to improved allocative efficiencies, thus resulting in a net welfare loss. It appears that market access in agricultural sectors of other countries is a must to raise Sri Lanka a pre-requisite to enhance Sri Lankan income.

Critique and Limitations of CGE Models

The results of global trade models generally indicate that the potential contribution to global economic welfare of removing agricultural subsidies, both domestic and export, is much less than that of removing agricultural tariffs. Though this seems somewhat puzzling, in reality it should not so given that three-fourths of the global agricultural support is afforded through tariff protection at the borders with only one-fifth being provided through domestic subsidies and much less through export subsidies (Anderson et al, 2006). However, it is equally important to note that the extent of tariff protection in the major developing countries, including India, is greater than in the developed countries.

While many of the existing general equilibrium models adopt GTAP modelling framework some others are at variance from GTAP including the World Bank's LINKAGE Model and the Brown-Deardorff-Stern (BDS) CGE Model (Brown et al, 2002 and Chadha et al 2003). It is now well documented that the computable general equilibrium models for analysing trade liberalisation scenarios suffer from various limitations. "The empirical limitations of CGE forecasts rest on broader theoretical weaknesses: the models are largely locked within a static framework, and remarkably assume that trade policy causes no change in total employment, up or down" (Ackerman, 2005). Another detailed critique of the CGE trade models concludes that "developing countries would be ill-advised to follow the radical recommendations of the World Bank's liberalisation strategy in so far as it rests on results drawn from the current trade models" (Taylor and Arnim, 2006). This paper appeals for 'honest' simulation strategies showing the different variety of outcomes that result from a range of plausible assumptions. It is suggested that the policy makers would thus be able to assess different scenarios for themselves.

“CGE models have several limitations, and often do not incorporate key features of developing countries. In particular CGE models do not account for the presence of persistent unemployment in the developing countries. In the presence of unemployment, trade liberalisation may simply move workers low productivity protected sectors into unemployment” (Charlton and Stiglitz, 2005).

Having put forth the weaknesses in the CGE analysis, it is pertinent to state that these models are exercises in quantifying the effects of changes in trade policies on economies of the affected countries. “The main benefit of CGE models is that they offer rigorous and theoretically consistent framework for analysing trade policy questions” (Piermartini and Teh, 2005). It further adds that “The numbers that come out of the simulations should only be used to give a sense of the order of magnitude that a change in policy can mean for economic welfare or trade.”

These models also discipline our thinking about how the economies actually work through complex inter-linkages as compared to the sectoral and narrow level analysis of such policy changes. Nevertheless, models should not be allowed to become substitute for rigorous policy analysis. One may not place much faith in the actual values derived from CGE analysis yet these models highlight many interesting general equilibrium effects and enable one to draw inferences from comparisons across alternative scenarios. “These models enable us to observe the effects of various liberalisation experiments on trade volumes, prices and incomes. Simulations can separately determine the effects of reform on different sectors and on different countries and regions. The connection between exogenous trade reforms and welfare outcomes is complex, and determined in CGE models by the scope and functional form of the model and values of demand elasticities and other key parameters.” (Charlton and Stiglitz, 2005).

While we do appreciate the critiques and the weaknesses of the CGE models, at the same time, we do understand and expect that most of the CGE modellers are themselves aware of various problems and limitations imposed by underlying assumptions and careful about interpreting their results. The results should not be read as forecasts but, at best, guidelines on the possible outcomes of changes in certain existing policies. In real life, much more work should be done at sectoral levels to create or banish confidence in such results.

Policy Implications of Agricultural Trade Liberalization

There is a major debate about the policy implications of agricultural trade reform under the three pillars of agricultural protection, viz. domestic subsidies, export subsidies and import barriers. A significant proportion of protection to agriculture in the high-income countries is provided by import barriers (including high tariffs) and much less by export and domestic

subsidies. It is also true that dismantling of domestic and export subsidies would raise the prices of agricultural goods in the world markets. However, it would be pretentious to derive from these facts that the developing countries would necessarily be net losers and hence the high-income countries should continue to have these two subsidies in place. It is relevant to understand five important facts which justify that the while market access is the most major hurdle among the three agricultural trade obstructing pillars, domestic and export subsidies must also be eliminated simultaneously.

Firstly, some of the current estimates put the post trade-reform increase in agricultural prices between 5 and 10 per cent. Assuming that such trade liberalisation would be implemented over a period of 5 to 10 years (like in the previous GATT round), the order of expected price increases would be relatively manageable (Messerlin, 2005).

Secondly, the dismantling of import protection regime in the absence of dismantling of domestic and export subsidies would carry a risk the countries would tend to raise such subsidies even further. Dismantling domestic subsidies would also be necessary for the United States to share with the EU the political and adjustment pain of reducing agricultural trade distortions since the EU has a much higher dependence on trade distorting measures including export subsidies and import barriers (Anderson et al, 2006).

Thirdly, the logic of maintaining domestic subsidies through decoupled and targeted policies vis-à-vis price and production based support also has its own flaws. Even the decoupled support to the farmers can have some impact on production, and hence on trade, through various indirect means. Even if such payments get consigned into the “Green Box” these would continue to remain a contentious issue between the developing and the high-income countries (Ash, 2006).

Fourthly, there is a distinction between global trade changes in temperate and tropical agricultural products as result of agricultural trade liberalisation. While the high-income countries are net importers of temperate products including rice, wheat, other grains and oilseeds the high-income countries are their net exporters. The reverse is true of temperate products including fruits and vegetables (Charlton and Stiglitz, 2005).

Finally, one of the most important determinants of competitiveness of exports of the developing countries is their profitability of export. The unprecedented decline in international prices during 1995-2000 has affected exports of India.

Concluding Remarks

The South Asian agricultural markets are likely to get affected through various re-adjustments after trade liberalisation both at global and South Asian countries' borders. We have conducted hypothetical simulations on various combinations of trade liberalisation

experiments in primary and processed agricultural sectors across the high-income and developing countries/regions of the world. We have also experimented with alternatives for individual countries in South Asian region when they choose liberalise their own markets to provide market access. Nevertheless, food security issues must be kept in view during the process of liberalisation of trade in agriculture.

While complete global agricultural trade liberalisation by the high income countries would raise global welfare along with rise in welfare of most of the countries/regions of the world it may affect farmers in these countries/regions in different ways. The resources would get re-allocated with obvious consequence of creating gainers and losers in the process. While it is important for the South Asian region and its allies to use much of their bargaining capital in getting “market access” into the high-income country-markets, it is simultaneously urgent and relevant to get “domestic and export subsidies” of the high-income countries eliminated.

The South Asian region, in particular, gains from the complete elimination of agricultural tariffs by the high income countries except for Bangladesh. Higher gains are attained when the high income countries eliminate domestic and export subsidies in addition to their tariffs in agricultural sectors.

Realisation of a regional trade agreement in agriculture is likely to bring gains to the South Asian region, though Bangladesh loses under such arrangement. The regional gains become multi-fold upon complementing the RTA with complete liberalisation by high income countries.

Within the South Asian region, autonomous liberalisation of agricultural tariffs by the member countries exhibits gains for both, the member country and the region, but for the Sri Lankan case when it loses upon eliminating its own agricultural tariffs.

Table 1: Estimates of the extent of support to agriculture and food sectors, by region and policy instrument, 2001 (US\$ billion)								
	OECD estimates of support to primary agriculture	GTAP database price- based distortions (excluding non- tariff barriers)						
		GTAP database estimates of support to primary agriculture			GTAP database estimates of support to food processing			GTAP database estimates of support to all countries agriculture and food (% in brackets)
	OECD Countries	OECD Countries	Non OECD Countries	All Countries	OECD Countries	Non OECD Countries	All Countries	
Direct domestic subsidies	89	90 ^b	7	97	0	0	0	97 (19%)
- Fully coupled to prod'n	37 ^a							
Market price support (MPS)	139	46	76	122	198	82	280	402 (81%)
Export subsidies ^c	N.A	3	1	4	26	0.1	26	30 (6%)
Import tariffs ^d	N.A	43	75	118	172	82	254	372 (75%)
All support measures ^e	228	136	83	219	198	82	280	499 (100%)

a The portion somewhat decoupled from production refers to payments to farmers based on area planted, animal numbers, historic entitlements, input constraints or overall farming income. The fully coupled portion refers to payments based on output or input use or otherwise not classified. Even if all non- OECD domestic subsidies were fully coupled, that would still mean less than half [(37+ 7)/ 97= 45 percent] of domestic farm subsidization is fully coupled globally.

b The domestic support is estimated from the value wedges between payments at agents' prices and market prices in the GTAP database. These payments are collected by commodity and region in payments to final output, payments to factors, payments to domestic intermediate inputs, and payments to imported intermediate inputs. The GT AP- AGR Model allows us to identify from the GTAP database payments to land based on historical entitlements of \$8 billion (Keeney 2005, p. 85).

c Export subsidy market price support is calculated as the sum over all goods of the value of output at undistorted prices of good i in region r times the corresponding export subsidy rate of good i in region r, minus the sum of the value of each intermediate inputs used in industry i in region r times its corresponding export subsidy rate.

d Import tariff market price support is calculated as the sum over all goods of the value of output i at undistorted prices in region r times the corresponding trade weighted tariff rate of good i in region r, minus the sum of the value of each intermediate input used in industry i in region r times its corresponding tariff rate. In deriving the import weights for making these calculations, intra-EU15 trade was excluded.

e The value of OECD production of primary agriculture at undistorted prices in the GTAP database is US\$614 billion, so \$136b represents an ad valorem subsidy equivalent of 22 percent. The OECD Secretariat's estimated value of production at farm gate prices is \$653b plus \$77b worth of direct payments based on output, and \$228b of that sum of \$730b is subsidies. Hence at undistorted prices the production value is \$502b, so \$228b represents an ad valorem subsidy equivalent of 44 percent.

Sources: Anderson, Martin and Valenzuela (2006), Table 1, p 21.

Table 2: Mapping of Model Sectors with GTAP Sectors			
Sr No.	Code	Description	GTAP Sectors
1	pdr	Paddy rice	Paddy rice.
2	wht	Wheat	Wheat.
3	gro	Cereal grains nec	Cereal grains nec.
4	v_f	Vegetables, fruit, nuts	Vegetables, fruit, nuts.
5	osd	Oil seeds	Oil seeds.
6	c_b	Sugar cane, sugar beet	Sugar cane, sugar beet.
7	pfb	Plant-based fibers	Plant-based fibers.
8	ocr	Crops nec	Crops nec.
9	ctl	Cattle,sheep,goats,horses	Cattle,sheep,goats,horses.
10	oap	Animal products nec	Animal products nec.
11	rmk	Raw milk	Raw milk.
12	wol	Wool, silk-worm cocoons	Wool, silk-worm cocoons.
13	for	Forestry	Forestry.
14	fsh	Fishing	Fishing.
15	cogm	Coal, oil gas and minerals	Coal; Oil; Gas; Minerals nec.
16	cmt	Meat: cattle,sheep,goats,horse	Meat: cattle,sheep,goats,horse.
17	omt	Meat products nec	Meat products nec.
18	vol	Vegetable oils and fats	Vegetable oils and fats.
19	mil	Dairy products	Dairy products.
20	pcr	Processed rice	Processed rice.
21	sgr	Sugar	Sugar.
22	ofd	Food products nec	Food products nec.
23	b_t	Beverages and tobacco products	Beverages and tobacco products.
24	tex	textile & wearing apparels	Textiles; Wearing apparel.
25	mnf	Other Manufactures	Leather products; Wood products; Paper products, publishing; Petroleum, coal products; Chemical,rubber,plastic prods; Mineral products nec; Ferrous metals; Metals nec; Metal products; Motor vehicles and parts; Transport equipment nec; Electronic equipment; Machinery and equipment nec; Manufactures nec.
26	svc	Services	Electricity; Gas manufacture, distribution; Water; Construction; Trade; Transport nec; Sea transport; Air transport; Communication; Financial services nec; Insurance; Business services nec; Recreation and other services; PubAdmin/Defence/Health/Educat; Dwellings.
Source: GTAP Ver 6.2 Data Base			

Table 3: Mapping of Model Country/Region with GTAP Country/Region			
Sr No.	Code	Description	GTAP Regions
1	EU15	European Union - 15	Austria; Belgium; Denmark; Finland; France; Germany; United Kingdom; Greece; Ireland; Italy; Luxembourg; Netherlands; Portugal; Spain; Sweden.
2	EFTA	European Free Trade Area	Switzerland; Rest of EFTA.
3	CAN	Canada	Canada.
4	USA	USA	United States of America.
5	MEX	Mexico	Mexico.
6	JPN	Japan	Japan
7	KOR	South South Korea	South Korea
8	HKG	Hong Kong	Hong Kong
9	TWN	Taiwan	Taiwan.
10	SGP	Singapore	Singapore
11	ANZ	Australia New Zealand	Australia; New Zealand; Rest of Oceania.
12	EUA	EU-New Entrants 2004	Cyprus; Czech Republic; Hungary; Malta; Poland; Slovakia; Slovenia; Estonia; Latvia; Lithuania.
13	RUS	Russian Federation	Russian Federation.
14	OEEFSU	Other Eastern Europe and Former Soviet Union	Rest of Europe; Albania; Bulgaria; Croatia; Romania; Rest of Former Soviet Union; Turkey.
15	CHN	China	China
16	IDN	Indonesia	Indonesia.
17	MYS	Malaysia	Malaysia
18	PHL	Philippines	Philippines
19	THA	Thailand	Thailand
20	OSEA	Rest of South East Asia	Rest of East Asia; Cambodia; Viet Nam; Rest of Southeast Asia.
21	IND	India	India.
22	BGD	Bangladesh	Bangladesh
23	PAK	Pakistan	Pakistan
24	LKA	Sri Lanka	Sri Lanka
25	XSA	Rest of South Asia	Rest of South Asia.
26	OLAC	Latin America	Rest of North America; Bolivia; Colombia; Ecuador; Peru; Venezuela; Chile; Paraguay; Uruguay; Rest of South America; Central America; Rest of Free Trade Area of America; Rest of the Caribbean.
27	ARG	Argentina	Argentina.
28	BRZ	Brazil	Brazil.
29	MENA	Middle East & North Africa	Iran, Islamic Republic of; Rest of Middle East; Egypt; Morocco; Tunisia; Rest of North Africa.
30	SSA	Sub-Saharan Africa	Botswana; South Africa; Rest of South African Customs , Malawi; Mauritius; Mozambique; Tanzania; Zambia; Zimbabwe; Rest of Southern African Development community. Community; Madagascar; Nigeria; Senegal; Uganda; Rest of Sub-Saharan Africa.
Source: GTAP Ver 6.2 Data Base			

Table 4: Simulation Design	
Simulation	Description
SIM_1	High Income countries eliminate only input + output subsidies in primary and processed agriculture
SIM_2	High Income countries eliminate export subsidies in primary and processed agriculture
SIM_3	High Income countries provide market access in primary and processed agriculture
SIM_4	Sim_2+sim_3+sim_4 : Complete liberalisation by High Income countries
SIM_5	South Asian countries give market access to form a RTA in primary and processed agriculture
SIM_6	Sim_1+Sim_5, Complete liberalisation by High Income countries+South Asian RTA
SIM_7	India unilaterally provides market access in primary and processed agriculture
SIM_8	Bangladesh unilaterally provides market access in primary and processed agriculture
SIM_9	Pakistan unilaterally provides market access in primary and processed agriculture
SIM_10	Sri Lanka unilaterally provides market access in primary and processed agriculture
High Income Countries are : European Union – 15, EFTA (mainly Switzerland; and Rest of EFTA), Canada, USA, Mexico, Japan, South Korea, Hong Kong, Taiwan, Singapore; and Australia and New Zealand South Asian Countries are: India, Bangladesh, Pakistan, Sri Lanka and Rest of South Asia	

Table 5: Absolute Change in Welfare (SIM_1 to SIM_10) - US\$ million											
Region/ Country	Sim_1	Sim_2	Sim_3	Sim_4	Sim_5	Sim_6	Sim_7	Sim_8	Sim_9	Sim_10	
European Union – 15	410	3055	4084	9904	14	9913	97	8	18	2	
European Free Trade Area	84	-109	961	1361	3	1376	16	1	4	0	
Canada	346	-53	809	1064	-6	1057	28	0	4	-0	
USA	1182	-70	1430	3484	-7	3475	60	15	18	4	
Mexico	-323	-97	80	-295	2	-293	7	-0	1	0	
Japan	-425	-455	20663	19431	7	19441	-14	-1	0	1	
Korea	-296	-46	5687	5455	-0	5454	-0	-1	3	1	
Hong kong	-34	-41	11	-76	3	-72	-3	-1	-1	-0	
Taiwan	-170	-35	67	-117	1	-116	-7	-1	-3	-0	
Singapore	-15	-30	428	413	0	414	-42	3	-11	1	
Australia New Zealand	321	270	1914	2688	-12	2675	41	5	-0	1	
EU-New entrants 2004	10	-188	1044	892	0	885	3	0	-0	0	
Russian Federation	-64	-325	-37	-446	-1	-447	22	-0	2	1	
Other Eastern Europe and Former Soviet Union	16	-78	352	341	-4	338	0	-1	-3	2	
China	-569	-86	601	121	6	124	-24	-6	-19	-1	
Indonesia	-47	-24	-36	-117	-8	-125	106	3	8	2	
Malaysia	23	-19	-18	-3	-4	-6	223	6	58	1	
Philippines	-20	-31	32	-28	0	-28	2	-1	-0	-0	
Thailand	0	6	890	916	-5	911	0	3	-3	0	
Rest of South East Asia	-41	-14	122	60	-4	56	31	0	-1	-0	
India	15	11	535	591	5	589	673	9	6	2	
Bangladesh	-23	-9	-36	-69	-7	-75	17	1	1	-0	
Pakistan	-3	-3	19	24	3	28	-2	2	14	2	
Sri Lanka	4	-4	46	44	4	47	4	0	1	-9	
Rest of South Asia	1	-2	-2	-3	57	71	21	0	4	0	
Latin America	14	-109	1704	1588	-1	1586	8	-1	-1	-0	
Argentina	285	58	381	759	-3	756	-29	-4	3	-0	
Brazil	463	34	4368	4820	-7	4814	-18	2	5	-0	
Middle East & North Africa	-325	-760	248	-861	-2	-863	57	-1	14	1	
Sub-Saharan Africa	56	-224	363	191	-11	179	40	0	26	-1	
World	873	622	46711	52134	24	52163	1315	46	146	10	
High Income Countries	1079	2389	36134	43313	5	43323	183	30	33	10	
South Asia	-6	-7	562	587	62	660	713	13	26	-4	

Source: Our Model Results

Source: Our Model Results

Table 6: Welfare Decomposition in India (US\$ million)				
Simulation	Equivalent Variations (US\$ million)			
	Total	Allocative Efficiency	Terms of Trade	I-S Effect
Sim_1	15	-42	49	9
Sim_2	11	-8	19	-1
Sim_3	535	95	469	-30
Sim_4	591	51	563	-23
Sim_5	5	4	2	-0
Sim_6	589	56	557	-24
Sim_7	673	1336	-669	5
Sim_8	9	-1	10	0
Sim_9	6	1	5	0
Sim_10	2	-0	2	-0
Source: Our Results				

Table 7: Welfare Decomposition in Bangladesh (US\$ million)				
Simulation	Equivalent Variations (US\$ million)			
	Total	Allocative Efficiency	Terms of Trade	I-S Effect
Sim_1	-23	1	-22	-2
Sim_2	-9	-3	-6	-0
Sim_3	-36	-9	-26	-1
Sim_3	-69	-11	-55	-3
Sim_5	-7	6	-10	-3
Sim_6	-75	-4	-65	-6
Sim_7	17	5	12	-0
Sim_8	1	60	-49	-10
Sim_9	1	1	1	-0
Sim_10	-0	0	-0	-0
Source: Our Results				

Table 8: Welfare Decomposition in Pakistan (US\$ million)				
Simulation	Equivalent Variations (US\$ million)			
	Total	Allocative Efficiency	Terms of Trade	I-S Effect
Sim_1	-3	2	-5	-0
Sim_2	-3	-2	-0	-0
Sim_3	19	5	15	-1
Sim_4	24	7	18	-1
Sim_5	3	3	0	-0
Sim_6	28	10	19	-1
Sim_7	-2	-1	-1	-0
Sim_8	2	0	1	0
Sim_9	14	157	-139	-4
Sim_10	2	0	2	0

Source: Our Results

Table 9: Welfare Decomposition in Sri Lanka (US\$ million)				
Simulation	Equivalent Variations (US\$ million)			
	Total	Allocative Efficiency	Terms of Trade	I-S Effect
Sim_1	4	-0	4	0
Sim_2	-4	-1	-4	-0
Sim_3	46	-3	50	-1
Sim_4	44	-4	49	-1
Sim_5	4	-6	10	-0
Sim_6	47	-10	58	-1
Sim_7	4	0	4	0
Sim_8	0	-0	0	0
Sim_9	1	-0	2	0
Sim_10	-9	7	-16	0
Source: Our Results				

References

- Ackerman, Frank (2005), "The Shrinking Gains from Trade: A Critical Assessment of Doha Round Projections", *Working Paper No. 05-01*, Global Development and Environment Institute, Tufts University, Medford.
Agricultural Economics 25 (2-3), 321-335.
- Aksoy, M. Ataman (2005), "Global Agricultural Trade Policies", in M. Ataman Aksoy and John C. Beghin (eds.), *Global Agricultural Trade and Developing Countries*, Chapter 3, the World Bank.
- Anderson, Kym and Will Martin (2006), "Scenarios for Global Trade Reform", in Thomas Hertel and Will Martin (eds.), *Poverty and The WTO*, Chapter 2, New York: Palgrave Macmillan; Washington D.C: the World Bank.
- Anderson, Kym, Will Martin and Ernesto Valenzuela (2006), "The Relative Importance of Global Agricultural Subsidies and Market Access", World Bank. Forthcoming in *World Trade Review* 5(3), November 2006.
- Brown, D.K., A.V. Deardorff and R.M. Sterns (2002), "Computational Analysis of Multilateral Trade Liberalization in the Uruguay Round and Doha Development Round", *RSIE Discussion paper No. 489*, School of Public Policy, University of Michigan, Ann Arbor.
- Burfisher, Mary, E. (2003), "Options for Agricultural Policy Reform in the World Trade Organisation Negotiations", in Merlinda D. Ingco (ed.), *Agriculture, Trade and the WTO*, Washington D.C.: The World Bank.
- Chadha, Rajesh, Drusilla K. Brown, Alan V. Deardorff, and Robert M. Stern (2003). "Computational Analysis of the Impact on India of the Uruguay Round and the Doha Development Agenda Negotiations", in Aaditya Mattoo and Robert M. Stern (eds.), *India and the WTO*, Washington D.C.: Oxford University Press in collaboration with the World Bank.
- Diakosavvas, D. (2003) "The Uruguay Round Agreement on Agriculture in Practice: How Open are OECD Markets?", in Merlinda D. Ingco (ed.), *Agriculture, Trade and the WTO*. Washington D.C.: The World Bank.
- Dimaranan, Betina, Thomas Hertel and Roman Keeney (2004), "OECD Domestic Support and Developing Countries", in Basudev Guha-Khasnobis (ed.), *The WTO, Developing Countries and the Doha Development Agenda: Prospects and Challenges for Trade-Led Growth*, London: Palgrave-Macmillan.
- Francois, J., H. van Meijl and F. van Tongeren (2005), "Trade Liberalisation in the Doha Development Round", *Economic Policy*, 20(42): pp 340-391.
- Hanslow, Kevin (2000), "A General Welfare Decomposition for CGE Models", Conference Paper, *Third Annual Conference on Global Economic Analysis*, Melbourne, June 2000.
- Hertel, Thomas and Roman Keeney (2006), "What is at Stake: The Relative Importance of Import Barriers, Export Subsidies and Domestic Support", in Kym Anderson and Will Martin (eds.) *Agricultural Trade Reform and the Doha Development Agenda*, Chapter 2, New York: Palgrave Macmillan; Washington D C: the World Bank.

Jensen, Hans G. (2005), "Domestic Support: The European Union" in Dimaranan, Betina V. and McDougall, Robert A. (eds), *Global Trade, Assistance, and Production: The GTAP 6 Data Base Documentation*, Center for Global Trade Analysis, Purdue University, West Lafayette, Indiana, USA, July 2005.

Jha, Veena, Kailas Karthikeyan and Abhijit Das (2006), "Impact of Trade Liberalisation on Indian Agriculture", in Veena Jha (ed) *India and the Doha Work Programme: Opportunities and Challenges*, Chapter 2, New Delhi: UNCTAD and Macmillan India.

Keeney, Roman and Thomas Hertel (2005), "GTAP-AGR: A Framework for Assessing the Implications of Multilateral Changes in Agricultural Policies", GTAP Technical Paper No. 24. Purdue University, West Lafayette, IN.

Martin, W., and Alan L. Winters (1996), "The Uruguay Round: A Milestone for the Developing Countries", in Will Martin and Alan Winters (eds.), *The Uruguay Round and the Developing Countries*, Washington D.C.: The World Bank.

Messerlin, Patrick A. (2005), "Agriculture", Paper presented at "Perspectives on the WTO Doha Development Agenda Multilateral Trade Negotiations", Ann Arbor, Michigan *Global Economy Journal*, 5(4), Berkeley Electronic Press: <http://www.bepress.com/gej>

OECD (2004), "Agricultural Support: How is it Measured and What does it Mean?" OECD Observer, Paris.

OECD (2005), "Agricultural Policies in OECD Countries: Monitoring and Evaluation", OECD, Paris.

Panagariya, Arvind (2005), "Liberalizing Agriculture", *Foreign Affairs*, WTO Special Issue, December 2005.

Piermartini, Roberta and Robert The (2005), "Demystifying Modelling Methods for Trade Policy", Discussion Paper No. 10, Geneva, Switzerland, WTO

Rae, A. and A. Strutt (2003), "Doha Proposals for Domestic Support: Assessing the Priorities", paper presented at the *Annual meeting of the International Trade Research Consortium*.

Razzaque, Mohammad A., Selim Rehan and Nazneen Ahmed (2006), "Global Rice Trade Liberalisation: Implications for Some Alternative Scenarios", *9th Annual Conference on Global Economic Analysis*, Addis Ababa, Ethiopia.

Tangemann, Stefan (2005), "Is the Concept of the Producer Support Estimate in Need of Revision?", *OECD Food, Agriculture and Fisheries Working paper No. 1*, OECD, Paris.

Taylor, Lance and Rudiger von Arnim (2006), "Modelling the Impact of Trade Liberalisation: A Critique of CGE Models", *Report Prepared for OXFAM International*, New School for Social Research, New York.

Valenzuela, Ernesto, Kym Anderson and Thomas Hertel (2006), "Impacts of Trade Reform: Sensitivity of GTAP Results to Modelling Assumptions", *9th Annual Conference on Global Economic Analysis*, Addis Ababa, Ethiopia.

Walsh, Keith, Martina Brockmeier and Alan Mathews (2005), "Implications of Domestic Support for Further Agricultural Trade Liberalisation", *8th Annual Conference on Global Economic Analysis*, Lubeck, Germany.