



Centre for International
Economic Studies

**Discussion Paper
No. 0519**

**Distortions to world trade: impacts on
agricultural markets and farm incomes**

**Kym Anderson, Will Martin
and Dominique van der Mensbrugghe**

August 2005

WTO Program

**University of Adelaide
Adelaide 5005 Australia**

CENTRE FOR INTERNATIONAL ECONOMIC STUDIES

The Centre was established in 1989 by the Economics Department of the Adelaide University to strengthen teaching and research in the field of international economics and closely related disciplines. Its specific objectives are:

- to promote individual and group research by scholars within and outside the Adelaide University
- to strengthen undergraduate and post-graduate education in this field
- to provide shorter training programs in Australia and elsewhere
- to conduct seminars, workshops and conferences for academics and for the wider community
- to publish and promote research results
- to provide specialised consulting services
- to improve public understanding of international economic issues, especially among policy makers and shapers

Both theoretical and empirical, policy-oriented studies are emphasised, with a particular focus on developments within, or of relevance to, the Asia-Pacific region. The Centre's Director is Reza Y. Siregar (reza.siregar@adelaide.edu.au).

Further details and a list of publications are available from:

Executive Assistant
CIES
School of Economics
Adelaide University
SA 5005 AUSTRALIA
Telephone: (+61 8) 8303 5672
Facsimile: (+61 8) 8223 1460
Email: cies@adelaide.edu.au

Most publications can be downloaded from our Home page:
<http://www.adelaide.edu.au/cies/>

ISSN 1445-3746 series, electronic publication

CIES Discussion Paper 0519**Distortions to world trade: impacts on
agricultural markets and farm incomes**

Kym Anderson, Will Martin and Dominique van der Mensbrugge

World Bank
1818 H Street NW
Washington DC 20433
kanderson@worldbank.org
wmartin1@worldbank.org
dvandermensbrugg@worldbank.org

July 2005

This is a product of the World Bank's DfID-funded pair of projects on *Agricultural Trade Reform and the Doha Development Agenda* and on *Putting Development Back into the Doha Agenda: Poverty Impacts of a WTO Agreement*. Chapters for the two books to be published in late 2005 can be downloaded at www.worldbank.org/trade/wto. The authors are grateful for helpful comments from project participants and for funding from the UK's Department for

International Development. The views expressed are the authors' alone and not necessarily those of the World Bank, its Executive Directors or the countries they represent, nor the funder of the project.

Abstract

This paper provides estimates of the impact that removing all merchandise trade distortions (including agricultural subsidies) would have on food and agricultural production, trade and incomes. Using the latest versions of the GTAP database and the World Bank's LINKAGE model of the global economy (projected to 2015), our results suggest farm employment, the real value of agricultural output and exports, the real returns to farm land and unskilled labor, and real net farm incomes would all rise substantially in developing country regions with a move to free merchandise trade, thereby alleviating rural poverty – despite the decline in international terms of trade for developing countries that are net food importers or are enjoying preferential access to agricultural markets of high-income countries.

JEL codes: C68, D58, F17, Q17

Key words: Trade policy reform, computable general equilibrium modeling, agricultural markets, economic welfare

Contact author:

Kym Anderson
Development Research Group
The World Bank
Mailstop MC3-303
1818 H Street NW
Washington DC 20433 USA
Phone +1 202 473 3387
Fax +1 202 522 1159
kanderson@worldbank.org

Distortions to world trade: impacts on agricultural markets and farm incomes

To what extent are government trade and subsidy policies still distorting agricultural markets and farmers' incentives around the world? Nearly two decades ago a major World Bank study addressed that question for 18 developing countries (Krueger, Schiff and Valdes 1988), and found that farmers in those countries were discriminated against by their governments' policies, albeit less so directly than indirectly (via restrictions on imports of industrial products and overvalued exchange rates). Another study at that time focused on time series data for developed and newly industrializing countries, and found a tendency for national governments to gradually change from taxing to subsidizing agricultural relative to industrial production (and from subsidizing to taxing food consumers) in the course of their economic development, and at an earlier stage the weaker an economy's comparative advantage in agriculture (Anderson and Hayami 1986).

Meanwhile the OECD Secretariat has been estimating direct producer supports by its member governments, and finds that they all support their farmers and that the aggregate degree of support is high and has not fallen over the past fifteen years (Legg 2003, OECD 2005) – having risen substantially over earlier post-World War II decades when manufacturing protection began falling to what are now very low levels in those countries. That is, developing countries' policies of the past had caused international prices of farm products to be above what they otherwise would have been, while the policies of high-income countries had the opposite effect. A partial equilibrium attempt to measure the net effect of those policies in the 1980s suggests

they almost exactly offset each other in terms of their impact on international prices of temperate foods, while more than halving the volume of international food trade (Tyers and Anderson 1992, Table 6.9). Hence developing country farmers and agricultural production at that time were clearly discriminated against by the patterns of distortions across sectors and regions.

Since the 1980s, however, a number of major policy changes have occurred. Many developing countries have been reforming their trade and subsidy regimes unilaterally; innumerable preferential trading arrangements (some reciprocal, others non-reciprocal) have been signed and have led to sub-global or discriminatory trade liberalization that may or may not have improved global welfare; the Uruguay Round of multilateral trade negotiations, begun in 1986, came to a successful conclusion in 1994 and by end-2004 the agreed reforms were fully implemented; and the World Trade Organization (WTO) came into being to replace the GATT Secretariat on 1 January 1995 and since then its membership has grown by 20 to almost 150 customs territories, with new members (especially China) committing to significant reforms as the price of admission (Crawford and Fiorentino 2005; World Bank 2002, 2004, 2005; Drabek and Bacchetta 2004).

By the mid-1990s it appeared to one group of analysts that, for the sample of fifteen developing countries they examined, the problem of an anti-agricultural bias in those countries' trade and sectoral policies had all but disappeared (Jensen, Robinson and Tarp 2002). But what about in other developing countries? And are some developing countries overshooting and adopting the potentially equally wasteful agricultural protectionist stance of more-advanced economies?

To answer these questions requires extending the time series of estimates of distortions in the Krueger/Schiff/Valdes sample and extending the sample to a wider range of countries. That

is the focus of a new research project getting under way at the World Bank. But in the meantime it is possible to answer the question in the title of the present paper using a new database for 2001. Specifically, here we address the question: What would be the consequences for agricultural markets and farm incomes if all countries were to reduce their trade distortions simultaneously (as in an ambitious WTO round), as distinct from just reducing their own distortions?¹

That is, the aim of this paper is to make use of a new database and a global general equilibrium model to assess how agricultural markets and value added in agriculture would change if, over the next decade, the world were to remove all merchandise trade barriers and agricultural subsidies. While no-one anticipates such a radical reform, the analysis serves as a benchmark to suggest what is at stake in the WTO's current round of multilateral trade negotiations – as well as in further unilateral reforms. It can also give a better indication of agricultural comparative advantages around the world than is available by looking at indicators in the current distortion-ridden situation.

Specifically, we make use of the World Bank's recursive dynamic model of the global economy known as LINKAGE (van der Mensbrugghe 2004), which has formed the basis for the World Bank's standard decade-long projections of the global economy and of its earlier trade analysis (e.g., World Bank 2002, 2004). The distinction is made in our welfare results between effects of moving to free trade by developing countries versus by high-income countries, and in agriculture as compared with non-agricultural sectors. We also make use of the latest GTAP

¹ The Krueger, Schiff and Valdes (1988) and Jensen, Robinson and Tarp (2002) studies focused on effects of just own-country policies, the first using partial equilibrium and the second using national general equilibrium models. On the relationship between those two methodologies, see Bautista, Robinson, Wobst and Tarp (2001).

database (Version 6.05, see www.gtap.org) which has the virtue of including not only reciprocal but also non-reciprocal preferential tariffs, the latter providing low-income exporters duty-free access to protected high-income country markets. This allows us to take into account the fact that reform may cause a decline in the international terms of trade for those developing countries that are enjoying preferential access to agricultural markets of high-income countries (in addition to those that are net food importers because their comparative advantage is in other sectors such as labor-intensive manufacturing).

The paper begins with an examination of current distortions, the emphasis being mainly on import tariffs since they are later shown to be far more important than agricultural subsidies. This is followed by a description of the LINKAGE model of the global economy to be used to analyze the consequences of removing those distortions. The key results of the simulations are then presented. After discussing some qualifications, the paper concludes by highlighting the key messages and drawing out implications for developing countries in particular.

Key distortions in global markets

Border measures traditionally have been the main means by which governments distort prices in their domestic markets for products, with the price of tradables relative to nontradables affected by interventions in the market for foreign exchange, and the relative prices of the various tradables affected by trade taxes-cum-subsidies or quantitative trade restrictions. Multiple exchange rates have also altered relative prices among tradable products. Product-specific domestic producer or consumer subsidies have played a more limited role (because of their much greater cost to the treasury), with a few exceptions most notably in rich-country

agriculture. With the freeing up of most foreign exchange markets over the past two decades, the phasing out of most export taxes,² and the conversion of many non-tariff trade barriers into tariffs, the task of measuring the extent of distortions to goods markets is made much easier in that attention can focus on import tariffs and agricultural subsidies. In principle services trade and foreign investment distortions also could distort incentives in the agricultural and industrial sectors, but they are ignored here partly because much controversy still surrounds their measurement and how they should be modelled, and partly because they do not seem destined for major reform under the current Doha Development Agenda of multilateral trade reform by WTO members.

The latest release of the GTAP dataset, Release 6.05, includes estimates of bilateral tariffs and of domestic and export subsidies as of 2001 for 87 countries and country groups spanning the world. This is a substantial improvement over Version 5 of the GTAP dataset, which relates to 1997. The new protection data come from a joint CEPII (Paris)/ITC (Geneva) project. The product of this joint effort, known as MAcMaps, is a HS6 tariff level detailed database on bilateral protection that integrates trade preferences, specific and compound tariffs and a partial evaluation of non-tariff barriers such as tariff rate quotas (TRQs).³ The new GTAP database has lower tariffs than the previous database. This is because of the inclusion of bilateral trade preferences, as well as the major reforms between 1997 and 2001 such as continued implementation of the Uruguay Round agreements, and China's progress towards WTO

² Apparently only a few minor export taxes remain – see Piermartini (2004) and also Thiele (2004).

³ More information on the MAcMaps database is available in Bouët et al. (2004) and at <http://www.cepii.fr/anglaisgraph/bdd/macmap.htm>. For details of its incorporation into the GTAP Version 6 dataset, see www.gtap.org.

accession (which alone contributed to the ratio of global exports plus imports to GDP rising from 44 to 46 percent over those four years).

According to this dataset, the average import tariff for agriculture and food in 2001 was 16.0 percent for high-income countries and 17.7 percent for developing countries, while for manufactures other than textiles and clothing it was 8.3 percent for developing countries and just 1.3 percent for high-income countries (Table 1). The averages of course obscure large variations across countries and commodities, and are poor indicators of overall assistance to farming. For example, if high-income countries' tariffs on temperate farm products are at a near-prohibitive 100 percent, but zero on tropical products such as coffee, those countries' import-weighted average agricultural tariff could be quite low even though agricultural value added in those rich countries had been enhanced substantially. Consider also the case of a developing country with a strong agricultural comparative advantage in all but one small farming industry, and with high tariffs to stave off import competition for that industry and for all manufacturing industries. Overall agricultural value added would be depressed by that structure of protection, yet the import-weighted average tariff protection for agriculture would be high and possibly above that for manufactures. A third case is where the non-agricultural primary sector receives a similar level of import protection as the farm sector and less than the manufacturing sector, but is much more export-focused: trade reform may cause it to expand at the expense not only of manufacturing but also of farming. Hence it is not possible to say from the tariff data in Table 1 whether developing country policies have overshot in terms of moving away from an anti-agricultural bias, even though the ratio of agricultural to all goods tariffs in that table is well above unity for each of the regions shown. What is needed to address that issue is a general

equilibrium model to estimate the net effects of all sectors' distortions on agricultural markets and net farm income, to which we now turn.

The global LINKAGE model for assessing sectoral and welfare effects of trade distortions

The model used for this analysis is the World Bank's global dynamic computable general equilibrium (CGE) model, known as LINKAGE (van der Mensbrugghe 2004). It is a relatively straightforward CGE model but with some characteristics that distinguish it from standard comparative static models such as the GTAP model (described in Hertel 1997). A key difference is that it is recursive dynamic, so while it starts with 2001 as its base year it can be solved annually through to 2015. The dynamics are driven by exogenous population and labor supply growth, savings-driven capital accumulation, and labor-augmenting technological progress as assumed for the *Global Economic Prospects* report in World Bank (2005). In any given year, factor stocks are fixed. Producers minimize costs subject to constant returns to scale production technology, consumers maximize utility, and all markets – including for labor – are cleared with flexible prices. There are three types of production structures. Crop sectors reflect the substitution possibilities between extensive and intensive farming; livestock sectors reflect the substitution possibilities between pasture and intensive feeding; and all other sectors reflect standard capital/labor substitution (with two types of labor: skilled and unskilled). There is a single representative household per modeled region, allocating income to consumption using the extended linear expenditure system. Trade is modeled using a nested Armington structure in which aggregate import demand is the outcome of allocating domestic absorption between

domestic goods and aggregate imports, and then aggregate import demand is allocated across source countries to determine the bilateral trade flows.

There are several sources of protection in the model. The most important involves bilateral import tariffs. There are also bilateral export subsidies. Domestically, for numerous countries subsidies are important in agriculture, where they apply to intermediate goods, outputs, and payments to capital and land.

Three closure rules are used. First, government fiscal balances are fixed in any given year.⁴ The fiscal objective is met by changing the level of lump sum taxes on households. This implies that losses of tariff revenues are replaced by higher direct taxes on households. Second, the current account balance is fixed. Given that other external financial flows are fixed, this implies that ex ante changes to the trade balance are reflected in ex post changes to the real exchange rate. For example, if import tariffs are reduced, the propensity to import increases and additional imports are financed by increasing export revenues. The latter typically is achieved by a real exchange rate depreciation. Finally, investment is driven by savings. With fixed public and foreign saving, investment comes from changes in the savings behavior of households and from changes in the unit cost of investment. The latter can play an important role in a dynamic model if imported capital goods are taxed. Because the capital account is exogenous, rates of return across countries can differ over time and across simulations. The model only solves for relative prices, with the numéraire, or price anchor, being the export price index of manufactured exports

⁴ For the sake of simplicity they are fixed in US\$ terms at their base year level, minimizing potential sustainability problems; but this implies they decrease over time as a percentage of GDP for expanding economies.

from high-income countries. This price is fixed at unity in the base year and throughout the projection period to 2015.

The version of the LINKAGE model used for this study is based on the GTAP database and is solved with 27 regions and 25 sectors. There is a heavy emphasis on agriculture and food, comprising 13 of the 25 sectors, and a focus on the largest commodity exporters and importers.

Effects of current protection policies

The LINKAGE model provides a baseline projection of the world economy first to 2005 and then to 2015 assuming no other policy changes. Deviations from that baseline in 2015, due to total liberalization from 2005, are then examined. The first step requires a pre-simulation to bring the world as depicted in the GTAP dataset in 2001 up to the start of 2005. In terms of policy shocks, we include only key multilateral commitments in that pre-simulation, namely the final stages of Uruguay Round implementation including the phase-out of the Multifibre Arrangement (MFA), the accession of China and Taiwan to the WTO, and the eastern enlargement of the European Union from 15 to 25 members. The impacts of those three reforms are non-trivial: had they not been implemented, the dynamic gains in 2015 from freeing global merchandise trade would have been an extra \$64 billion per year. Nearly half of that difference is due to the removal of MFA quotas and hence should be considered part of the Uruguay Round's legacy. The effect of those reforms on tariffs can be seen by comparing the estimates at the start of 2005 in Table 2 with those for 2001 in Table 1.

The next step is to measure the prospective effects of removing all agricultural subsidies plus those tariffs summarized in Table 2 over the 2005-2010 period. This could be done for each

economy in turn, so as to assess the impact of own-country policies as in Jensen, Robinson and Tarp (2002). But since each country's policies are there to some extent because of other countries' policies, and are more likely to be reformed if other regions were to do so at the same time (as following a multilateral trade negotiation such as the Doha Agenda), a perhaps more-appropriate question is how each region's welfare, agricultural markets and farm incomes would change if all trade distortions were to be removed together. Our LINKAGE model's answer to that question is that it would lead to global gains by 2015 of \$287 billion per year. The distribution across regions of that economic welfare (or equivalent variation in income) gain, reported in Table 3, suggests two-thirds would accrue to high-income countries. However, as a share of national income, developing countries would gain more, with an average increase of 0.8 percent compared with 0.6 percent for high-income countries. The results vary widely across developing countries, ranging from little impact in the case of Bangladesh and Mexico to 4 or 5 percent increases in parts of East Asia.

The second column of numbers in Table 3 shows the amount of that welfare gain due to changes in the international terms of trade for each country. For developing countries as a group the terms of trade effect is negative, reducing somewhat the gains from improved efficiency of domestic resource use (especially in China and India). When the terms of trade effect is netted out, it generates the numbers in parentheses in the final column of Table 3 which can be interpreted as an indication of the relative degree of inter-sectoral distortion in each economy. By that indicator, developing countries are more than twice as wasteful of their resources as are high-income countries – and low-income countries are nearly three times as wasteful.

There are several ways to decompose the real income gains from full global trade reform so as to better understand the sources of the waste for each region. One way is to assess the

impacts of developing country liberalization versus industrial country liberalization in different economic sectors; another is to decompose by policy instrument. The latter gives results very similar to those reported in Hertel and Keeney (2005), who estimate that market access barriers explain 93 percent of the welfare effects of agricultural policies, with domestic support and export subsidy removal contributing only 5 and 2 percentage points, respectively.⁵

Our results when decomposed by sector are provided in Table 4. They suggest global liberalization of agriculture and food markets contributes 63 percent of the total global gains (similar to Hertel and Keeney's 66 per cent). This is consistent with the high tariffs in agriculture and food versus other sectors shown in Table 1, but is nonetheless remarkable given the low shares of agriculture in global GDP (4 percent) and global merchandise trade (9 percent). Seven-tenths of those gains are accounted for by the farm policies of high-income countries, and those policies also account for the majority of the overall gains from trade reform to high-income countries. Notice also that developing country gains from high-income country reform are only half as large from textiles as from agricultural policies.

The full liberalization results suggest little change in the high-income countries' shares of global output and exports of processed food, beverages and tobacco. Only for primary agriculture are the changes noticeable: the export share falls by more than one-quarter, from 53 to 38 percent (including intra-EU trade) – but the output share falls by only one-sixth, from 30 to 25 percent (Table 5). For developing countries, their share of global output of food and agricultural products increases 2 percentage points and their share of global exports of those goods rises 4 percentage points. In absolute terms, agricultural and food output in high-income

⁵ Hoekman, Ng and Olarreago (2004) reach a similar conclusion from estimating the effects of halving each of the three types of agricultural distortions, in their case using partial equilibrium analysis.

countries would decline but only by 0.1 percent per year over the projection period to 2015 following a move to free trade in all merchandise, instead of rising by 1.6 percent per year.

The impact of full trade reform on agricultural and food output and trade is shown for each country/region in Table 6, where it is clear that exports are enhanced much more than output. As a consequence, the global share of agricultural and food production exported rises, from 9.5 to 13.2 percent (or from 6.6 to 11.6 percent when intra-EU trade is excluded). The increase in exports of those goods from developing countries would be a huge \$191 billion per year more. Certainly Latin America accounts for a large part of that increase, but all regions' exports expand and even low-income countries would sell an extra \$36 billion worth of such goods per year (an increase of 52 percent). Also of interest is what happens to food imports: middle-income countries as a group would see them growing less rapidly than farm exports, while low-income countries' imports of those goods would grow only as fast as their exports of food and agricultural products, leaving their food and agricultural self sufficiency ratio unchanged. Even for high-income countries that ratio would fall only two percentage points, although it is concentrated in primary agricultural products where the fall is seven points. The opposite is true in Sub-Saharan Africa and Latin America, while for South Asia and China their agricultural self sufficiency levels would fall only one percentage point despite their expansion in exports of labor-intensive manufactures (Table 7).

Would freeing global merchandise trade lead to more trade gain for developing countries than for high-income countries, given the latter's high protection rates in agriculture and textiles? This question is pertinent for trade negotiators, who often think more in terms of the boost to the value of trade than to changes in economic welfare. Table 8 suggests any imbalance of that sort is not likely to be a major problem, even with complete trade liberalization. Certainly in those

two protected sectors exports would increase more for developing than for high-income countries, but for other manufactures the trade growth for the two regions would have the opposite bias. Also, much of the developing countries' trade growth is with other developing countries. Hence for merchandise trade as a whole, developing countries would sell an extra \$318 billion to high-income countries under free trade whereas high-income countries would sell an extra \$290 billion to developing countries. A small amount of services trade liberalization by developing countries would be sufficient to close that gap, if full reciprocity were sought.

How big would be the consequences of reform for farm output and employment growth over the implementation period post-2004? Table 9 shows what that annual growth to 2015 would be in the baseline (no policy changes post-2004) and what it would be if all distortions to merchandise trade were removed. If there were completely free trade, farm output would decline (instead of growing slightly) in just the EU and Japan while growing slower in a few other highly protective countries – but, for most countries/regions shown in Table 9, farming activities would expand. This contrasts with the rhetoric suggesting farm protection cuts would cause a major collapse of protected sectors.

The farm employment picture is somewhat different. Typically, economic growth leads to declines in not only the relative importance of agriculture (for reasons explained in Anderson 1987 and Martin and Warr 1993) but also in absolute numbers employed in farming once a country reaches middle-income status. Thus it is not surprising that numerous middle- and high-income countries are projected to lose farm jobs over the next decade in the baseline scenario of Table 9. For the most protected farm sectors, that rate of farm employment decline would more than double if the world were to move to completely free trade. For other economies, though,

farm employment would grow a little faster, allowing developing countries to absorb more workers on their farms.

Such reform also raises the share of agricultural and food production that is exported globally, from 9.5 percent in the baseline to 13.2 percent under free merchandise trade (Table 10). Even in the protected countries this ratio rises a little, because farm resources would move within the sector from import-competing to more-competitive farming activities.

The relatively small percentage changes in net national economic welfare hide the fact that redistributions of welfare among groups within each country following trade reform can be much larger. This is clear from the impacts on real rewards to labor, capital and land that are reported in Table 11. The results also strongly support the expectation from trade theory that returns to unskilled labor rise substantially in developing countries, and by more than wages of skilled workers, which in turn rise more than earnings from produced capital. That is, full reform would be likely to improve equity and reduce poverty in developing countries, given that the vast majority of their poor earn their income as unskilled laborers (including as farmers). For high-income countries, again consistent with standard trade theory, skilled workers gain more than unskilled workers. Those European and Northeast Asian farmers renting agricultural land would benefit from a large fall in farm rental costs, more or less offsetting the fall in prices for their output, while earnings of landowners in those countries would lose.⁶

Those changes in factor rewards assume labor is mobile between sectors. In the most densely populated developing countries full liberalization would encourage more farm workers to take up now-more-rewarding work in labor-intensive manufacturing and service activities, so

⁶ Their loss is relative to the no-reform baseline, which ignores the fact that such farm landowners have long enjoyed protection-inflated returns, in some cases for several decades.

value-added in agriculture would fall not only in economies where it has been highly protected (Europe, Northeast Asia and the US) but also in South Asia – whose trade policies have a slightly pro-agricultural bias according to the GTAP database, and which enjoys expanding market access abroad for those non-agricultural products in which the region has a strong comparative advantage.⁷ All other developing country regions would see a rise in net farm income though (as would the developed country Cairns Group members of Canada, Australia and New Zealand). That is true of China not only because it has already reduced much of its agricultural protection as part of its reforms associated with its accession to WTO at the end of 2001, but also because it faces extremely high tariff barriers in its export markets for farm products (Jen, Laborde and Martin 2005). And it is true in particular of the Sub-Saharan African region, even when southern Africa is separated out, despite the fact that there are numerous net food importing and preference-receiving exporting countries in that region (see Anderson, Martin and van der Mensbrugge (2005) for more details). Table 12 shows separately the contributions of high-income and developing countries' policy reforms to that outcome, from which it is clear that most of the effect comes from one or other of those reforms, with only a minor contribution to the residual from non-agricultural sectors. Those value added changes are due in considerable part to the changes in import and export prices for farm and other products, which are summarized in Table 13.

Of particular importance to Brazil and some Sub-Saharan African countries is the case of cotton, which is receiving special attention in the WTO's Doha Development Agenda following the Cancun Trade Ministerial in 2003 and the Dispute Settlement case that went against the US

⁷ The move to free trade would boost South Asia's ratio of production to consumption in textiles and clothing from 1.51 to 1.66, for example.

in 2004. Under full trade and subsidy liberalization, global cotton markets would change dramatically: the value of production would fall by one-third or more than \$5 billion per year in high-income countries (mostly in the US), and the value of their exports would fall by \$3.6 billion. The world totals would hardly change though, as developing country output and exports of cotton would expand by about the same amounts, with Sub-Saharan Africa (excluding South Africa) enjoying more of that gain than any other region (Table 14).

The bottom line, therefore, is that if all current distortions to world trade in merchandise were phased out over the rest of this decade then, according to the latest GTAP database and the Linkage model, by 2015 developing country agricultural production, employment and real net income would be greater than without such reform. And it would be greater in most regions within the developing country group, the exceptions being South Asia and Eastern Europe where import tariffs are higher for agricultural than non-agricultural goods. This does not *necessarily* mean that if each individual developing country were to unilaterally liberalize we would find farmers benefiting in all cases except in South Asia and Eastern Europe; but if we were to run those many individual model simulations we may well get that result also, since, as is apparent from Table 3, terms of trade effects of reforms by others are usually dominated by efficiency gains from own reforms except for the least-distorted economies.

Lessons, implications and areas for further research

The following are the key messages that emerge from our analysis:

- The potential gains from global trade reform are large, including for developing countries and especially when they participate in the reform, despite its adverse terms of trade impact on many developing countries;
- Agriculture is where the greatest gains from liberalization would occur;
- Liberalization would cause farm output and farm employment to be greater in developing countries relative to the baseline, except in South Asia;
- It is the poorest people that appear to be most likely to gain from global trade liberalization, namely farmers and unskilled laborers in developing countries; and, in particular,
- Net farm income would be enhanced in all developing country regions other than South Asia (where job growth would be greater in non-farm activities).

To realize that potential gain, it is in agriculture that by far the largest cuts in bound tariffs and subsidies are required. The political sensitivity of farm support programs, coupled with the complexities of the measures introduced in the Uruguay Round Agreement on Agriculture and of the modalities set out in the Doha Framework Agreement of July 2004, make that a daunting task. However, with global gains of the order of \$290 billion per year at stake from removing trade barriers, even if no reforms were forthcoming in services, and even if the counterfactual is the status quo rather than protectionist backsliding, the political will needs to be found to bring about such reform. The WTO's Doha Development Agenda is an obvious vehicle for moving down this path (Anderson and Martin 2005a, b). Multilateral cuts in tariff bindings are especially helpful because they can lock in previous unilateral trade liberalizations that otherwise would remain unbound and hence vulnerable to reversals to higher protection; and they can be used as an opportunity to multilateralize previously agreed preferential trade

agreements and thereby reduce the risk of trade diversion from those bilateral or regional arrangements. It remains to be seen whether the political will can be mustered to bring that Doha round to a successful conclusion.

The results concerning the extent of bias in trade policies against or in favor of agriculture are very much dependent on the levels of distortion in the GTAP database of course. Those for high-income countries are reasonably reliable, thanks in large part to the protection estimates provided by the OECD (2005 and earlier). Currently available estimates of (particularly agricultural) trade distortions and subsidies in developing countries are less reliable. Nor are many estimates provided in the GTAP database of export taxes or tax equivalents of quantitative restrictions and bans on exports. A new project at the World Bank is seeking to provide better estimates of that sort. Distortions to factor markets, particularly labor, may also have an important influence on the results for some countries if they were to be included in the model. More-challenging tasks would be to also provide estimates of distortions to services trade and foreign direct investment, so as to see what impact they also have on agricultural and other goods production and trade; and to estimate the poverty consequences of such reforms (building on pioneering empirical work in Hertel and Winters 2005).

References

- Anderson, K. (1987), 'On Why Agriculture Declines With Economic Growth', *Agricultural Economics* 1(3): 195-207, June.
- Anderson, K. and W. Martin (eds.) (2005a), *Agricultural Trade Reform and the Doha Development Agenda*, New York: Palgrave Macmillan, co-published with the World Bank (forthcoming).
- Anderson, K. and W. Martin (2005b), 'Agricultural Trade Reform and the Doha Development Agenda', *The World Economy* 28(9), September (forthcoming).
- Anderson, K., W. Martin and D. van der Mensbrugghe (2005), 'Would Multilateral Trade Reform Benefit Sub-Saharan Africa?' Policy Research Working Paper No. 3616, World Bank, Washington DC, June.
- Bautista, R.M., S. Robinson, P. Wobst and F. Tarp (2001), 'Policy Bias and Agriculture: Partial and General Equilibrium Measures', *Review of Development Economics* 5(1): 89-104, February.
- Bouët, A., Y. Decreux, L. Fontagné, S. Jean and D. Laborde (2004), 'A Consistent, *ad valorem* Equivalent Measure of Applied Protection Across the World: The MAcMap-HS6 Database', mimeo, CEPII, Paris, 20 December.
- Crawford, J.-A. and R.V. Fiorentino (2005), 'The Changing landscape of Regional Trade Agreements', Discussion paper No. 8, Geneva: World Trade Organization.
- Drabek, Z. and M. Bacchetta (2004), 'Tracing the Effects of WTO Accession on Policy-making in Sovereign States: Preliminary Lessons from the Recent Experience of Transition Countries', *The World Economy* 27: 1083-1125.

- Jean, S., D. Laborde and W. Martin (2005), 'Consequences of Alternative Formulas for Agricultural Tariff Cuts', Ch 4 in *Agricultural Trade Reform and the Doha Development Agenda*, edited by K. Anderson and W. Martin, New York: Palgrave Macmillan (forthcoming).
- Hertel, T. (ed.) (1997), *Global Trade Analysis: Modeling and Applications*, Cambridge and New York: Cambridge University Press.
- Hertel, T.W. and R. Keeney (2005), 'What's at Stake: The Relative Importance of Import Barriers, Export Subsidies and Domestic Support', Ch. 2 in *Agricultural Trade Reform and the Doha Development Agenda* edited by K. Anderson and W. Martin, New York: Palgrave Macmillan (forthcoming).
- Hertel, T.W. and L.A. Winters (eds.) (2005), *Putting Development Back Into the Doha Agenda: Poverty Impacts of a WTO Agreement*, New York: Palgrave Macmillan, co-published with the World Bank (forthcoming).
- Hoekman, B., F. Ng and M. Olarreaga (2004), 'Agricultural Tariffs versus Subsidies: What's More Important for Developing Countries?' *World Bank Economic Review* 18(2): 175-204.
- Jensen, H.T., S. Robinson and F. Tarp (2002), 'General Equilibrium Measures of Agricultural Policy Bias in Fifteen Developing Countries', TMD Discussion Paper No. 105, IFPRI, Washington DC, October.
- Krueger, A.O., M. Schiff and A. Valdes (1988), 'Agricultural Incentives in Developing Countries: Measuring the Effect of Sectoral and Economy-wide Policies', *World Bank Economic Review* 2(3): 255-72, September.

- Legg, W. (2003), 'Agricultural Subsidies: Measurement and Use in Policy Evaluation', *Journal of Agricultural Economics* 54(2): 175-200, July.
- Martin, W. and P.G. Warr (1993), 'Explaining the Relative Decline of Agriculture: A Supply-Side Analysis for Indonesia', *World Bank Economic Review* 7(3): 381-401, September.
- OECD (2005), *Agricultural Policies in OECD Countries: Monitoring and Evaluation 2005*, Paris: Organization for Economic Cooperation and Development.
- Piermartini, R. (2004), 'The Role of Export Taxes in the Field of Primary Commodities', WTO Discussion Paper No. 4, Geneva.
- Thiele, R. (2004), 'The Bias Against Agriculture in Sub-Saharan Africa: Has it Survived 20 Years of Structural Adjustment Programs?' *Quarterly Journal of International Agriculture* 42(1): 5-20.
- Tyers, R. and K. Anderson (1992), *Disarray in World Food Markets: A Quantitative Assessment*, Cambridge and New York: Cambridge University Press.
- van der Mensbrugghe, D. (2004), 'LINKAGE Technical Reference Document: Version 6.0', *mimeo*, The World Bank, Washington, DC. Accessable at <http://siteresources.worldbank.org/INTPROSPECTS/Resources/334934-1100792545130/LinkageTechNote.pdf>
- World Bank (2002), *Global Economic Prospects and the Developing Countries 2002: Making Trade Work for the Poor*, Washington DC: The World Bank.
- World Bank (2004), *Global Economic Prospects: Realizing the Development Promise of the Doha Agenda*, Washington DC: The World Bank.
- World Bank (2005), *Global Economic Prospects: Trade, Regionalism, and Development*, Washington DC: The World Bank.

Table 1: Import-weighted average applied tariffs, by sector and region, 2001
(percent)

Importing region:	Agriculture and processed food	Other primary products^a	Textiles and clothing	Other manufact- uring	ALL GOODS
High-income countries^b	16.0	1.0	7.5	1.3	2.9
Developing countries	17.7	6.5	17.0	8.3	9.9
<i>Middle-income countries</i>	16.5	4.6	16.8	7.3	8.9
<i>Low-income countries</i>	22.2	14.2	17.9	14.5	15.9
East Asia and Pacific	26.3		17.8	8.6	10.5
South Asia	33.9		20.1	22.2	23.5
Europe & Central Asia	14.8		10.7	4.1	6.0
Middle East & N. Africa	14.1		27.1	7.2	9.8
Sub-Saharan Africa	18.2		23.7	10.5	12.6
Latin America & the Carib.	10.3	5.1	11.3	7.1	7.7
World total	16.7		10.2	3.5	5.2

^a Forestry, fishing, fuels, minerals and non-ferrous metals.

^b Intra-EU15 trade is ignored in calculating weights for determining tariff averages.

Source: Authors' compilations from the GTAP database Version 6.05

Table 2: Import-weighted average applied tariffs, by sector and country, 2005
(percent)

Importing region:	Agriculture and processed food	<i>(Primary agriculture only)</i>	<i>(Processed food only)</i>	Textiles and clothing	Other manufacturing
World	15.2			9.3	3.1
<u>High-income</u>	15.9			7.3	1.2
Australia & NZ	2.6	0.3	3.3	13.9	4.1
EU25 + EFTA	13.9	13.2	14.7	5.1	1.7
United States	2.4	2.3	2.5	9.6	0.9
Canada	9.0	1.2	14.1	8.7	0.5
Japan	29.3	48.0	20.8	9.0	0.4
S. Korea & Taiwan	53.0	84.5	22.4	9.2	3.6
Hong Kong & Sing.	0.1	0.0	0.2	0.0	0.0
<u>Developing countries^b</u>	14.2			14.3	7.1
<i>Middle-income</i>	12.1			13.6	6.0
Argentina	7.1	5.6	7.8	11.1	10.1
Brazil	5.0	2.4	9.0	14.7	9.7
China	10.3	9.9	11.0	9.6	5.5
Mexico	10.3	10.8	9.7	7.8	4.3
Russia	13.5	14.6	12.8	15.8	7.8
South Africa	8.6	5.9	10.6	21.9	5.4
Thailand	16.7	12.7	19.2	16.4	7.6
Turkey	16.6	16.4	17.0	3.8	1.2
Rest of East Asia	13.4	18.6	9.0	8.7	3.5
Rest of LAC	10.8	9.2	11.8	12.9	8.4
Rest of ECA	15.7	10.4	19.5	9.3	3.2
M. East &N. Africa	13.1	8.2	18.3	23.9	7.2
<i>Low-income</i>	22.0			17.9	14.1
Bangladesh	12.7	7.4	21.2	29.9	16.2
India	49.9	25.7	75.6	26.5	24.2
Indonesia	5.0	4.3	6.2	8.0	4.3
Vietnam	37.1	13.1	44.8	29.1	12.3
Rest of South Asia	21.1	14.2	32.0	6.6	14.3
Selected SSAfrica ^a	11.8	10.2	13.0	12.5	7.5
Rest of SSAfrica	21.2	18.0	23.6	26.2	14.0
Rest of the World	11.8	1.9	18.7	5.6	8.9

^a The Selected Sub-Saharan African countries (for which national modules are available in the LINKAGE Model) include Botswana, Madagascar, Malawi, Mozambique, Tanzania, Uganda, Zambia, Zimbabwe.

^b Numbers in parentheses are the averages at the start of 2005 following WTO accession by China and end of MFA.

Source: Authors' projections from the GTAP database Version 6.05 using the World Bank's LINKAGE model

Table 3: Impacts on real income from full liberalization of global merchandise trade, by country/region, 2015

(relative to the baseline, in 2001 dollars and percent)

	Total real income gain p.a. (\$billion)	<i>Change in income due just to change in terms of trade (\$billion)</i>	<i>Gain due to improved efficiency of resource use net of terms of trade effect (\$billion)</i>	Total real gain as percentage of baseline income in 2015^a
Australia and New Zealand	6.1	3.5	2.6	1.0 (0.4)
EU 25 plus EFTA	65.2	0.5	64.7	0.6 (0.6)
United States	16.2	10.7	6.5	0.1 (0.0)
Canada	3.8	-0.3	4.1	0.4 (0.4)
Japan	54.6	7.5	47.1	1.1 (1.0)
Korea and Taiwan	44.6	0.4	44.2	3.5 (3.5)
Hong Kong and Singapore	11.2	7.9	3.3	2.6 (0.8)
Argentina	4.9	1.2	3.7	1.2 (0.9)
Bangladesh	0.1	-1.1	1.2	0.2 (2.4)
Brazil	9.9	4.6	5.3	1.5 (0.8)
China	5.6	-8.3	13.9	0.2 (0.5)
India	3.4	-9.4	12.8	0.4 (1.5)
Indonesia	1.9	0.2	1.7	0.7 (0.7)
Thailand	7.7	0.7	7.0	3.8 (3.4)
Vietnam	3.0	-0.2	3.2	5.2 (5.5)
Russia	2.7	-2.7	5.4	0.6 (1.2)
Mexico	3.6	-3.6	7.2	0.4 (0.8)
South Africa	1.3	0.0	1.3	0.9 (0.9)
Turkey	3.3	0.2	3.1	1.3 (1.2)
Rest of South Asia	1.0	-0.8	1.8	0.5 (0.9)
Rest of East Asia	5.3	-0.9	6.2	1.9 (2.2)
Rest of LAC	10.3	0.0	10.3	1.2 (1.2)
Rest of ECA	1.0	-1.6	2.6	0.3 (0.8)
Middle East and North Africa	14.0	-6.4	20.4	1.2 (1.7)
Selected SSA countries	1.0	0.5	0.5	1.5 (0.8)
Rest of Sub-Saharan Africa	2.5	-2.3	4.8	1.1 (2.2)
Rest of the World	3.4	0.1	3.3	1.5 (1.5)
High-income countries	201.6	30.3	171.3	0.6 (0.5)
Developing countries	85.7	-29.7	115.4	0.8 (1.1)
Middle-income countries	69.5	-16.7	86.2	0.8 (1.0)
Low-income countries	16.2	-12.9	29.1	0.8 (1.4)
East Asia and Pacific	23.5	-8.5	32.0	0.7 (1.0)
South Asia	4.5	-11.2	15.7	0.4 (1.4)
Europe and Central Asia	7.0	-4.0	11.0	0.7 (1.1)
Sub-Saharan Africa	4.8	-1.8	6.6	1.1 (1.5)
Latin America and the Caribbean	28.7	2.2	26.5	1.0 (0.9)
World total	287.3	0.6	286.7	0.7 (0.7)

^a Numbers in parentheses refer to that due to efficiency gains net of terms of trade effects.

Source: Authors' World Bank LINKAGE model simulations

Table 4: Regional and sectoral source of gains from full liberalization of global merchandise trade, developing and high-income countries, 2015

(relative to the baseline scenario)

	Gains by region in \$billion			Percent of regional gain		
	<i>Devel- oping</i>	<i>High- income</i>	<i>World</i>	<i>Devel- oping</i>	<i>High- income</i>	<i>World</i>
Developing countries liberalize:						
<i>Agriculture and food</i>	28	19	47	33	9	17
<i>Textiles and clothing</i>	9	14	23	10	7	8
<i>Other merchandise</i>	6	52	58	7	26	20
<i>All sectors</i>	43	85	128	50	42	45
High-income countries liberalize:						
<i>Agriculture and food</i>	26	109	135	30	54	47
<i>Textiles and clothing</i>	13	2	15	15	1	5
<i>Other merchandise</i>	4	5	9	5	2	3
<i>All sectors</i>	43	116	159	50	57	55
All countries liberalize:						
<i>Agriculture and food</i>	54	128	182	63	64	63
<i>Textiles and clothing</i>	22	16	38	25	8	14
<i>Other merchandise</i>	10	57	67	12	28	23
<i>All sectors</i>	86	201	287	100	100	100

^a Small interaction effects are distributed proportionately and numbers are rounded to sum to 100 percent

Source: Authors' World Bank LINKAGE model simulations

Table 5: Developing countries' shares of global output and exports, by sector, 2015

(percent)

	Primary agriculture	Processed food, beverages and tobacco	Textiles and clothing	Other manufacturing
Output				
— baseline	70	40	62	35
— free trade	75	40	65	35
Exports^a				
— baseline	47	34	63	30
— free trade	62	40	67	32

^a Including intra-EU trade*Source:* Authors' World Bank LINKAGE model simulations

Table 6: Impacts of full global trade liberalization on agricultural and food output and trade, by country/region, 2015

(relative to baseline)

	\$billion			Percent change relative to baseline		
	Exports	Imports	Output	Exports	Imports	Output
Australia and New Zealand	18.0	1.4	27.9	38.0	23.0	20.5
EU 25 plus EFTA	21.7	103.5	-185.8	-10.8	39.3	-12.3
United States	18.4	16.5	30.7	11.6	25.6	0.0
Canada	14.6	6.9	7.2	40.2	54.3	4.8
Japan	2.8	34.7	-91.7	60.4	169.7	-18.4
Korea and Taiwan	33.2	12.3	-0.4	600.2	189.8	20.2
Hong Kong and Singapore	7.0	1.5	7.4	115.2	7.6	35.4
Argentina	10.4	0.7	12.2	44.2	36.9	11.5
Bangladesh	0.8	0.4	-2.5	60.9	15.6	0.8
Brazil	38.0	2.8	66.4	120.6	48.4	34.0
China	15.1	24.1	-9.9	145.6	27.3	-0.9
India	5.1	13.4	-23.8	53.2	165.4	-3.7
Indonesia	3.6	1.9	4.5	32.2	23.5	2.4
Thailand	5.6	5.2	5.3	29.2	57.2	4.7
Vietnam	1.2	3.3	-2.1	13.9	170.4	-13.3
Russia	0.7	4.4	-7.8	15.4	22.3	-5.4
Mexico	11.9	6.7	6.2	66.0	52.9	2.2
South Africa	2.4	1.1	1.4	55.9	40.2	4.9
Turkey	4.3	4.3	-0.1	109.4	140.3	0.5
Rest of South Asia	2.9	3.7	-1.5	57.1	83.3	-1.8
Rest of East Asia	9.4	5.8	7.4	61.7	50.7	6.8
Rest of LAC	36.0	9.6	37.0	68.1	42.3	11.7
Rest of ECA	9.2	10.9	-22.2	106.0	90.5	-1.6
Middle East and North Africa	13.2	17.5	-7.8	64.1	43.1	-1.2
Selected SSA countries	4.5	1.3	5.3	50.0	74.4	9.2
Rest of Sub Saharan Africa	9.5	8.1	-4.1	45.4	79.2	-0.6
Rest of the World	8.2	5.8	2.9	168.3	123.3	4.4
High-income countries	115.8	176.7	-204.7	15.7	65.5	-5.3
Developing countries	191.9	131.0	66.8	67.4	51.5	2.2
Middle-income countries	156.1	93.1	88.2	72.7	41.9	3.2
Low-income countries	35.8	37.9	-21.4	52.3	99.3	-1.0
East Asia and Pacific	34.8	40.4	5.2	54.4	35.5	0.1
South Asia	8.9	17.5	-27.8	55.1	122.9	-3.0
Europe and Central Asia	14.2	19.6	-30.0	79.7	62.6	-1.9
Sub Saharan Africa	16.4	10.5	2.6	47.7	71.6	2.1
Latin America and the Caribbean	96.3	19.8	121.8	75.7	46.1	13.8
World total (excluding intra-European trade)	307.7	307.7	-137.8	36.3	59.8	-1.3

Source: Authors' World Bank LINKAGE model simulations

Table 7: Impact of global liberalization on self sufficiency^a in agricultural and other products, selected regions, 2015

	High-income countries		Developing countries		Sub-Saharan Africa		Latin America & Caribbean		South Asia		China	
	<i>Baseline</i>	<i>Global lib'n</i>	<i>Baseline</i>	<i>Global lib'n</i>	<i>Baseline</i>	<i>Global lib'n</i>	<i>Baseline</i>	<i>Global lib'n</i>	<i>Baseline</i>	<i>Global lib'n</i>	<i>Baseline</i>	<i>Global lib'n</i>
Rice	101	78	100	103	92	82	99	99	102	103	100	108
Wheat	160	140	91	94	55	39	92	127	99	98	92	93
Other grains	119	134	93	88	101	102	107	109	99	99	89	42
Oil seeds	135	79	90	106	158	278	188	249	100	102	3	3
Sugar	97	66	102	115	110	120	126	173	100	100	56	35
Plant-based fibers	121	84	96	103	389	698	95	107	89	92	94	96
Vegetables and fruits	89	80	103	105	139	144	147	185	97	91	98	98
Other crops	86	87	112	111	168	176	142	134	105	106	19	17
Livestock	104	104	98	98	103	103	103	102	99	99	96	95
Other natural resources	94	94	104	104	126	127	129	129	97	97	93	93
Fossil fuels	81	80	124	125	152	160	119	118	71	61	88	85
Processed meats	101	93	99	111	97	139	105	134	108	117	91	88
Vegetable oils and fats	98	91	102	108	89	76	113	107	77	34	96	91
Dairy products	104	103	90	94	78	79	95	96	97	98	66	61
Other food, beverages & tob.	98	101	102	99	102	96	108	108	112	110	99	98
Textiles	97	98	102	101	81	68	89	83	132	137	102	101
Wearing apparel	68	61	162	176	89	73	95	84	527	792	228	260
Leather products	60	56	139	144	92	66	110	92	173	191	158	167
Chemicals rubber & plastics	105	106	92	91	75	71	82	77	95	94	94	91
Iron and steel	101	101	99	98	106	107	102	95	98	95	94	93
Motor vehicles and parts	103	104	91	87	66	76	105	105	97	89	92	82
Capital goods	103	103	95	95	48	47	86	83	82	82	105	106
Other manufacturing	96	97	107	106	121	116	100	95	101	98	112	113
Agriculture and food	100	98	100	102	109	113	112	122	100	98	95	94
Agriculture	101	94	100	102	119	125	122	136	100	99	94	93
Processed foods	99	99	101	101	100	100	106	113	103	95	97	96
Textile and wearing apparel	79	76	118	121	84	69	95	85	151	166	128	132
Other manufacturing	99	100	101	100	98	98	96	92	92	89	102	102

^a Self sufficiency is defined as domestic production as a percentage of domestic consumption measured in value terms at fob prices.

Source: Authors' World Bank LINKAGE model simulations

Table 8: Changes in bilateral trade flows from full global liberalization ^a, 2015

(Difference in bilateral trade flows at FOB prices in 2015 compared to the baseline, \$billion)

	<i>Importer:</i>		
	<i>World</i>	<i>High-income countries</i>	<i>Developing countries</i>
<i>Exporter:</i>	Agriculture and food		
World	314	186	128
High-income	104	54	50
Developing	210	133	77
	Textiles and clothing		
World	164	79	85
High-income	47	8	40
Developing	117	71	46
	Other manufacturing		
World	595	227	368
High-income	312	112	200
Developing	284	114	168
	All merchandise trade		
World	1073	492	581
High-income	463	174	290
Developing	610	318	291

^a Aggregations exclude intra-EU trade

Source: Authors' World Bank LINKAGE model simulations

Table 9: Agricultural output and employment growth, baseline and full liberalization, 2005-2015

(annual percent growth rate between 2005 and 2015)

	Output growth		Employment growth	
	Baseline	Full global liberaliz'n	Baseline	Full global liberaliz'n
Australia & New Zealand	3.5	5.2	0.4	1.9
EU 25 plus EFTA	1.0	-1.5	-1.8	-3.9
United States	2.2	1.3	-0.8	-2.1
Canada	3.5	5.2	0.2	1.9
Japan	0.5	-4.3	-2.7	-6.5
Korea and Taiwan	2.2	0.1	-1.3	-3.9
Hong Kong and Singapore	2.8	3.3	0.0	0.2
Argentina	2.9	5.1	0.9	3.3
Bangladesh	4.2	4.4	1.1	1.2
Brazil	3.3	6.1	1.1	4.0
China	4.3	4.3	0.8	0.7
India	4.3	4.1	1.0	0.6
Indonesia	3.0	2.9	-0.7	-0.7
Thailand	-0.1	1.3	-4.6	-3.7
Vietnam	5.8	6.1	3.9	3.5
Russia	1.5	1.0	-2.3	-2.7
Mexico	3.9	4.1	2.0	2.3
South Africa	2.5	3.3	0.0	0.8
Turkey	3.0	2.6	-0.5	-1.2
Rest of South Asia	4.8	4.8	2.0	1.9
Rest of East Asia	3.7	3.5	0.2	-0.1
Rest of LAC	4.4	6.6	1.9	3.8
Rest of ECA	3.3	3.3	0.0	-0.1
Middle East & N. Africa	4.0	4.0	1.5	1.4
Selected SSA countries	5.3	5.7	3.0	3.3
Rest of Sub-Saharan Africa	4.6	4.8	2.2	2.5
Rest of the World	5.0	6.4	2.4	3.5
High-income countries	1.6	-0.1	-1.5	-3.1
Developing countries (WB)	3.9	4.2	1.0	1.2
Middle-income countries	3.7	4.1	0.4	0.3
Low-income countries	4.4	4.5	1.2	0.9
East Asia and Pacific	4.0	4.0	-0.5	-0.8
South Asia	4.4	4.2	1.5	1.4
Europe and Central Asia	3.0	2.9	2.3	2.6
Middle East and N. Africa	4.0	4.0	1.7	3.4
Sub-Saharan Africa	4.5	4.9	0.2	0.0
Latin America and Carib.	3.8	5.8	0.4	1.9
World total	3.2	2.9	-1.8	-3.9

Source: Authors' World Bank LINKAGE model simulations

Table 10: Share of agricultural and food production exported, 2001 and 2015

(percent)

	<i>Baseline</i> 2001	<i>Baseline</i>	<i>Full global liberaliz'n</i> 2015
Australia & New Zealand	33.3	37.2	42.7
EU 25 plus EFTA	16.7	17.3	17.6
EU 25 plus EFTA (excl. intra-EU25)	4.0	5.1	7.7
United States	6.3	7.9	9.2
Canada	24.5	29.5	40.0
Japan	0.9	1.2	2.3
Korea and Taiwan	4.4	4.8	26.5
Hong Kong and Singapore	26.0	30.0	47.8
Argentina	21.6	25.2	32.5
Bangladesh	1.7	3.6	5.7
Brazil	15.3	17.3	28.9
China	3.3	0.9	2.2
India	3.5	3.0	4.7
Indonesia	11.9	10.0	12.9
Thailand	30.2	28.2	34.6
Vietnam	23.9	26.9	35.3
Russia	6.1	5.5	6.7
Mexico	5.6	7.8	13.2
South Africa	16.0	12.7	18.8
Turkey	9.6	6.0	12.4
Rest of South Asia	6.0	6.2	9.9
Rest of East Asia	16.1	14.6	22.1
Rest of LAC	13.9	18.1	27.1
Rest of ECA	2.4	1.7	3.7
Middle East & N. Africa	5.2	6.7	11.2
Selected SSA countries	13.2	18.1	25.4
Rest of Sub-Saharan Africa	11.2	15.8	23.3
Rest of the World	6.6	7.0	17.7
High-income countries	5.8	7.5	11.6
Developing countries	7.5	6.9	11.6
Middle-income countries	7.6	6.6	11.4
Low-income countries	7.3	7.9	12.4
East Asia and Pacific	7.2	4.1	6.5
South Asia	3.8	3.6	5.7
Europe and Central Asia	3.7	2.7	5.0
Sub-Saharan Africa	12.5	15.8	23.1
Latin America & the Caribbean	12.7	15.9	24.8
World total	9.5	9.5	13.2
World total (excl. intra-EU25)	6.6	7.2	11.6

Source: Authors' World Bank LINKAGE model simulations

Table 11: Impacts of full global merchandise trade liberalization on real factor prices, 2015^a

(relative to the baseline in 2015, percent)

	Un- skilled wages	Skilled wages	Capital^b user cost	Land^b user cost	CPI
Australia and New Zealand	3.1	1.1	-0.3	17.4	1.2
EU 25 plus EFTA	0.0	1.3	0.7	-45.4	-1.3
United States	0.1	0.3	0.0	-11.0	-0.4
Canada	0.7	0.7	0.4	22.8	-0.9
Japan	1.3	2.2	1.1	-67.4	-0.1
Korea and Taiwan	6.5	7.1	3.8	-45.0	-0.7
Hong Kong and Singapore	3.2	1.6	0.3	4.4	1.1
Argentina	2.9	0.5	-0.7	21.3	0.3
Bangladesh	1.8	1.7	-0.2	1.8	-7.2
Brazil	2.7	1.4	1.6	32.4	2.2
China	2.2	2.2	2.8	-0.9	-0.4
India	2.8	4.6	1.8	-2.6	-6.0
Indonesia	3.3	1.5	0.9	1.0	0.5
Thailand	13.2	6.7	4.2	11.4	-0.6
Vietnam	25.3	17.6	11.0	6.8	-2.3
Russia	2.0	2.8	3.5	-2.2	-3.3
Mexico	2.0	1.6	0.5	2.8	-1.4
South Africa	2.8	2.5	1.8	5.7	-1.6
Turkey	1.3	3.4	1.1	-8.1	-0.3
Rest of South Asia	3.7	3.2	0.1	0.1	-2.7
Rest of East Asia	5.8	4.2	5.2	-0.9	-1.6
Rest of LAC	5.7	1.4	-0.4	17.8	-1.2
Rest of ECA	2.3	4.2	2.1	-0.3	-2.6
Middle East and North Africa	4.1	4.1	2.6	2.4	-3.1
Selected SSA countries	6.0	1.6	0.0	4.6	0.4
Rest of Sub-Saharan Africa	8.2	6.5	2.2	5.2	-5.0
Rest of the World	4.4	2.7	1.1	6.3	-1.4
High-income countries	0.6	1.1	0.5	-20.0	-0.6
Developing countries	3.5	3.0	1.9	0.9	-1.7
Middle-income countries	3.2	2.6	1.9	2.2	-1.1
Low-income countries	4.2	3.9	1.9	-1.0	-4.0
World total	1.2	1.5	0.8	-0.8	-0.8

^a Nominal factor prices deflated by the consumer price index (CPI).^b The user cost of capital and land represents the subsidy inclusive rental cost.*Source:* Authors' World Bank LINKAGE model simulations

Table 12: Effects of full liberalization of global agricultural and other merchandise trade on agricultural value added, by country/region, 2015

(relative to baseline, 2001 dollars and percent)

	\$billion			percent		
	<i>Developing agr & food</i>	<i>High-income agr&food</i>	<i>All goods</i>	<i>Developing Ag&food</i>	<i>High-income Ag&Food</i>	<i>All goods</i>
Australia and New Zealand	2.5	3.2	6.4	10.1	13.0	25.6
EU 25 plus EFTA	7.3	-42.0	-39.1	4.9	-28.3	-26.4
United States	5.1	-20.7	-18.2	4.2	-17.0	-15.0
Canada	2.0	1.4	3.4	13.3	9.6	23.3
Japan	0.2	-17.7	-17.7	0.4	-39.6	-39.5
Korea and Taiwan	0.5	-10.1	-9.5	1.7	-35.4	-33.3
Hong Kong and Singapore	0.1	0.1	0.1	3.6	5.0	7.5
Argentina	0.4	4.9	6.1	2.1	27.4	33.8
Bangladesh	-0.4	0.2	-0.5	-3.3	1.7	-4.4
Brazil	0.0	15.1	15.1	0.1	46.2	46.3
China	-16.3	13.3	0.3	-3.8	3.1	0.1
India	-17.3	2.9	-17.1	-8.2	1.4	-8.1
Indonesia	-0.1	1.0	0.8	-0.4	3.3	2.7
Thailand	1.1	3.1	3.8	7.2	20.4	25.0
Vietnam	0.9	0.3	0.8	14.5	5.7	13.6
Russia	-1.8	0.7	-1.4	-8.4	3.2	-6.5
Mexico	-3.8	7.9	0.9	-9.9	20.9	2.5
South Africa	0.1	0.4	0.5	1.3	7.8	9.6
Turkey	-2.9	0.9	-2.0	-10.3	3.0	-7.2
Rest of South Asia	-1.7	1.2	-0.6	-3.7	2.7	-1.3
Rest of East Asia	-1.4	1.2	-0.2	-5.5	4.6	-0.7
Rest of LAC	1.9	19.7	22.9	2.5	26.0	30.2
Rest of ECA	-2.1	1.4	-1.1	-3.3	2.3	-1.8
Middle East and North Africa	-4.8	6.2	0.3	-4.4	5.6	0.3
Selected SSA countries	0.4	1.1	1.5	2.7	6.5	9.1
Rest of Sub Saharan Africa	-0.7	3.0	2.3	-1.7	7.2	5.4
Rest of the World	0.7	2.5	3.1	3.4	13.2	16.4
High-income countries	17.6	-85.8	-74.6	4.6	-22.3	-19.4
Developing countries	-47.9	87.1	35.6	-3.9	7.0	2.9
Middle-income countries	-29.6	74.8	45.3	-3.4	8.7	5.3
Low-income countries	-18.2	12.3	-9.7	-4.8	3.2	-2.5
East Asia and Pacific	-15.8	18.9	5.5	-3.2	3.8	1.1
South Asia	-19.4	4.4	-18.1	-7.2	1.6	-6.8
Europe and Central Asia	-6.8	3.0	-4.5	-6.0	2.6	-4.0
Middle East and North Africa	-4.8	6.2	0.3	-4.4	5.6	0.3
Sub Saharan Africa	-0.2	4.5	4.3	-0.3	7.1	6.7
Latin America and the Caribbean	-1.4	47.7	45.0	-0.9	29.0	27.4
World total	-30.3	1.3	-39.0	-1.9	0.1	-2.4

Source: Authors' World Bank LINKAGE model simulations

Table 13: Impact of full liberalization of global merchandise trade on indexes of real export and import prices*(Change in export and import price in 2015 relative to baseline, percent)*

	Export prices		Import prices	
	<i>Ag & food</i>	<i>All merchandise</i>	<i>Ag & food</i>	<i>All merchandise</i>
Australia and New Zealand	4.5	2.2	2.0	0.1
EU 25 plus EFTA	1.0	-0.1	-0.1	-0.4
United States	10.1	0.5	1.5	-0.4
Canada	2.4	-0.3	3.4	-0.2
Japan	-5.0	0.9	1.6	0.0
Korea and Taiwan	-14.9	0.8	5.0	0.2
Hong Kong and Singapore	1.6	1.8	2.0	0.2
Argentina	2.8	2.9	3.3	0.3
Bangladesh	-6.5	-5.5	5.9	0.7
Brazil	6.0	3.0	2.6	-0.2
China	-0.2	-0.3	7.4	1.0
India	-3.5	-6.1	5.0	0.1
Indonesia	1.8	0.5	8.0	1.3
Thailand	2.5	-0.2	1.4	0.1
Vietnam	4.8	-0.8	3.7	0.3
Russia	-2.7	-1.9	4.8	0.2
Mexico	1.7	-1.5	8.3	0.3
South Africa	-0.6	-0.1	1.6	-0.3
Turkey	-0.5	-0.4	9.0	0.0
Rest of South Asia	0.2	-2.1	3.8	0.1
Rest of East Asia	0.3	-0.1	3.6	0.6
Rest of LAC	2.0	-0.3	3.5	0.1
Rest of ECA	-2.6	-2.5	1.8	-0.8
Middle East and North Africa	-1.0	-1.8	4.5	0.1
Selected SSA countries	2.6	1.4	1.5	-0.6
Rest of Sub Saharan Africa	-1.4	-3.1	3.7	-0.1
Rest of the World	0.1	-0.5	-0.8	-0.3
High-income countries	3.2	0.3	0.9	-0.3
Developing countries	1.2	-0.8	5.0	0.4
Middle-income countries	1.7	-0.6	5.2	0.4
Low-income countries	-0.1	-2.2	4.1	0.3
East Asia and Pacific	1.6	-0.2	6.2	0.8
South Asia	-2.7	-5.1	4.8	0.1
Europe and Central Asia	-2.2	-1.8	4.2	-0.3
Sub Saharan Africa	-0.4	-1.5	3.0	-0.2
Latin America and the Caribbean	3.1	0.0	4.8	0.1
World total (excluding intra-European trade)	3.9	0.1	3.1	0.0

Source: Authors' World Bank LINKAGE model simulations

Table 14: Impact of full global liberalization on output and exports of cotton, by region, 2015

(2001 \$ billion)

	Output	Exports^a
United States	-4.7	-3.5
EU 25 plus EFTA	-1.4	-1.0
Other high-income	1.0	0.9
Sub-Saharan Africa	2.2	1.9
Latin America	1.2	0.7
Other developing	1.8	1.6
World total	0.1	0.6

^a Including intra-EU trade*Source:* Authors' World Bank LINKAGE model simulations

CIES DISCUSSION PAPER SERIES

The CIES Discussion Paper series provides a means of circulating promptly papers of interest to the research and policy communities and written by staff and visitors associated with the Centre for International Economic Studies (CIES) at the Adelaide University. Its purpose is to stimulate discussion of issues of contemporary policy relevance among non-economists as well as economists. To that end the papers are non-technical in nature and more widely accessible than papers published in specialist academic journals and books. (Prior to April 1999 this was called the CIES Policy Discussion Paper series. Since then the former CIES Seminar Paper series has been merged with this series.)

Copies of CIES Policy Discussion Papers may be downloaded from our Web site at <http://www.adelaide.edu.au/cies/> or are available by contacting the Executive Assistant, CIES, School of Economics, Adelaide University, SA 5005 AUSTRALIA. Tel: (+61 8) 8303 5672, Fax: (+61 8) 8223 1460, Email: cies@adelaide.edu.au. Single copies are free on request; the cost to institutions is US\$5.00 overseas or A\$5.50 (incl. GST) in Australia each including postage and handling.

For a full list of CIES publications, visit our Web site at <http://www.adelaide.edu.au/cies/> or write, email or fax to the above address for our *List of Publications by CIES Researchers, 1989 to 1999* plus updates.

- 0519 Anderson, Kym, Martin, Will and van der Mensbrugge, Dominique, "Distortions to world trade: impacts on agricultural markets and farm incomes", August 2005
- 0518 Anderson, Kym, Martin, Will and van der Mensbrugge, Dominique, "Would Multilateral Trade Reform Benefit Sub-Saharan Africans?", August 2005
- 0517 Anderson, Kym and Martin, Will, "Agricultural Trade Reform and the Doha Development Agenda", August 2005
- 0516 Anderson, Kym, Martin, Will and van der Mensbrugge, Dominique, "Doha Merchandise Trade Reform: What's at Stake for Developing Countries?", August 2005
- 0515 Anderson, Kym, "On the Virtues of Multilateral Trade Negotiations", August 2005
- 0514 Anderson, Kym, "Interactions Between Trade Policies and GM Food Regulations", August 2005
- 0513 Anderson, Kym, "Setting the Trade Policy Agenda: What Roles for Economists?", August 2005
- 0512 Stein, Jerome L., "Optimal debt and equilibrium exchange rates in a Stochastic Environment: An Overview", July 2005
- 0511 Bayer, Ralph C. and Binenbaum, Eran, "The Hay and the Carrot: A Model of Corporate Sponsoring of Academic Research", July 2005
- 0510 Binenbaum, Eran, "Grants, Contracts, and the Division of Labor in Academic Research", July 2005
- 0509 Li, Jie and Rajan, Ramkishen S., "Can High Reserves Offset Weak Fundamentals? A Simple Model of Precautionary Demand for Reserves", June 2005
- 0508 Sugema, Iman, "The Determinants of Trade Balance and Adjustment to the Crisis in Indonesia", June 2005
- 0507 Ouyang, Alice Y. and Rajan, Ramkishen S., "Monetary Sterilization in China Since the 1990s: How Much and How Effective?", June 2005
- 0506 Sugema, Iman and Chowdhury, Anis, "Aid and Fiscal Behaviour in Indonesia: The Case of a lazy Government", May 2005

- 0505 Chowdhury, Anis and Sugema, Iman, "How Significant and Effective has Foreign Aid to Indonesia been?", May 2005
- 0504 Siregar, Reza Y. and Pontines, Victor, "Incidences of Speculative Attacks on Rupiah During The Pre- and Post-1997 Financial Crisis", May 2005
- 0503 Cavoli, Tony and Rajan, Ramkishen S., "Have Exchange Rate Regimes in Asia Become More Flexible Post Crisis? Re-visiting the evidence." January 2005
- 0502 Cavoli, Tony, "Sterilisation, Capital Mobility and Interest Rate Determination for East Asia" February 2005
- 0501 Marrewijk, Charles Van, "Basic Exchange Rate Theories" February 2005
- 0415 Griffiths, William and Webster, Elizabeth. "The Determinants of Research and Development and Intellectual Property Usage among Australian Companies, 1989 to 2002" December 2004
- 0414 Marrewijk, Charles Van and Koen G. Berden, "On the static and dynamic costs of trade restrictions" November 2004
- 0413 Anderson, Kym, Lee Ann Jackson and Chantal Pohl Nielsen "Genetically Modified Rice Adoption" November 2004
- 0412 Anderson, Kym, "The Challenge of Reducing Subsidies and Trade Barriers" November 2004
- 0411 Anderson, Kym and Lee Ann Jackson, "Standards, Trade and Protection: the case of GMOs", November 2004
- 0410 Anderson, Kym, Richard Damania and Lee Ann Jackson, "Trade, Standards, and the Political Economy of Genetically Modified Food", November 2004
- 0409 Anderson, Kym and Lee Ann Jackson, "Some Implications of GM Food Technology Policies for Sub-Saharan Africa", November 2004
- 0408 Anderson, Kym and Lee Ann Jackson, "GM Food Crop Technology and Trade Measures: Some economic Implications for Australia and New Zealand" November 2004
- 0407 Marrewijk, Charles Van, "An Introduction to International Money and Foreign Exchange Markets", October 2004
- 0406 Pontines, Victor and Reza Y. Siregar, "The Yen, The US dollar and The Speculative Attacks Against The Thailand Baht", October 2004
- 0405 Siregar, Reza and William E. James, "Designing an Integrated Financial Supervision Agency: Selected Lessons and Challenges for Indonesia", October 2004
- 0404 Pontines, Victor and Reza Y. Siregar, "Successful and Unsuccessful Attacks: Evaluating the Stability of the East Asian Currencies", August 2004
- 0403 Siregar, Reza and Ramkishen S. Rajan "Exchange Rate Policy and Reserve Management in Indonesia in the Context of East Asian Monetary Regionalism", August 2004
- 0402 Siregar, Reza "Interest Spreads and Mandatory Credit Allocations: Implications on Bank Loans to Small Businesses in Indonesia", January 2004.
- 0401 Cavoli, Tony., Ramkishen S. Rajan, and Reza Siregar "A Survey of Financial Integration in East Asia: How Far? How Much Further to Go?", January 2004.
- 0323 Rajan, Ramkishen., Reza Siregar and, Graham Bird "Examining the Case for Reserve Pooling in East Asia: Empirical Analysis", September 2003.
- 0322 Chantal Pohl Nielsen and Kym Anderson "Golden Rice and the Looming GMO Trade Debate: Implication for the Poor", July 2003.
- 0321 Anderson, Kym "How Can Agricultural Trade Reform Reduce Poverty?" July 2003.
- 0320 Damania, Richard and Erwin Bulte "Resources for Sale: Corruption, Democracy and the Natural Resource Curse", July 2003.