

# Comparing the effects of different approaches to liberalising world grains markets

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*The success of the current Doha Round of the WTO negotiations on agriculture will require substantial reform in each of the three areas of market access, export subsidies and domestic support. Substantial improvement in market access for agricultural products will be an essential requirement for achieving a successful outcome. However, the extent of improvement in market access resulting from the current negotiations will largely depend on the form and the approach followed to reduce tariffs and expand tariff rate quotas.*

*In this paper different approaches to expanding market access for grains area analysed using a partial equilibrium model. Simulated scenarios include linear reductions in applied tariffs and expansions in tariff rate quotas, which are contrasted with a scenario representing market access proposals of the Cairns Group of countries in the current WTO agricultural negotiations.*

*The effects of these two trade liberalisation scenarios on world prices and trade are analysed and discussed. Results indicate that to achieve a meaningful gain in market access for grains, WTO members must agree to either directly reduce the current applied tariffs or make large percentage reductions to the WTO bound rates, which lead to effective reductions in the current applied rates.*



## Introduction

The Uruguay Round Agreement on Agriculture was a significant step toward the liberalisation of trade in agricultural commodities. In that agreement WTO members made a commitment to provide improved market access through reductions to trade barriers, reduce subsidised exports and reduce the value domestic support.

Despite these commitments the degree of trade liberalisation resulting from the Uruguay Round was only modest. This means that the task of substantially advancing international agricultural policy reform lies ahead.

The current Doha round of the WTO agricultural negotiations provide an opportunity to achieve fundamental reform of distorting policies across agriculture, including in the grains sector. In this Doha round WTO members once again affirmed their commitment to engage in negotiations that will lead to, among other things, substantial improvement in market access.

To achieve this goal substantial expansion in tariff rate quotas and substantial reduction in tariffs that restrict trade are required. However, the extent of improvement in market access resulting from the current negotiations will largely depend on the form and the approach agreed to reduce tariffs and expand tariff rate quotas.

The aim in this paper is to give an overview of markets access barriers to trade in grains and to assess the effect of different approaches of market access liberalisation for grains on world grains markets. To achieve this two policy experiments are carried out using ABARE's Grains Model. In the first experiment, the size of all tariff rate quotas for grains, oilseed products and palm oil are doubled and all applied tariffs — including in-quota and above-quota tariffs — are reduced by 50 per cent. While in the second experiment the Cairns<sup>1</sup> Group proposal to improve market access in the current WTO agricultural negotiations is modeled.

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<sup>1</sup> Members of the Cairns Group are Argentina, Australia, Bolivia, Brazil, Canada, Chile, Colombia, Costa Rica, Guatemala, Indonesia, Malaysia, New Zealand, Paraguay, Philippines, South Africa, Thailand and Uruguay.

**Key findings**

- For tariff reductions to result in effective improvement in market access for grains it will be necessary to either agree to reduce the actual applied tariffs or to have large percentage cuts to bound tariffs to ensure reductions to applied tariffs.
- Substantial increase in quota volumes and/or substantial reductions in above-quota tariffs are required to ensure effective improved access in markets where tariff rate quotas restrict trade.
- As applied tariff rates for grains are much lower than bound tariff rates in many cases, a repeat of the Uruguay round approach of implementing average cuts of 36 per cent to bound tariffs, with a minimum cut of 15 per cent, will not be sufficient to achieve a reduction in applied tariff rates.
- Increased access to grains, oilseed products and palm oil has the potential to deliver net increases in the value of world trade and prices. Most of the potential gains from improvement in market access come from liberalising restrictive WTO bound tariff rate quotas in Japan, the European Union, Korea and China.

## An overview of global grain markets

The global grains market is characterised by:

- countries with large domestic markets that are also large producers;
- import dependent countries with medium sized domestic markets but little domestic production; and
- a small number of major exporters.

Countries with large domestic wheat markets that import only a small proportion of their domestic use include India<sup>1</sup>, Pakistan, China, the Russian Federation, Turkey and the Ukraine. These six countries are among the largest ten wheat markets in the world. However, all import less than 10 per cent of their domestic wheat requirements (table 1).

In the case of India, Pakistan, China and Turkey, high tariffs or nontariff barriers restrict imports. In cases like these, where trade barriers restrict imports to large markets, effective liberalisation of trade barriers has the potential to provide significant increases in market access globally and to increase world market prices.

There are also a number of countries with medium sized domestic markets that import virtually all of their domestic use. While these countries have moderate domestic markets, they make up some of the world's largest wheat importers. For example, the Republic of Korea, the Philippines, Indonesia, Japan, Algeria and Brazil all import over 80 per cent of their use. These countries are among the largest ten wheat importers globally.

The United States, the European Union, Canada, Australia and Argentina are the major world wheat exporters, while the United States dominates the global maize market (table 1). Of the main exporters, the United States and the European Union have been major users of export subsidies in the past, particularly for wheat.

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<sup>1</sup> In some years India is a net wheat exporter.

## 1 Wheat and maize: Global supply and disposal, 2000

*Ranked by consumption*

|                                  | <b>Production</b><br>kt | <b>Consumption</b><br>kt | <b>Imports</b><br>kt | <b>Exports</b><br>kt |
|----------------------------------|-------------------------|--------------------------|----------------------|----------------------|
| <b>Wheat</b>                     |                         |                          |                      |                      |
| China                            | 99 600                  | 115 500                  | 2 000                | 700                  |
| European Union                   | 104 150                 | 88 923                   | 3 300                | 14 300               |
| India                            | 75 754                  | 65 865                   | 100                  | 1 569                |
| Former Soviet Republics <b>a</b> | 64 385                  | 65 290                   | 5 570                | 4 550                |
| United States                    | 60 501                  | 36 170                   | 2 449                | 28 876               |
| Middle East <b>b</b>             | 13 085                  | 30 725                   | 16 760               | 550                  |
| Eastern Europe <b>c</b>          | 28 205                  | 30 627                   | 3 903                | 2 579                |
| Pakistan                         | 21 079                  | 20 500                   | 150                  | 200                  |
| North Africa <b>d</b>            | 3 586                   | 15 986                   | 11 000               | 220                  |
| Turkey                           | 15 037                  | 15 812                   | 2 776                | 2000                 |
| Egypt                            | 6 564                   | 12 500                   | 5 800                | 0                    |
| Brazil                           | 1 595                   | 9 900                    | 7 900                | 0                    |
| Canada                           | 26 804                  | 9 576                    | 20                   | 17 292               |
| ASEAN <b>e</b>                   | 0                       | 9 375                    | 9 750                | 375                  |
| Japan                            | 688                     | 6 077                    | 5 854                | 0                    |
| Argentina                        | 15 960                  | 5 849                    | 0                    | 11 086               |
| Mexico                           | 3 398                   | 5 634                    | 2 784                | 548                  |
| Australia                        | 22 190                  | 5 134                    | 0                    | 16 082               |
| Bangladesh                       | 1 840                   | 3 390                    | 1 200                | 0                    |
| Republic of Korea                | 5                       | 2 939                    | 2 721                | 0                    |
| Ethiopia                         | 1 900                   | 2 750                    | 850                  | 0                    |
| Republic of South Africa         | 2 317                   | 2 600                    | 600                  | 300                  |
| Other                            | 7 284                   | 22 103                   | 14 988               | 248                  |
| World                            | 575 928                 | 583 226                  | 100 475              | 100 475              |
| <b>Maize</b>                     |                         |                          |                      |                      |
| United States                    | 253 208                 | 196 605                  | 254                  | 54 613               |
| China                            | 105 000                 | 120 000                  | 150                  | 4 000                |
| European Union                   | 38 890                  | 40 808                   | 2 500                | 100                  |
| Brazil                           | 37 000                  | 35 400                   | 250                  | 150                  |
| Mexico                           | 18 500                  | 24 300                   | 5 800                | 15                   |
| ASEAN <b>e</b>                   | 16 765                  | 21 405                   | 4 605                | 150                  |
| Japan                            | 1                       | 16 050                   | 16 000               | 0                    |
| India                            | 12 000                  | 12 000                   | 400                  | 5                    |
| Egypt                            | 5 800                   | 10 300                   | 4 500                | 0                    |
| Canada                           | 6 800                   | 8 900                    | 1 600                | 100                  |
| Republic of Korea                | 85                      | 8 300                    | 8 000                | 0                    |
| South Africa                     | 8 500                   | 8 300                    | 50                   | 1 000                |
| Argentina                        | 15 000                  | 6 500                    | 15                   | 8 500                |
| Taiwan                           | 24                      | 5 200                    | 5 100                | 0                    |
| Turkey                           | 2 400                   | 3 600                    | 1 200                | 0                    |
| Colombia                         | 1 000                   | 3 000                    | 2 000                | 0                    |
| Other                            | 63 453                  | 83 793                   | 19 771               | 3 512                |
| World                            | 584 426                 | 604 461                  | 72 145               | 72 145               |

**a** Armenia, Azerbaijan, Belarus, Estonia, Georgia, Kazakstan, Kyrgystan, Latvia, Lithuania, Moldova, Russia, Tajikistan, Turkmenistan, Ukraine, Uzbekistan. **b** Bahrain, Cyprus, Iran, Iraq, Israel, Jordan, Kuwait, Lebanon, Oman, Saudi Arabia, Syria, United Arab Emirates, Yemen United. **c** Albania, Bulgaria, Czech Republic, Former Yugoslavia, Hungary, Poland, Romania, Slovakia. **d** Algeria, Libya, Morocco, Tunisia. **e** Indonesia, Malaysia, Philippines, Singapore, Thailand, Vietnam.

## Market access

The market access elements of the Uruguay Round Agreement on Agriculture focused on converting nontariff barriers to tariffs; reducing bound tariff rates; and ensuring the provision of at least minimum access opportunities and maintenance of current access levels, mainly through establishing tariff rate quotas (see box 1 for an explanation of key terms). For the current WTO agriculture negotiations to result in improved market access, the focus must be on the barriers that continue to constrain trade, particularly binding tariff rate quotas and high applied tariffs.

The market access arrangements that apply to grains tend to fall into one of two extremes — very restrictive or relatively open. This tends to be the case irrespective of whether the country applies tariff rate quotas or tariff only protection. A number of countries also maintain state purchasing arrangements, which act as nontariff barriers.

### Box 1: Key terms

**Applied tariff rate:** The actual tariff that is applied at a particular time.

**Bound tariff rate:** The maximum rate that a WTO member undertakes to apply. The bound rate provides a ceiling that applied tariff rates cannot exceed except by negotiation, with compensation to the affected trading partners.

**Tariff rate quota (tariff quota):** The use of a reduced tariff rate for a specified volume of imports, while imports beyond these volumes face a higher tariff rate.

**In-quota tariff:** The reduced tariff rate that applies for the specified quantities that enter within a tariff quota.

**Above-quota tariff:** The tariff rate that applies to quantities imported in excess of the tariff quota quantity.

**Minimum access:** Members were required to ensure minimum access opportunities equal to 3 per cent of base period (1986–88) consumption in 1995, rising to 5 per cent of base period consumption by 2000.

**Swiss formula:** A formula for tariff reduction, which places an upper bound on tariffs and reduces higher tariffs proportionately more than the lower tariffs. The formula is represented as follows:

$$\text{Final tariff} = (A * \text{initial tariff}) / (A + \text{initial tariff})$$

Where A is the upper bound on all tariffs.

## Tariff rate quotas

Most WTO member countries with tariff rate quotas for grains imported more than their scheduled quotas in 2000, often substantially more (table 2). For example, Brazil, one of the world's largest wheat importers, imported over ten times its wheat tariff quota, mainly duty free from Argentina. Most tariff rate quotas for grains have not been binding because applied tariffs (the tariffs that are actually used) have been substantially lower than the bound above-quota tariff rates negotiated under the WTO (table 2).

Also, imports are often subject to preferential tariffs that are lower than these general applied tariffs. For example, in 2000 wheat imports by Brazil, Colombia, Israel, Mexico, Morocco, Poland and Tunisia were influenced by at least one regional or bilateral trade agreement that provided market access to specific trading partners at reduced tariff rates, or duty free. The tariff rates set for grain from countries outside these trade agreements were typically lower than the bound above-quota tariff rates, but were usually high enough to constrain or prohibit imports from these other nations. For example, Mexico applies a prohibitive general tariff of 198 per cent to maize imports. However, under NAFTA, imports from Canada and the United States are subject to a 3 per cent tariff (table 2). Although maize imports from the United States are subject to a tariff quota, the quota has always been extended by waiving the above-quota tariff whenever consumption has approached the quota volume (Juarez 2001).

The extent of additional access beyond scheduled tariff quotas is significant relative to the size of world trade. For example, in 2000 the WTO tariff rate quotas for wheat totalled 13 million tonnes, while imports from countries with tariff rate quotas totalled 29 million tonnes. For maize, tariff rate quotas totalled almost 14 million tonnes, while imports from countries with tariff rate quotas totalled over 23 million tonnes (table 2). This additional access beyond scheduled tariff quota volumes represented about 15 per cent of world wheat trade and about 13 per cent of world maize trade in 2000.

In cases where the scheduled tariff rate quotas do not constrain grain imports, negotiating increased quota volumes or reduced above-quota tariffs is unlikely to increase access to these markets. Even doubling wheat tariff quotas would have no effect on imports by most of these countries. This contrasts with the situation with dairy products, reported in Shaw and Love (2001) where tariff quotas restrict trade in many countries.

While most countries that apply tariff rate quotas for grains provide relatively liberal access for grains, access to a number of other tariff rate quota markets is quite restricted. The European Union, Japan and Venezuela for wheat, and the European Union, India, Korea and possibly Poland for maize, apply very restrictive tariff rate quotas at their bound rates (table 2).

## 2 Tariff rate quotas for wheat and maize: 2000

|                         | TRQ Imports    |       | Bound tariffs |                  | Applied tariffs |                   | Regional Trade Agreement      |
|-------------------------|----------------|-------|---------------|------------------|-----------------|-------------------|-------------------------------|
|                         | Quantity<br>kt | kt    | In-quota<br>% | Above-quota<br>% | General<br>%    | Preferential<br>% |                               |
| <b>Wheat</b>            |                |       |               |                  |                 |                   |                               |
| Brazil                  | 750            | 7900  | 0.0           | 50.6             | 12.5            | 0.0               | Mercosur                      |
| Canada                  | 227            | 20    | 1.9           | 76.5             | 50.0            | 0.0               | NAFTA                         |
| Colombia                | 692            | 1100  | 124.0         | 130.0            | 17.0            | 13.2              | Andean Community              |
| European Union <b>a</b> | 350            | 3300  | 0.0           | 25.0             | na              | 0.0               | Central Europe                |
| Israel                  | 450            | 1600  | 92.0          | 137.8            | 50.0            | 0.0               | EU, US                        |
| Japan <b>b</b>          | 5740           | 5854  | 244.8         | 414.3            | 235.4           | N/A               |                               |
| Mexico                  | 605            | 2785  | 70.1          | 70.1             | 67.0            | 4.5               | NAFTA                         |
| Morocco                 | 1555           | 3300  | 144.0         | 198.4            | 55.0            | 2.5               | EU                            |
| Poland                  | 338            | 860   | 25.0          | 64.0             | 15.0            | 0.0               | EU                            |
| South Africa            | 104            | 600   | 19.0          | 93.0             | 26.0            | N/A               |                               |
| Tunisia                 | 900            | 1300  | 17.0          | 108.0            | 44.0            | na                | EU                            |
| Venezuela               | 1271           | 1400  | 24.0          | 122.8            | 53.0            | N/A               |                               |
| Total                   | 12982          | 28848 |               |                  |                 |                   |                               |
| <b>Maize</b>            |                |       |               |                  |                 |                   |                               |
| Colombia                | 34             | 1800  | 80.0          | 227.0            | 46.0            | N/A               |                               |
| Dominican Republic      | 703            | 1100  | 5.0           | 74.0             | na              | N/A               |                               |
| Ecuador                 | 18             | 300   | 25.0          | 47.0             | 15.0            |                   | Mercosur,<br>Andean Community |
| European Union          | 2500           | 2500  | 0.0           | 76.0             | na              | 0                 | Central Europe                |
| India                   | 350            | 400   | 15.0          | 50.0             |                 | N/A               |                               |
| Mexico                  | 2501           | 5327  | 50.0          | 203.3            | 198.0           | 3                 | NAFTA                         |
| Morocco                 | 204            | 750   | 122.0         | 137.4            | 17.5            | na                | EU                            |
| Philippines             | 178            | 600   | 35.0          | 65.0             | na              | N/A               |                               |
| Poland                  | 250            | 330   | 20.0          | 64.0             | 20.0            | na                | EU, Central Europe            |
| Republic of Korea       | 6102           | 8000  | 2.3           | 343.0            | na              | N/A               |                               |
| South Africa            | 221            | 50    | 11.0          | 56.0             | 12.4            | N/A               |                               |
| Thailand                | 54             | 200   | 20.0          | 81.6             | na              | N/A               |                               |
| Venezuela               | 624            | 1350  | 20.0          | 127.2            | na              | N/A               |                               |
| Total                   | 13685          | 23180 |               |                  |                 |                   |                               |

**a** Commitments are for the EU15, which incorporates commitments of Austria and Finland. The EU also provides access for 600 000 tonnes of wheat from countries of central Europe under preferential arrangements. **b** Bound tariff rates are the ad valorem equivalent of the maximum in-quota and above-quota mark ups that can be applied. The maximum in-quota markup is ¥46.5 per kilogram, while the maximum above-quota markup is ¥55 per kilogram. The applied mark up in 2000 was ¥30.8 per kilogram. **na** not available. N/A not applicable.

Sources: WTO (1994; 2000).

## Tariff only protection

A number of prominent grain markets have very high bound tariff rates. For example in 2000, India, Nigeria, Pakistan, Thailand and Turkey had bound tariffs of 100 per cent or more for wheat, while Nigeria, Pakistan and Turkey also had bound tariffs of 150 per cent or more for maize. A number of other markets had bound rates of over 50 per cent (table 3).

### 3 Ad valorem tariffs for wheat and maize: 2000

|                    | Bound | Applied |                  | Tariff equivalent <sup>a</sup> |
|--------------------|-------|---------|------------------|--------------------------------|
|                    | %     | General | Preferential     | %                              |
| <b>Wheat</b>       |       |         |                  |                                |
| Chile              | 32.9  | 9.0     |                  |                                |
| China <sup>b</sup> | na    | 142.0   |                  |                                |
| Ecuador            | 19.0  | 10.0    | 0                |                                |
| Egypt              | 5.0   | 1.0     |                  |                                |
| India              | 100.0 | 50.0    |                  |                                |
| Indonesia          | 28.2  | 0.0     |                  |                                |
| Malaysia           | 0.0   | 0.0     |                  |                                |
| Nigeria            | 150.0 | 23.0    |                  |                                |
| Pakistan           | 150.0 |         |                  | 45.7                           |
| Peru               | 83.6  | 25.0    |                  |                                |
| Philippines        | 38.0  | 3.0     |                  |                                |
| Republic of Korea  | 5.1   | 2.3     |                  |                                |
| Russia             | na    | 5.0     | 0.0 <sup>c</sup> |                                |
| Saudi Arabia       | na    |         |                  | 223.9                          |
| Sri Lanka          | 0.0   | 20.0    |                  |                                |
| Thailand           | 105.5 | 18.6    |                  |                                |
| Turkey             | 188.0 | 55.0    | 0.0 <sup>d</sup> |                                |
| <b>Maize</b>       |       |         |                  |                                |
| Brazil             | 47.8  | 10.5    | 0.0 <sup>e</sup> |                                |
| Chile              | 0.0   | 9.0     | 5.4 <sup>e</sup> |                                |
| China <sup>b</sup> | na    | 142.0   |                  |                                |
| Egypt              | 5.0   | 0.0     |                  |                                |
| Indonesia          | 52.0  | 0.0     |                  |                                |
| Israel             | 42.8  |         | 0.0 <sup>f</sup> |                                |
| Japan              | 50.0  | 50.0    |                  |                                |
| Malaysia           | 5.4   | 0.0     |                  |                                |
| Nigeria            | 150   | 70.0    |                  |                                |
| Pakistan           | 150.0 | 10.0    |                  | nc                             |
| Peru               | 97.2  | 25.0    |                  |                                |
| Russia             | na    | 5.0     | 0.0 <sup>c</sup> |                                |
| Turkey             | 188.0 | 50.0    | 0.0 <sup>d</sup> |                                |

<sup>a</sup> ad valorem tariff equivalent of nontariff barriers. <sup>b</sup> The general applied rates shown are for 1999. Details of the tariff quotas to apply with China's accession to the WTO are provided in table 4. <sup>c</sup> Kazakhstan, Belarus, Uzbekistan and Tajikistan. <sup>d</sup> European Union and Central Europe. <sup>e</sup> Mercosur. <sup>f</sup> United States and European Union. **na** not applicable. **nc** not calculated

Source: WTO (1994).

Like the situation with tariff rate quotas, however, countries with tariff only protection tend to apply tariffs that are much lower than the WTO bound tariffs rates. This maintains the opportunity for these countries to increase tariff protection to bound levels in the future. Very large cuts to bound tariffs will be necessary to reduce and potentially eliminate the scope to increase applied tariffs in the future.

While applied tariffs are often much lower than bound tariffs, they are still restrictive in a number of cases. Applied tariffs for wheat of between 18 and 25 per cent operate in Peru, Nigeria, Sri Lanka and Thailand, while India has an applied tariff of 50 per cent.

Wheat imports by countries with high import barriers have been very small, accounting for less than 5 per cent of world wheat trade in 2000. However, some of these countries, including China, India and Pakistan, have large domestic markets that account for 30 per cent of world wheat consumption.

Non-tariff barriers create very high implicit rates of protection against wheat imports in Saudi Arabia and Pakistan, and to a lesser extent in India. For example, state purchasing agencies regulate cereal trade in India and Pakistan, which includes licensing imports and subsidising exports depending on domestic production patterns.

For other countries such as Ecuador and Turkey, regional trade agreements provide lower preferential tariffs or duty free access to regional trading partners. While Turkey applies a tariff rate of 50–55 per cent to imports from non-EU sources, most of its grain imports come duty free from the European Union. Brazil, Chile, Canada, Israel, the Russian Federation and Turkey are signatories to regional trade agreements that result in lower tariffs or duty free maize imports. Russia, which is currently outside the WTO, provides preferential access to several former Soviet wheat producing nations.

Overall, since the tariff rate quotas for grains of many WTO members are not binding and their applied tariffs are substantially lower than their bound rates, it will be necessary to expand quotas and/or reduce tariffs by a large percentage to gain an increase in market access. Also, with the differences between bound and applied tariff rates it is evident that a repeat of the Uruguay Round approach of implementing average cuts of 36 per cent to bound tariffs, with a minimum cut of 15 per cent, will not be sufficient to achieve a reduction in the actual applied tariff rates for grains in many WTO members.

## Impacts of improved market access for grains

The ABARE Grains Model was used to simulate liberalisation of world grain, oilseed and oilseed product markets. This model is an enhanced version of the OECD AGLINK<sup>1</sup> model, adding trade policies for the OECD countries represented in the model, and import demand for an additional 45 countries (see appendix A). The model was calibrated to reproduce the actual conditions in world grain markets in the year 2000. Subsequent years are simulated to show the long term effect of supply response and other model dynamics relative to the year 2000.

Policy experiments were carried out for the year 2000. That year was chosen as it was the most recent year for which all relevant data, particularly applied tariff rates, were available. The historical data for 2000 provided a base against which trade liberalisation experiments were compared. The simulation results therefore reflect market conditions and settings in 2000, and should be interpreted as how grain markets would have looked in 2000 had markets been liberalised in that year. A prospective medium term baseline was not considered in this analysis. Simulating the effects of trade liberalisation in 2000 avoids disagreements over commodity market projections and the impact of policies and market shocks after 2000, such as the Argentinean crisis and the 2002 US farm bill.

Two policy experiments were carried out to simulate global trade liberalisation of wheat, coarse grain, oilseed products, and palm oil. In the first experiment trade liberalisation was modeled by doubling the tariff rate quotas and halving the tariff rates applied by WTO member countries in the year 2000. In the second experiment the market access element of the Cairns Group proposal, which calls for the expansion of tariff rate quotas and the use of a 'Swiss formula' to cut WTO bound tariffs, was modeled.

Although Russia is applying for WTO membership, it was assumed that Russia, along with other non-WTO members, such as Iran, Algeria and Saudi Arabia, will not be bound by an agreement on agricultural trade liberalisation resulting from the current WTO negotiations. Consequently, tariffs for all nonmembers were left unchanged. For China, post-accession tariff rate quotas and tariff schedules were used.

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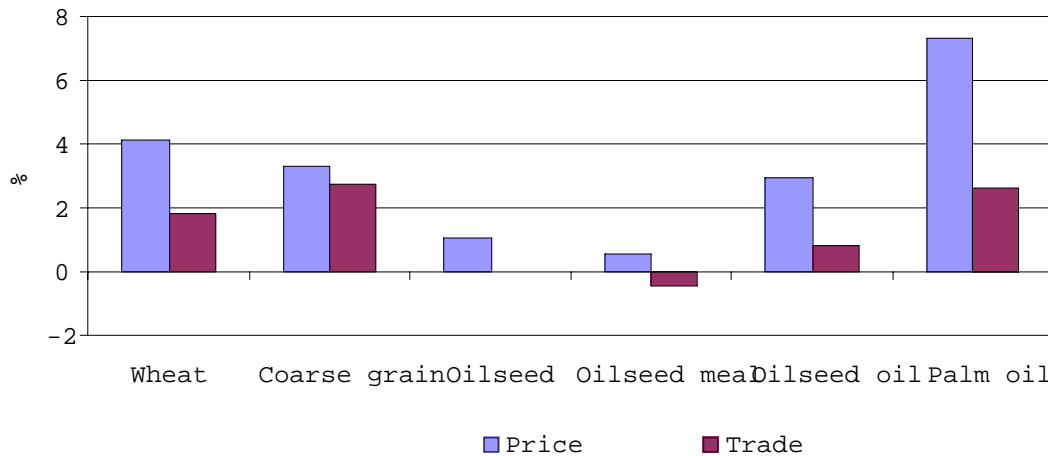
<sup>1</sup> See Conforti and Londero 2001.

**A. Doubling tariff rate quotas and halving applied tariffs**

In this first experiment, tariff rate quotas for all WTO members were doubled and all applied tariff rates were halved. Since the EU tariff quota for wheat of 350 000 tonnes was considerably smaller than the 3–5 per cent minimum market access levels agreed under the Uruguay Round, it was necessary first to establish the appropriate tariff quota for 2000 in order to examine the impacts of an effective expansion of tariff quotas. This required increasing the EU tariff quota for wheat in 2000 to 3.3 million tonnes (5 per cent of 1986–88 average wheat consumption in the EU15). Trade liberalisation in the European Union was then modeled by expanding this quota and reducing the in-quota and above-quota tariffs.

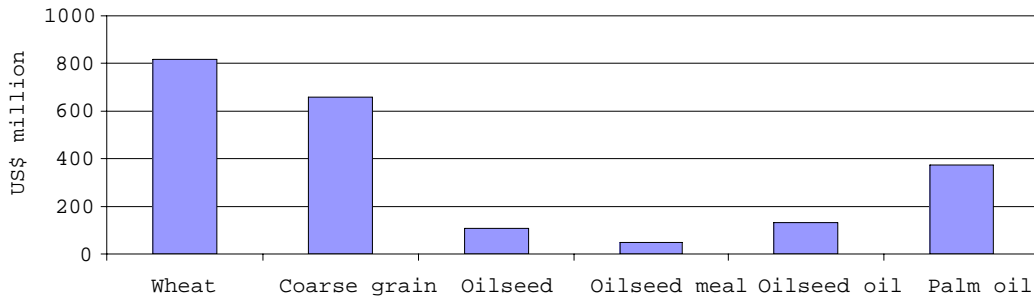
With the expansion of tariff quotas and reduction in tariffs, demand for grain, oilseed, oilseed oil and palm oil increased, and as a result world prices rose relative to the reference case without liberalisation. Increased world prices relative to their reference levels in 2000 are shown in figure A. These increases were modest because barriers to trade in grains were generally low, as discussed earlier, and import demand in many countries was relatively unresponsive to price changes.

**A Changes in the world prices and volume of trade in the first year following liberalisation, relative to the 2000 reference level.**



The volume of trade in all commodities, except for oilseed meal, increased modestly relative to the 2000 reference level (figure A). The combined effect of modest increases in price and volume was a considerable increase in the value of trade – around US\$810 million for wheat; US\$660 for coarse grains and US\$375 million for palm oil (figure B).

**B Change in value of world trade, in the second year following liberalisation, relative to the 2000 reference level**



The increase in the value of world trade was mostly due to increased access to European Union, Chinese, Japanese and Korean markets. These countries all had restrictive WTO tariff rate quotas and/or high tariffs for grain and/or oils. In addition, these countries also applied these bound rates in 2000. In markets that were highly protected by tariff rate quotas or tariffs, increased market access caused import prices (world price plus the tariff) to fall, and imports and consumption to increase relative to the 2000 reference level. The increased global demand for cereals, oilseed oil and palm oil led to increased world prices for these commodities.

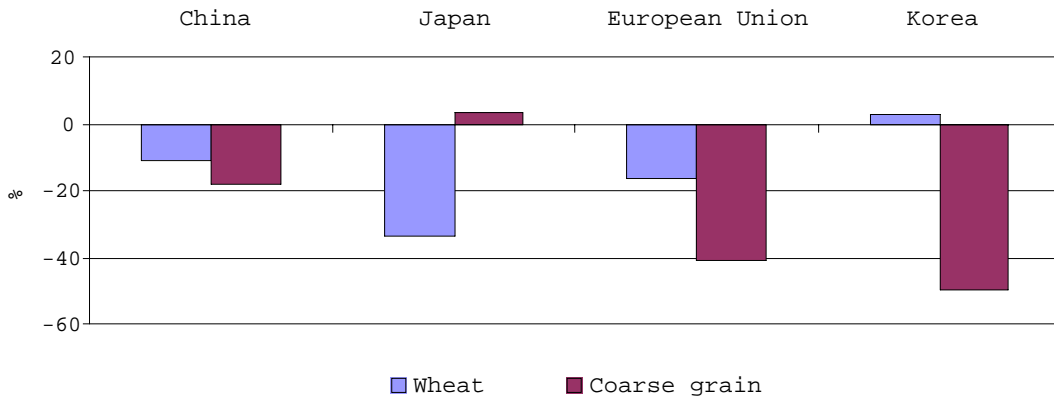
In markets that were less protected, such as Egypt and Brazil, tariff reductions were not sufficient to outweigh increased world prices, resulting in increased import prices and reduced imports. Non-WTO members such as Russian Federation, Iran and Algeria faced higher import prices for all commodities, as their tariffs were not reduced, and consequently their imports fell.

Countries that export grain or oilseed products increased their exports in response to increased world prices relative to the 2000 reference level, except in the case of oilseed meal. With minimal production response in the short term, increased exports in the first year following liberalisation occurred mainly as a result of reduced consumption and stocks in exporting countries. Increased production due to higher world prices contributed to greater increases in exports in following years.

***Wheat and coarse grain***

For wheat, the increase in trade was mainly due to an expansion of quotas in the European Union, Japan and China, which caused import prices to fall relative to the 2000 reference level (figure C). Lower import prices caused imports of wheat to increase by 1.1 million tonnes (33 per cent) in the European Union, by 1.3 million tonnes (22 per cent) in Japan, and by 439 000 tonnes (22 per cent) in China (figure D).

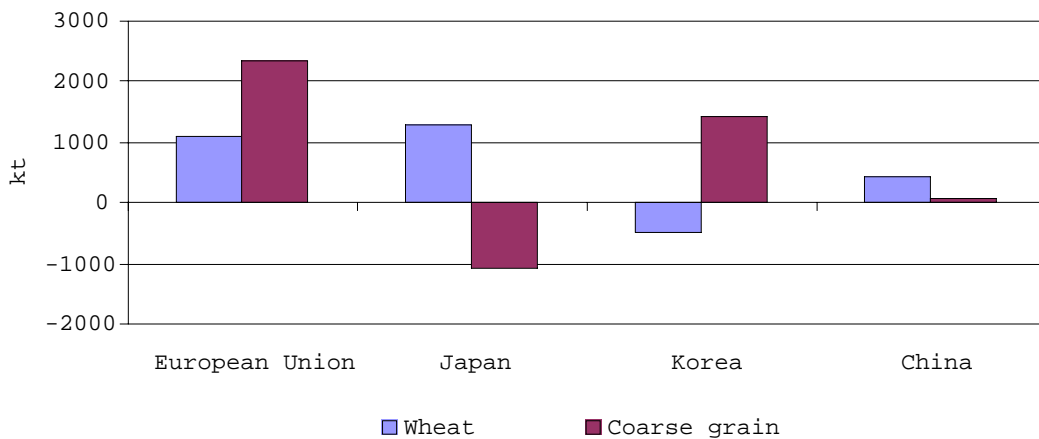
**C Wheat and coarse grain import prices, in the first year following liberalisation, relative to the 2000 reference level**



For coarse grain, increased demand was mainly the result of an expansion in the European Union and Korean quotas, resulting in lower import prices relative to the reference case (figure C). European Union imports of coarse grain increased by 2.3 million tonnes (82 per cent), while Korean imports increased by 1.4 million tonnes (13 per cent) (figure D).

Changing price relativities in the Korean market following trade liberalisation resulted in a substitution away from the feed use of wheat. The dramatic fall in the coarse grain import price following liberalisation contrasts with the slight increase in the wheat import price (figure C). The increase in Korean wheat import price occurs because the increase in the world price outweighs the effect of the cut to the import tariff of 3 per cent. Consequently, coarse grain imports increased while wheat imports, mainly feed wheat, fell by 500 000 tonnes (figure D).

**D Wheat and coarse grain imports, in the first year following liberalisation, relative to the 2000 reference level**

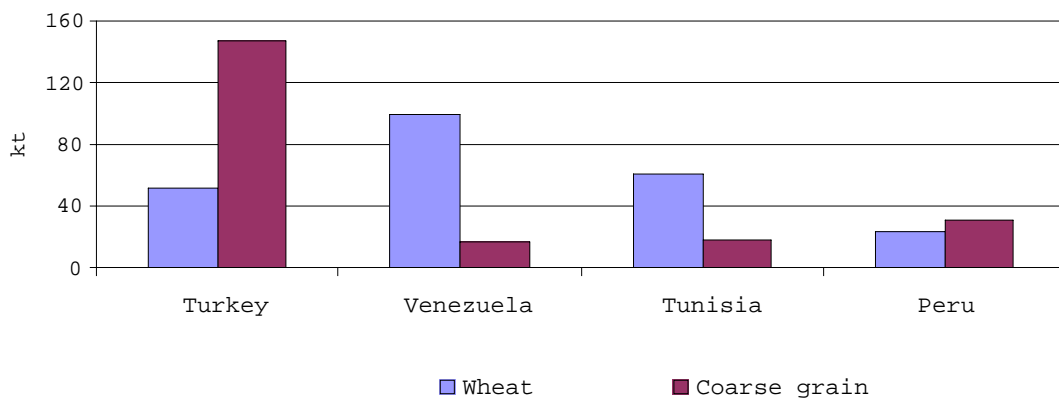


In contrast a combination of higher import price for coarse grain and lower import price for wheat in Japan caused coarse grain imports to fall and those of wheat to rise. Since Japan imposed no tariff on maize used for feed, an increase in the world price of coarse grain due to liberalisation caused the import price in Japan to increase by 3.3 per cent relative to the reference case (figure C). As a result, imports of coarse grain fell by 1.1 million tonnes and imports of feed wheat increased by around 840 000 tonnes (figure D).

Although import prices for wheat and coarse grain fell significantly in the European Union and China, their domestic prices fell by less than half a per cent, indicating that the effect of increased market access on domestic producers is minimal. This is because imports form a small proportion of total wheat and coarse grain consumption in the European Union and China. The fall in import prices was not large enough to fill the expanded quotas in the European Union, Korea and China, because demand for imports was not sufficiently responsive to price changes.

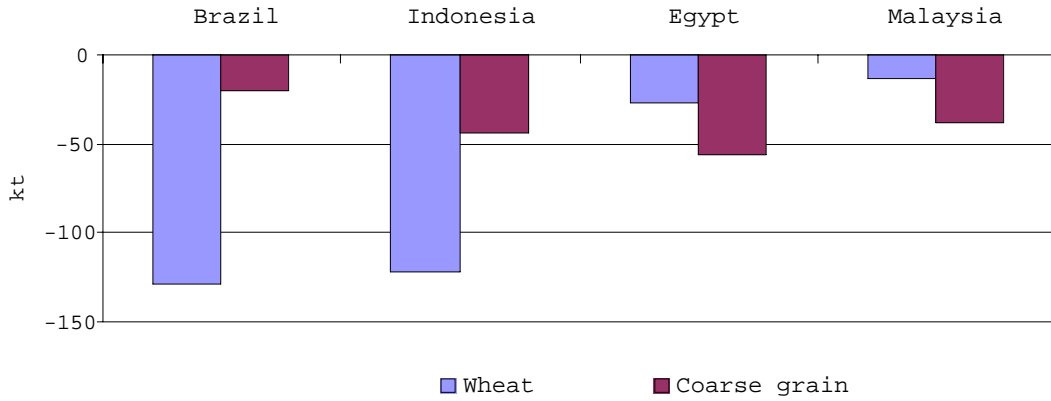
Trade liberalisation increased wheat and coarse grain imports relative to the reference case in many smaller WTO members with restrictive quotas or relatively high tariffs, such as Turkey, Venezuela, Tunisia, and Peru (figure E). Expanded quotas and reduced tariffs caused import prices in these countries to fall by more than the overall increase in world prices.

**E Wheat and coarse grain imports, in the first year following liberalisation, relative to the 2000 reference level**



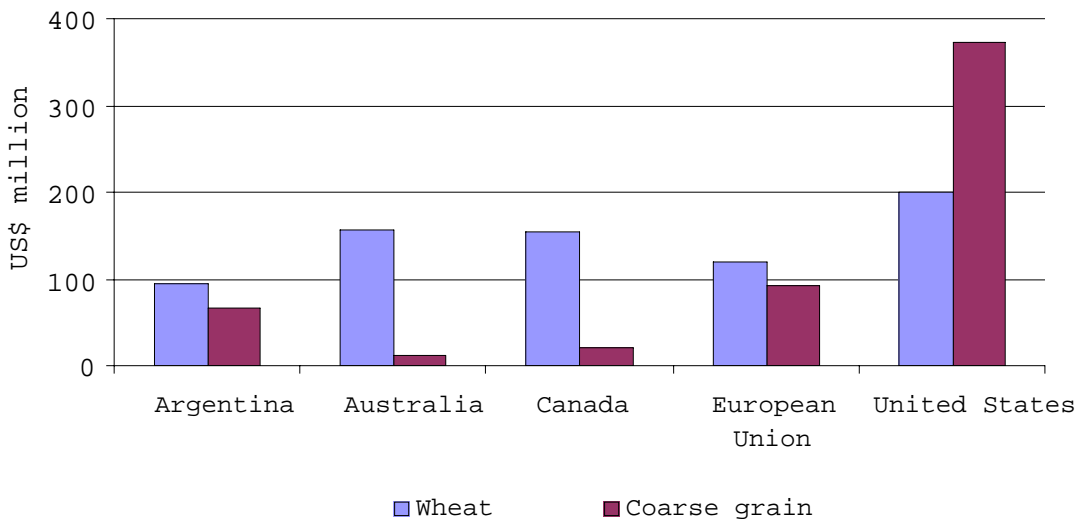
In WTO members with low trade barriers, such as Brazil, Indonesia, Egypt, and Malaysia, increased world prices following trade liberalisation outweighed the effect of lower tariffs on import prices. Consequently their import prices for wheat and coarse grain rose, and their imports fell relative to the 2000 reference level (figure F). For all non-WTO countries such as Russia, Iran and Algeria, some of whom import large quantities of grain, higher world prices reduced their wheat and coarse grain imports.

**F** Wheat and coarse grain imports, in the first year following liberalisation, relative to the 2000 reference level



Exports from the United States, Canada, the European Union and Argentina met most of the increased demand for wheat and coarse grain in the first year following liberalisation, coming mainly from stocks, as production takes some time to respond. In subsequent years production increased in response to higher prices, substantially increasing the value of exports from these nations (figure G). The value of Australian wheat exports increased by over US\$150 million.

**G** Change in value of world wheat and coarse grain exports in the second year following liberalisation, relative to the 2000 reference level



In the United States, the marketing loan effectively blocked the benefits of trade liberalisation from reaching grain producers. Internal producer prices in the United States remained below the administratively set marketing loan rate, resulting in a marketing loan payment to producers. Increased producer prices in the United States

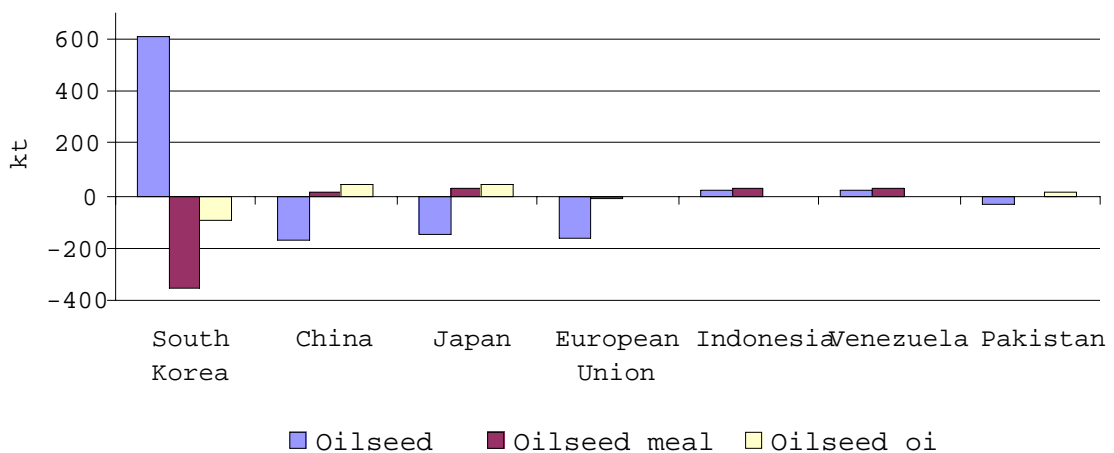
reduced marketing loan payments without increasing producer returns, and consequently US grain production remained largely unchanged. The marketing loan will continue to block actual price signals as long as the loan rate exceeds internal prices. US production decisions will be made in response to the high loan rate, resulting in excess production. Furthermore, the lack of US production response to low world prices will transfer the adjustment burden to other grain producing countries.

***Oilseeds and oilseed products***

Many WTO members had relatively low protection against imports of oilseed and oilseed products in 2000 compared to wheat or coarse grain. There were very few tariff rate quotas or high tariffs for oilseeds and oilseed products, with the exception of Korea. Where they exist, as in China, they are generally applied to oilseed oil. Low tariffs meant that liberalisation resulted in only slightly lower import prices of oilseeds and meal in most WTO member countries, with only small increases in import demand and world prices relative to the reference case. World oilseed meal prices also increased because of lower exports, as livestock producers in major exporting nations substituted toward oilseed meal away from wheat and coarse grain.

Korea had a very restrictive tariff rate quota for soybean, and liberalisation resulted in a large fall in the import price and an increase in demand for imports. Increased market access caused the import price of oilseeds in Korea to fall by 83 per cent, and imports to increase by 608 000 tonnes (43 per cent) relative to the 2000 reference level. In most other WTO countries, changes in oilseed imports following liberalisation were small (figure H).

**H** Changes in the imports of oilseeds and oilseed products in the first year following liberalisation, relative to the 2000 reference level

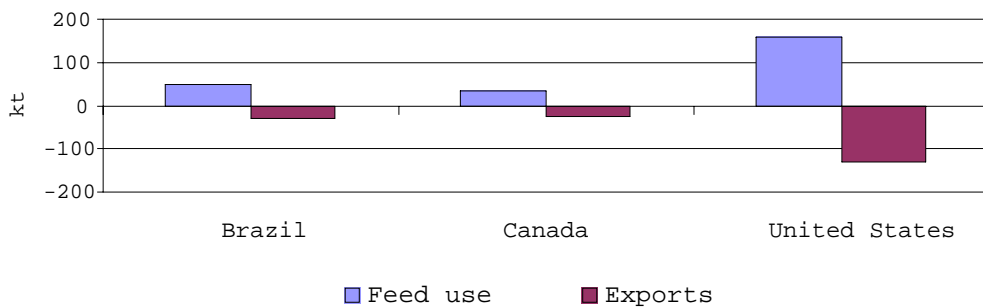


In most countries, oilseeds are crushed to produce meal and oil, and changes in oilseed imports result from changes in the price of seed relative to the price of meal and oil. For most countries oilseeds prices rose relative to meal and oil prices, causing oilseeds imports and crush to fall in favor of meal and oil imports. The largest falls in oilseeds imports following liberalisation occurred in the European Union, Japan, and China, which reduced their imports by 167 000, 148 000, and 174 000 tonnes respectively (figure H). Oilseeds imports into Korea, Indonesia and Venezuela increased relative to the 2000 reference level because the price of meal and oil rose more relative to the price of oilseed.

World oilseeds production fell following liberalisation as a result of major producers shifting resources to wheat and coarse grain, as world wheat and coarse grain prices increased more than the increase in world oilseeds price.

Reduced oilseed meal exports mainly from Brazil, Canada and the United States caused the world meal price to increase relative to the 2000 reference level (figure I). Brazil, Canada and the United States increased feed use of oilseed meal and reduced the use of feed wheat and coarse grains because the world prices of wheat and coarse grains increased more than the world price of oilseed meal. Increased domestic feed use of oilseed meal reduced the amount available for export.

**I Change in feed use and exports of oilseed meal in the first year following liberalisation, relative to the 2000 reference level**



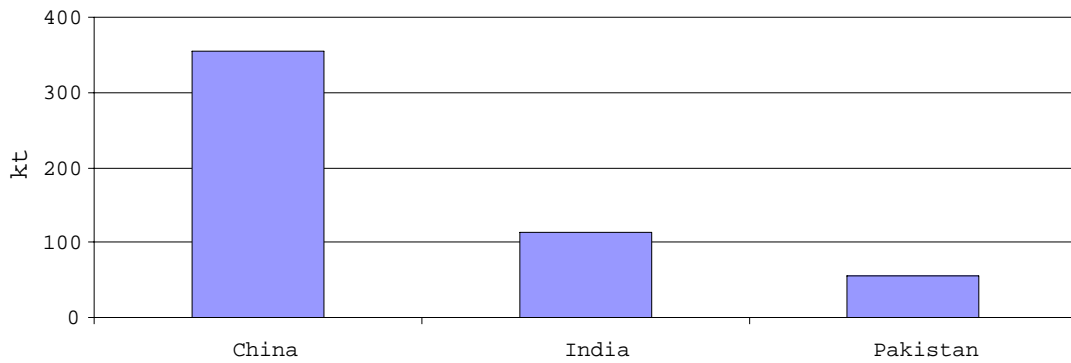
Most other WTO members had low tariffs for oilseed meal, so higher world prices generally translated into higher import prices, reducing oilseed meal imports.

Unlike oilseed and meal, oilseed oil is a highly protected commodity and trade liberalisation led to lower import prices and higher imports in many WTO members including China, Japan, and Pakistan (figure H). Substitution away from oilseeds production toward coarse grains and wheat constrained world supply response to increased oilseed oil demand, resulting in a 2.9 per cent increase in the world price relative to the 2000 reference level.

**Palm oil**

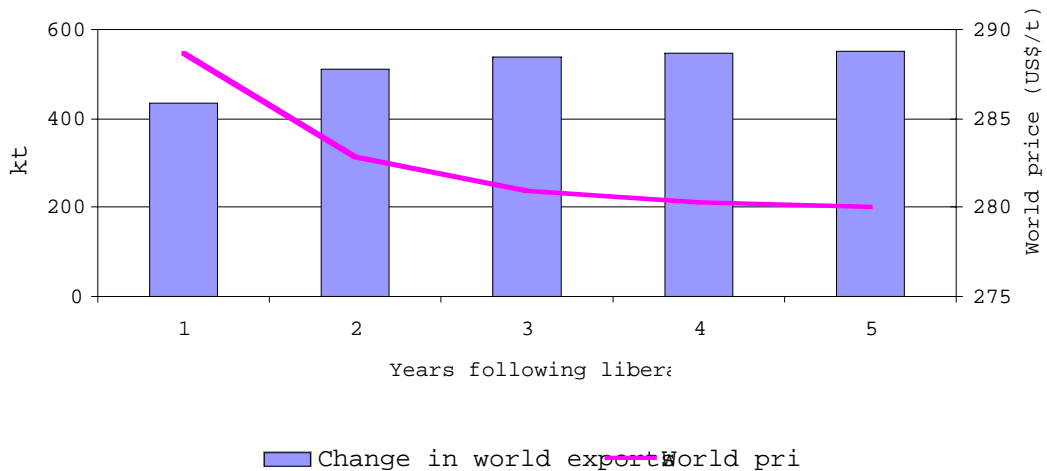
Expanded tariff rate quotas in China, and reduced tariffs in Pakistan and India, were the main drivers of the increased demand for palm oil following trade liberalisation (figure J). Increased import demand for palm oil in those countries caused the world palm oil price to increase by 7.3 per cent. The higher world price meant that all other WTO countries, which had low tariffs in 2000, reduced their imports relative to the 2000 reference level.

**J Change in palm oil imports, in the first year following liberalisation, relative to the 2000 reference level**



Palm oil prices increased significantly in the first year following liberalisation because supply response is slow in the short term. Additional exports initially came from reduced consumption and stocks in Malaysia and Indonesia. As supply gradually expands and exports increase in subsequent years, the initial impact on world palm oil prices is moderated (figure K).

**K World palm oil prices and change in world palm oil exports following trade liberalisation, relative to the 2000 reference level.**



## B. Cairns Group proposal

The second experiment to simulate liberalisation of global trade in grains modeled Cairns Group proposal for improving market access in the current Doha round of WTO agricultural trade negotiations. The proposal calls for, among other things, the expansion of tariff rate quota access by adding 20 and 14 per cent of consumption for developed and developing countries respectively and the elimination of in-quota tariffs (Cairns Group 2002). The proposal also calls for the use of a 'Swiss formula' to cut tariffs, with a coefficient of 25 for developed countries and 50 for developing countries (see box 2 for the key features of the Cairns Group proposal).

### Box 2: Key features of the Cairns Group market access proposal

Cutting tariffs significantly by applying the 'Swiss formula', to reduce all developed country tariffs to 25 per cent or lower.

Expanding developed country tariff quota access by adding 20 per cent of domestic consumption.

Improving the administration of tariff quota.

Eliminating the special safeguard mechanism for developed countries. Developing countries shall be permitted access to a new mechanism, which would operate under an agreed range of circumstances.

For developing countries there will be three types of tariff reductions;

- Initial tariffs of 0-50 percent, a 'Swiss formula' shall apply to reduce tariffs to 50 percent or lower.
- Initial tariffs of 50-250 per cent shall be reduced by 50 per cent.
- Initial tariffs over 250 per cent shall be reduced to 125 per cent.

Lower tariff quota expansion for developing countries (14 per cent of domestic consumption) phased in over a longer period.

Final bound tariff quota volumes in developing countries will be expanded by adding an amount equal to 14 per cent of domestic consumption of the product concerned over a nine year implementation period in equal installments.

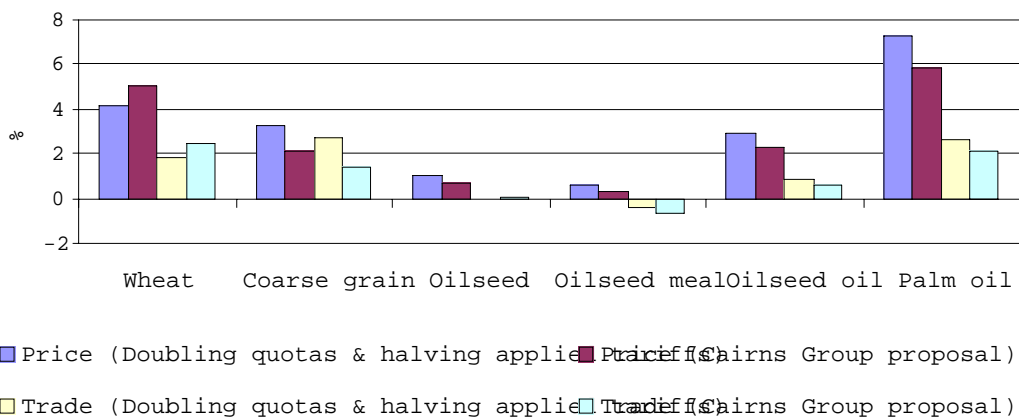
Tariff quota volumes are to be expanded on a most-favored nation basis.

Within-quota tariffs shall be phased out during the implementation period for developed countries and phased out or reduced for developing countries.

To model the Cairns Group proposal in this experiment, all in-quota tariffs were eliminated while developed and developing countries tariff rate quotas were expanded by the addition of an amount equal to 20 per cent and 14 per cent respectively of their average consumption for the period 1998–2000. The ‘Swiss formula’ was used to reduce WTO bound tariffs to a maximum tariff of 25 per cent for developed countries. For developing countries the ‘Swiss formula’ with a maximum tariff of 50 per cent was applied to all initial bound tariffs less than 50 per cent, while initial tariffs of between 50 and 250 per cent were reduced by 50 per cent, and initial tariffs of more than 250 per cent were reduced to 125 per cent. In this experiment the current applied tariff was left unchanged if the cut in the WTO bound rate was not deep enough to affect the applied rate. For example the bound rate for wheat in Turkey is 180 per cent while the applied rate is only 55 per cent, so the cut in the bound rate to 90 per cent after liberalisation fails to affect the current applied rate.

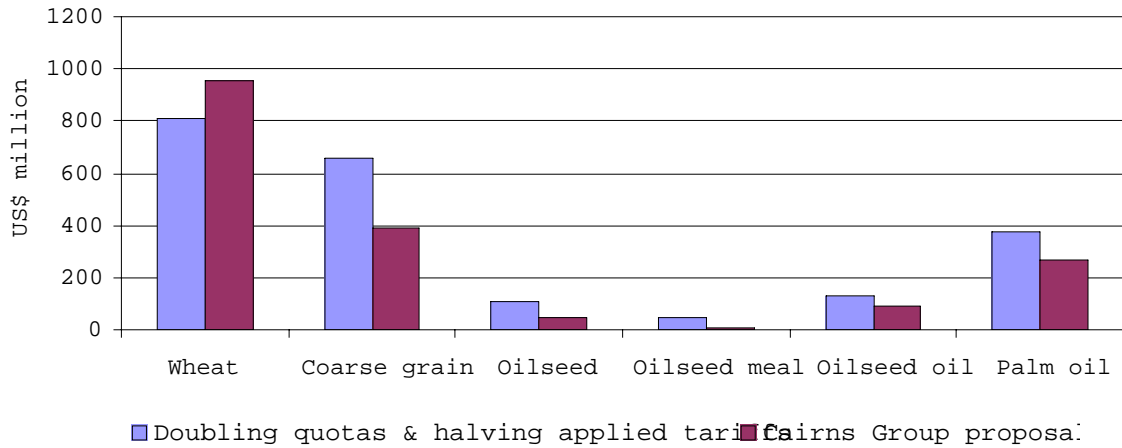
As a result of this liberalisation scenario demand for grains, oilseed products and palm oil increased and consequently world prices of all those commodities rose while their trade, except for oilseed meal also increased relative to the reference level in 2000. However the increase in the world prices of all commodities, with the exception of wheat, was smaller compared with the previous experiment, while the increase in the volume of trade was larger for wheat but smaller for coarse grain, oilseed oil and palm oil (figure L).

**L Changes in the world prices and volume of trade, in the first year following liberalisation, relative to the 2000 reference level**



Value of world trade also increased for all commodities relative to the reference level in 2000. The value of world wheat trade was higher than the level of the previous experiment due to higher world price and larger volume of trade, while the value of trade for other commodities was lower (figure M).

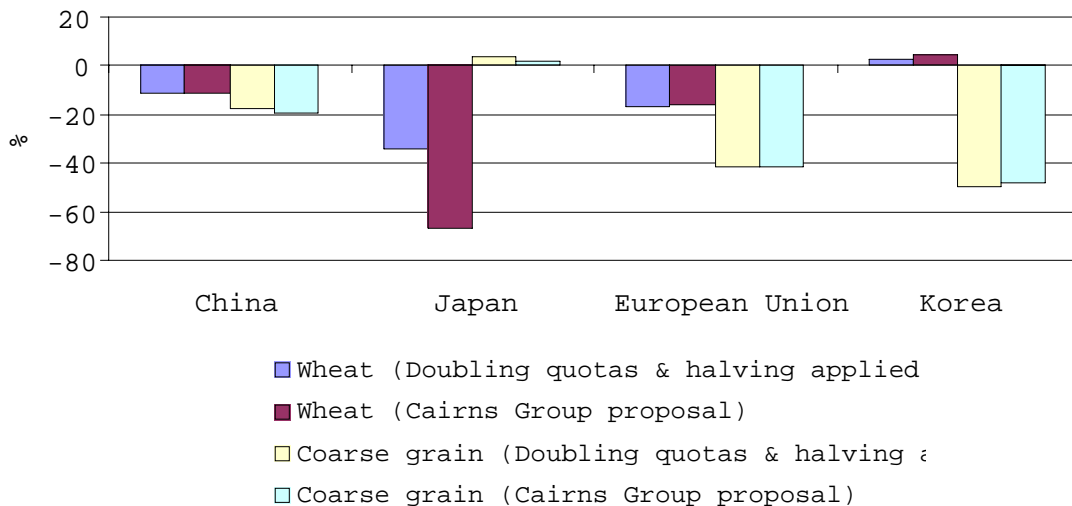
**M** Changes in the value of world trade, in the second year following liberalisation, relative to the 2000 reference level



**Wheat and coarse grain**

Following trade liberalisation in this experiment, import prices of wheat fell substantially in Japan, the European Union and China, while import prices of coarse grain also fell in Korea, the European Union and China (figure N).

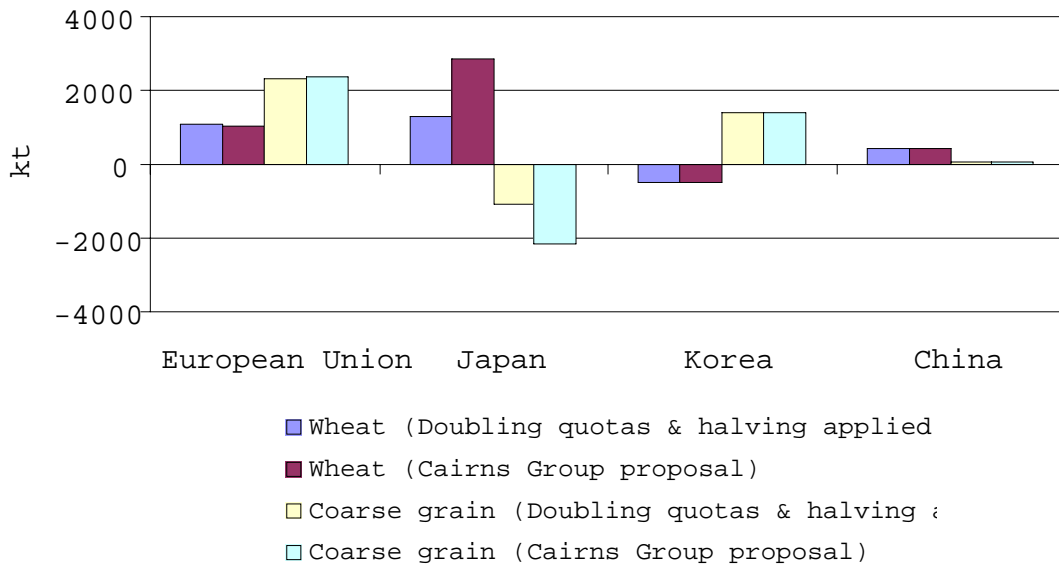
**N** Wheat and coarse grain import prices, in the first year following liberalisation, relative to the 2000 reference level



The elimination of within-quota markup and the substantial reduction in the above-quota bound markup for wheat in Japan caused Japanese wheat import price to fall by 67 per cent and imports to increase by 2.9 million tonnes relative to the reference level

in 2000 (figure O). Above-quota markup in this experiment fell from · 55 000 a tonne to only · 3200 a tonne (24 per cent of world price in 2000). In comparison, in the previous experiment Japan’s import price for wheat fell by only 34 per cent and consequently imports increased by 1.3 million tonnes only due to the in-quota markup still remaining high after liberalisation. This also left the expanded quota unfilled in the previous experiment. The substantial increase in Japanese wheat imports in this experiment caused the volume of trade in wheat and its world price to be higher than both the levels of the reference case in 2000 and the previous experiment.

**O Wheat and coarse grain imports, in the first year following liberalisation, relative to the 2000 reference level**

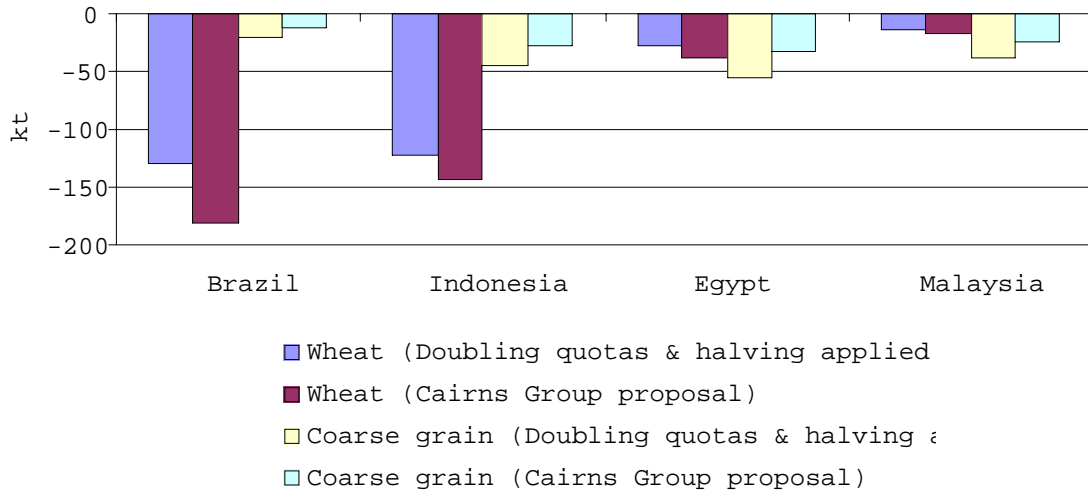


Japan’s imports of coarse grain fell by 2.2 million tonnes compared with a fall of 1.1 million tonnes in the previous experiment (figure O). This reflects a major substitution toward importing feed wheat after the substantial fall in the import price of wheat in this experiment relative to the previous experiment. The lower coarse grain imports in Japan also caused the world price and the volume of trade of coarse grain to be lower than the previous experiment levels.

In many WTO member countries with very low or no tariffs such as Brazil, Malaysia, Indonesia and Egypt, trade liberalisation in this experiment caused imports of wheat and coarse grain to fall relative to the reference case in 2000 (figure P).

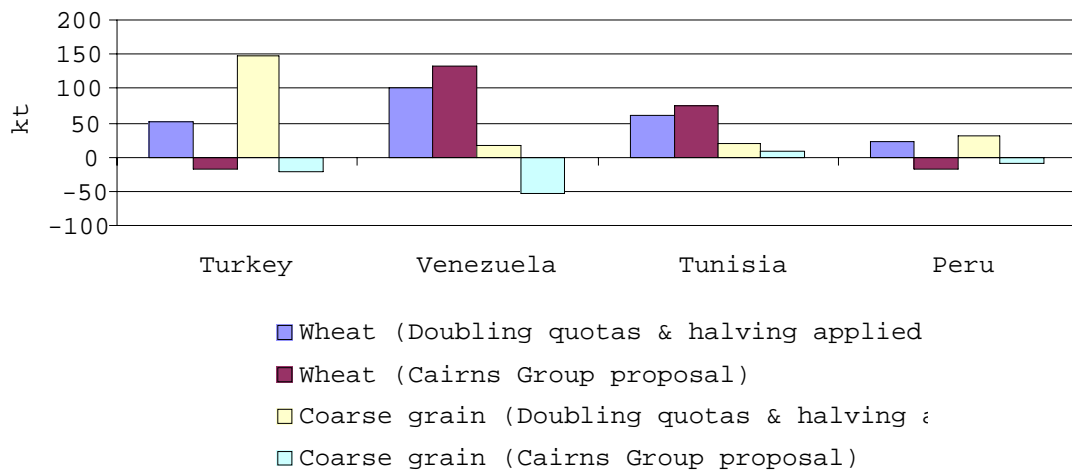
The fall in wheat imports in those countries was also more than the fall in the previous experiment due to the higher world price of wheat, while the fall in coarse grain imports was smaller due to the lower world price of coarse grain in this experiment relative to the previous experiment.

**P** Wheat and coarse grain imports, in the first year following liberalisation, relative to the 2000 reference level



Imports of wheat and coarse grain also fell in a number of other WTO member countries such as Turkey and Peru where the cut in the bound tariffs for wheat was not deep enough to affect their applied rates. While in countries such as Tunisia where the cut in the bound tariffs had an impact on the applied rates, trade in wheat and coarse grain increased relative to the reference level in 2000 (figure Q). Other results for wheat and coarse grain from this experiment were largely similar to those obtained from the previous experiment.

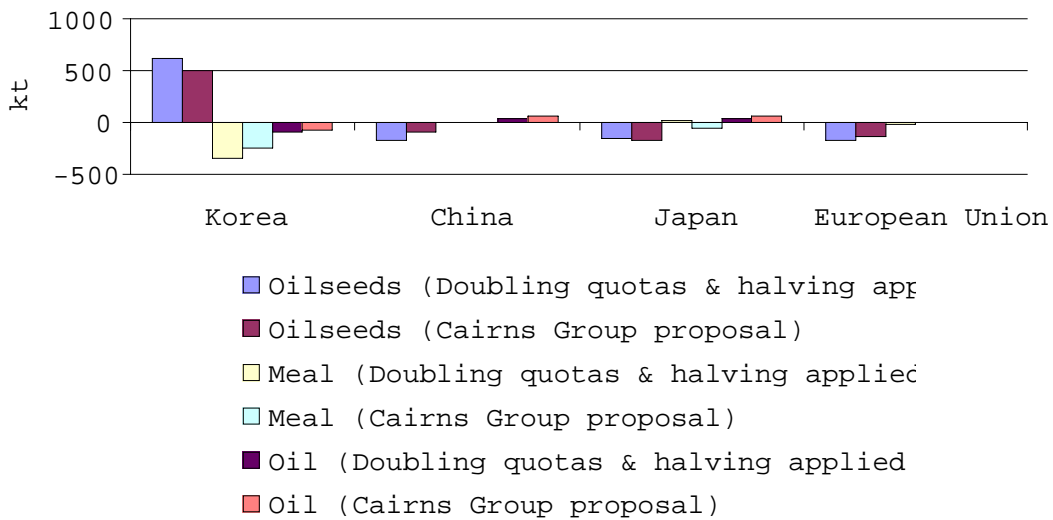
**Q** Wheat and coarse grain imports, in the first year following liberalisation, relative to the 2000 reference level



**Oilseeds and oilseed products**

Trade liberalisation in this experiment caused the import price of soybeans to Korea to fall by 63 per cent, which induced imports to increase by 506 000 tonnes (36 per cent). In comparison, the import price fell by 83 per cent and imports rose by 608 000 tonnes in the previous experiment (figure R). Korea imports almost all its soybeans and doubling its soybean quota in the previous experiment caused the import price to fall by more than the fall in this experiment where the quota was expanded by only 14 per cent of 1998–2000 average consumption. As a result of this increased oilseeds imports, oilseed meal and oilseed oil imports fell in Korea.

**R Oilseeds and oilseed products imports, in the first year following liberalisation, relative to the 2000 reference level**



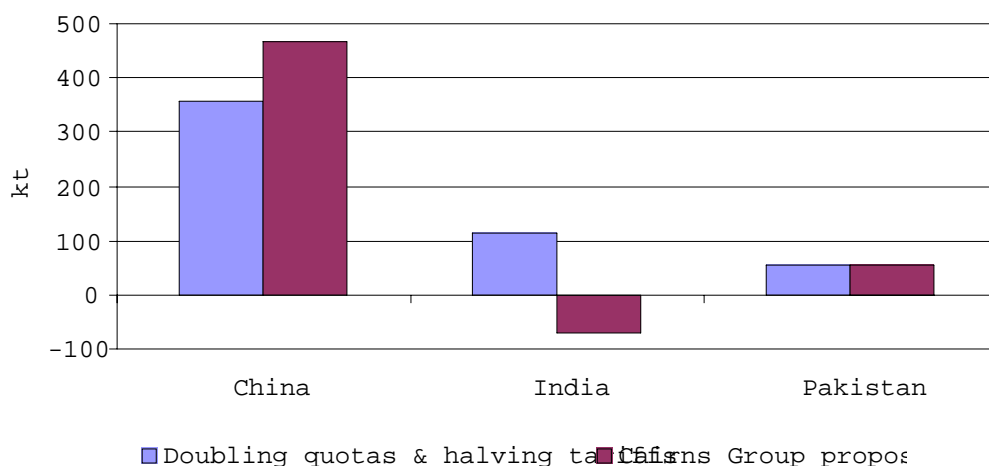
Since oilseeds imports were not subject to restrictive quotas or high tariffs in most countries, the resulting increase in its world price from trade liberalisation caused its imports to fall and the imports of oilseed products to increase. Oilseeds imports fell in China, Japan and the European Union, while oilseed oil imports increased in China and Japan. Other results for oilseeds and oilseed products from this experiment were largely similar to those obtained from the previous experiment.

**Palm oil**

Imports of palm oil increased in China and Pakistan in this liberalisation scenario, while imports of India fell (figure S). China’s increased import of palm oil was due to the expansion of its recent post WTO accession tariff rate quota. Reducing Pakistan’s bound rate for palm oil from 100 per cent to 50 per cent led to a reduction to the high applied tariff to palm oil in 2000 (76 per cent) and therefore to increased imports. Reducing the bound rate for palm oil in India from 165 per cent to 83 per cent on the

other hand had no impact on their applied rate in 2000 (44 per cent) and led to a fall in their imports as the world price increased.

**S Palm oil imports, in the first year following liberalisation, relative to the 2000 reference level**



**Conclusions**

The results from the two liberalisation experiments carried out in this paper indicate that reducing applied tariffs and/or expanding quotas is necessary to realise meaningful gains in market access for grains. This can be done in the current WTO negotiations by agreeing to either directly reduce the current applied tariffs or by making large percentage reductions in the WTO bound rates, which lead to reductions in the current applied rates.

Results also indicate that liberalising market access for grains, oilseed products and palm oil has the potential to deliver net increases in the value of world trade and prices. Most of the potential gains from market access improvement in both experiments came from liberalising restrictive WTO bound tariff rate quotas in a small number of countries. These countries were Japan, the European Union and China for wheat and the European Union, Korea and China for coarse grain. Liberalisation in Korea accounted for much of the gain for oilseeds. Reducing market access barriers in China, India and Pakistan accounted for the gain from palm oil trade liberalisation in the first experiment while it was China and Pakistan only in the second experiment. All these countries, with the exception of India and Pakistan, applied their actual WTO bound rates when most other countries had applied rates that were much lower than their bound rates.

## Appendix A: ABARE Grains Model (AGM)

ABARE's Grains Model is a partial equilibrium model of world trade in wheat, coarse grains and oilseed products. It is based on the OECD AGLINK, extended and enhanced to explicitly model the import demand and market access policies of all the world's major grain importers.

### Regional coverage

The OECD version of AGLINK represents trade flows mainly between OECD member countries as well as China and Argentina, two trading partners important to the OECD. The countries modeled individually in the OECD AGLINK model include most of the major grain exporting countries in temperate regions, but represent a smaller proportion of importers. The importing countries not explicitly modeled are aggregated into a single region known as *rest of world*. This means that individual country models in OECD AGLINK only represent a small proportion of world imports for many commodities (table 4).

#### 4 Share of world imports in 2000 in OECD AGLINK and ABARE Grains Model 2000

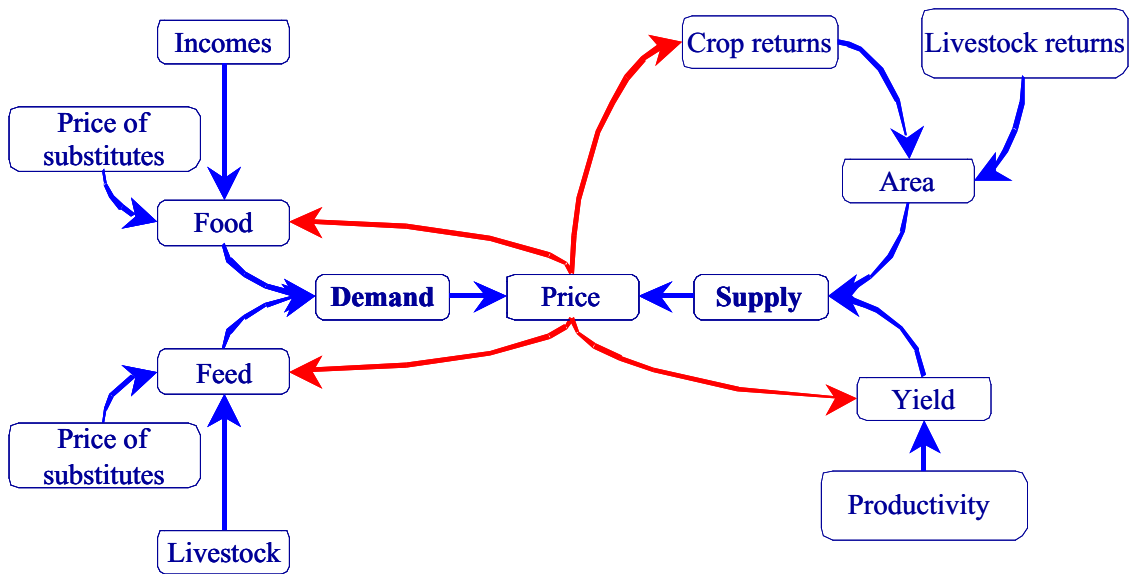
|               | OECD AGLINK | ABARE Grains Model |
|---------------|-------------|--------------------|
|               | %           | %                  |
| Wheat         | 25          | 88                 |
| Coarse grains | 55          | 93                 |
| Oilseeds      | 79          | 99                 |
| Oilseed meal  | 68          | 93                 |
| Oilseed oil   | 21          | 74                 |
| Palm oil      | 30          | 83                 |

Market access policies applied to agricultural commodities differ greatly between importing countries. Accurately specifying applied market access policies is essential for modeling constraints to trade and the potential effects of global liberalisation. ABARE has extended the OECD AGLINK model to represent the imports of an additional 45 countries for cereals and the oilseed complex. This means that in the ABARE Grains Model, a much higher proportion of world imports is explicitly represented in individual country models (table 4). In general, import demand was represented individually for each commodity in each country if imports in the year 2000 exceeded 500 000 tonnes for wheat or coarse grain or 200 000 tonnes for oilseed products and palm oil. Additional countries were modeled individually if it was judged that trade barriers restricted imports below these levels.

**AGLINK crop models**

The standard OECD AGLINK model mathematically represents the domestic demand and supply of grain and oilseed products for OECD countries, as well as Argentina and China. For the AGLINK countries, crop supply is typically modeled as the product of area harvested and yield (figure T). The area of each crop harvested depends on the relative returns from alternative crops, and between cropping and livestock production. Yield is influenced by price, implicitly through variable input use, and long term trends reflecting productivity improvements.

**T AGLINK’s crop models**



The demand for grain in AGLINK depends on both human consumption and livestock feed demand. The per capita demand for grain as food depends on the products own price, and the price of substitutes, including other grain, and complements such as livestock products. The demand for feed grain depends on livestock production, and the price of other feeds including oilseed meal.

For most countries, the demand for oilseeds is derived from the demand for the two products of crushing oilseeds, oilseed meal and oilseed oil. In general, higher meal and oil prices relative to seed price will result in increased crush of oilseeds, and vice versa. The use of oilseeds directly as food is modeled for China, Indonesia, Japan and South Korea, and directly for feed use in Argentina, Brazil, Mexico and the United States.

### Modeling import demand

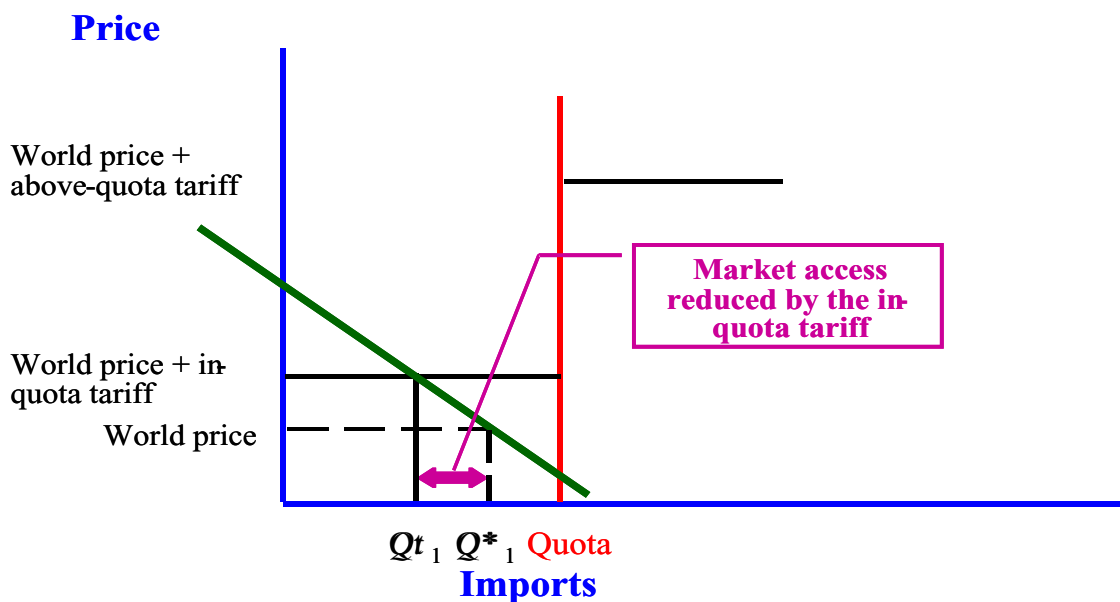
To model import demand in ABARE’s Grains Model it is assumed that consumers and processors differentiate between imported and domestically produced grain and oilseed products, and can substitute between the two (Shaw and Love 2001). The demand for imports and domestically produced grain products are specified separately in the model. Import demand equations were added to the standard OECD AGLINK representations of China, the European Union, Japan and Korea.

### Modeling tariff rate quotas

Modeling TRQ’s in ABARE’s Grains Model follows an accepted economic approach described by Abbott and Morse (2000), and recently applied to this type of modeling by Shaw and Love (2001). The model includes a representation of demand with prices that include both the in-quota and above-quota tariffs (figures U–W). When demand is low (high), the price of imports is determined by the in-quota (above) tariff. When the demand is on the quota, the shadow quota price ranges between the in and above-quota tariff levels.

If demand is low, the demand curve will intersect the in-quota tariff price resulting in imports below the quota volume ( $Q_{t_1}$  in figure U). In this case it is the in-quota tariff that restricts trade, and removing this tariff would result in a higher level of imports ( $Q^*_{t_1}$ ). Expanding the quota or reducing the above-quota tariff may have no effect on imports when demand is low.

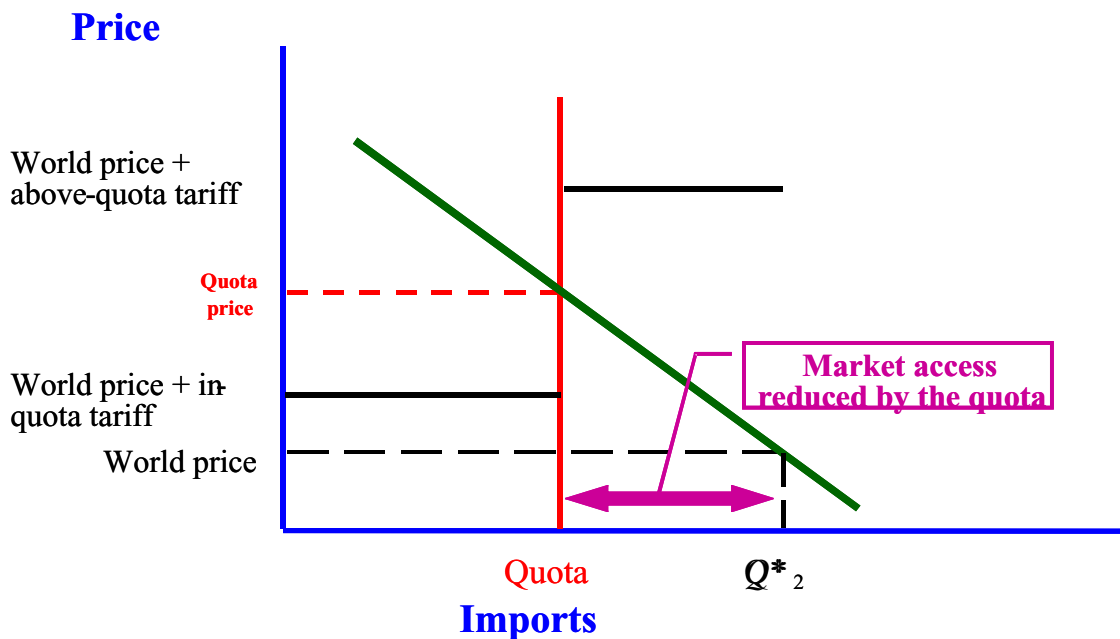
#### U Tariff rate quota with in-quota tariff binding



Depending on the level of demand, imports can be restricted to the tariff quota quantity and the shadow quota price will range between the in and above-quota price levels (figure V). The shadow price indicates the amount of rent generated by restricting the quantity of imports, which can be imported at the in-quota price but sold for a higher price on the domestic market. This rent can be auctioned to importers, allocated to foreign exporters, or dissipated through rent seeking behaviour and inefficient distribution systems.

When the quota restricts trade, reducing the in-quota tariff increases the amount of rent available, but does not increase the level of imports. Increasing the quota alone will increase imports until the quota price falls to the in-quota tariff level, at which point quota rent will be eliminated. Reducing the above-quota tariff will not increase imports unless it reduces the above-quota price below the shadow quota price. Only by removing both the quota and tariffs will imports increase to the free market level ( $Q^*_2$ ).

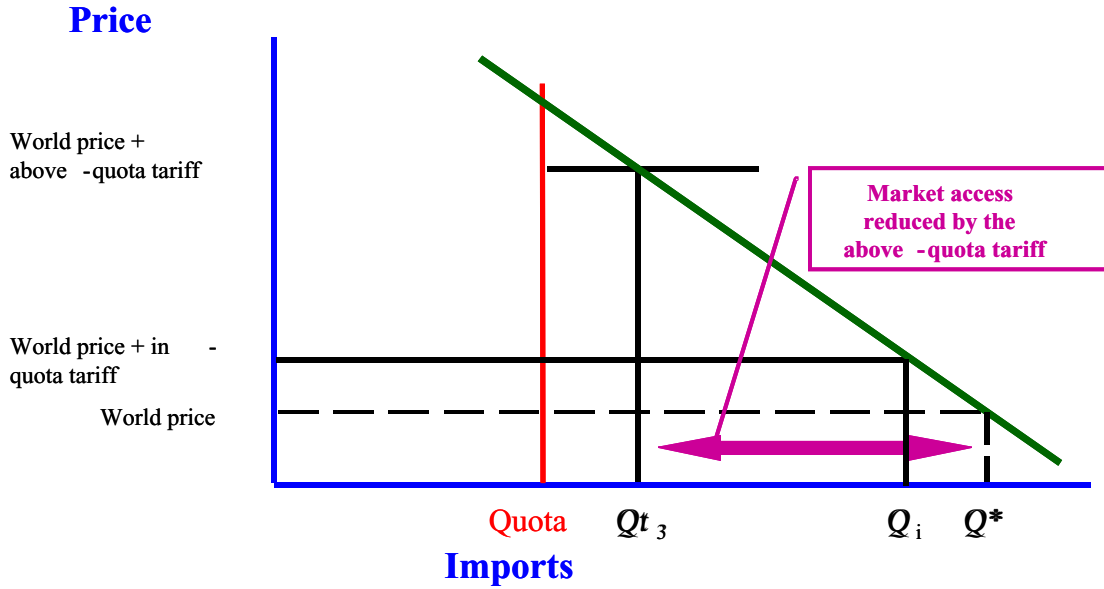
**V Tariff rate quota with quota binding**



If demand is high enough, the demand curve will intersect the above-quota tariff price resulting in imports above the quota volume ( $Q_{t_3}$  in figure W). When the above-quota tariff restricts trade, removing this tariff would increase imports until the price falls to the in-quota tariff level ( $Q_i$ ). Reducing the in-quota tariff alone has no effect on imports when the above-quota tariff is binding. The effect of expanding the quota depends on the magnitude of the increase relative to demand. A small increase may have no effect, with demand remaining above-quota. Larger increases could cause the shadow quota price to fall below the above-quota level, and make the quota binding. Very large

increases could result in the import price falling to the in-quota level. The quota and both tariffs need to be removed to achieve the free trade level of imports ( $Q^*$ ).

**W** Tariff rate quota with above-quota tariff binding



**Supply response**

As a model of temperate agriculture, the OECD AGLINK model represents over 90 per cent of the world's wheat and coarse grain exports through individual country model. ABARE Grains Model has a similar level of representation for oilseed products by modeling Brazilian production and consumption, and for palm oil by modeling Indonesian and Malaysian production and consumption.

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