# Trade Liberalization in Cereals:

## Blessing or Curse to Developing Countries?*

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## I. Introduction

For some time now, the large exporters of cereals, such as the United States, Canada, and Australia, have had a keen interest in the removal of trade barriers for cereals, in particular in the countries of the European Community. The motivation behind this interest does not need any elaboration. What is less clear is how trade liberalization in cereals would affect developing countries. A recent study seems to indicate that developing countries could actually be worse off with trade liberalization (Koester), the reason being that most developing countries are net importers of cereals and trade liberalization is likely to increase the world price at which developing countries are buying.

The purpose of the current study is to analyse the gains and/or losses of developing countries that could arise from trade liberalization in cereals by developed countries. The study differs from previous work in this area (Koester; Valdés and Zietz) in that a more recent data set is used and the interdependencies in production and consumption among different cereals are modelled explicitly. Also, the model relies largely on domestic demand and supply elasticities rather than trade elasticities thus reducing the likely underestimation of the benefits of trade liberalization.

developed countries outside the European Community (DCs), the developed countries of the European Community (EC), developing countries (LDCs), and a group of countries classified as rest-of-the-world (ROW). The countries within each of these four categories are assumed to react to world price changes according to the same behavioural postulates, although based on different parameter constellations. Of the four groups of countries only the DCs and the EC-members are supposed to eliminate their trade barriers. The level of protection in all other countries is held constant. How the world price change is related to the price and quantity changes in each category of countries is explained next starting with the DCs and the individual EC-members.

In the preliberalization situation, which is denoted by superscript $o$, the domestic price (p) of commodity $i$ ($i = 1, ..., q$) prevailing in developed country $j$ ($j = 1, ..., r$) can be related to the world market price (pw) by the equation

$$p^o_{ij} = pw^o_i \, r_j \left(1 + \tau^o_{ij}\right) \left(1 + m_{ij}\right)$$

where r is the market exchange rate, $\tau^o$ the ad-valorem equivalent of a country's tariff and nontariff barriers, and where m is a margin which incorporates insurance, freight, and marketing costs. Under these conditions a complete elimination of tariffs entails a percentage change in domestic price ($ph_{ij}$) of

$$ph_{ij} = \left(1 + pwh_i\right)/\left(1 + \tau^o_{ij}\right) - 1.$$

where pwh is defined as the percentage change in world price resulting from trade liberalization.[1]

For a given percentage change in domestic price (ph) consumption (C) and production (Q) of a particular commodity $i$ in developed country $j$ are assumed to change according to the behavioural equations

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[1] The exchange rate and the marketing margin are assumed to be unaffected by the changes induced by trade liberalization.

world excess demand, the countries of the European Community are assumed to influence the world market only as a net trading entity, similar to a large country with several regions or states.[4] To incorporate such an effect, the sum of the imports of all EC members is subtracted from the sum of their exports to arrive at EC net exports ($X_{iec}^{*}$) or net imports ($M_{iec}^{*}$), depending on the particular commodity being analysed. Only these net quantities enter world excess demand.

Whereas the domestic price change for DCs and the member states of the EC is a function of the world price change and the initial level of protection, the domestic price change of developing countries simply equals the change in the world price of that commodity. This follows directly from the assumption of constant protection levels for all countries other than those which are removing their trade barriers. As a consequence, the response of consumption and production of developing country $g$ ($g = 1,\ldots,s$) for commodity i to the simultaneous change in the world price of q commodities can be calculated by equations (1) and (2), respectively, if one replaces subscript $j$ with $g$ and $ph_{hj}$ with $pwh_h$.

Postliberalization exports of commodity i for developing country g are then given by the equations.

$$X^* = X^o + \Delta Q - \Delta C \qquad \text{if } X^o > 0$$

$$X^* = -(M^o + \Delta C - \Delta Q) \qquad \text{if } (\,\cdot\,) < 0 \text{ and } M^o > 0$$

$$X^* = 0 \qquad \text{otherwise}$$

where subscripts $i$ and $g$ have been left out for ease of reading. Similarly, postliberalization import levels are derived as

$$M^* = (M^o + \Delta C - \Delta Q) \qquad \text{if } (\cdot) > 0$$

$$M^* = 0 \qquad \text{otherwise}$$

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[4] This assumption is justified by the existence of the common agricultural policy and the large share of intra-EC trade.

$$\sum_i (\sum_k M^*_{ik} + M^*_{i\,EC} + \sum_g M^*_{ig} + M^*_{i\,ROW}) -$$

$$\sum_l (\sum_k X^*_{ik} + X^*_{i\,EC} + \sum_g X^*_{ig} + X^*_{i\,ROW})$$

where subscript $k$ stands for developed countries outside the European Community and subscript $g$ for developing countries.

For a given vector of world price changes and the corresponding quantities of postliberalization exports and imports, the change in export revenue or import costs of developing country $g$ and commodity $i$ can be calculated as

$$(5) \quad \Delta VX_{ig} = (X^*_{ig}\ pw^*_i - X^o_{ig}\ pw^o_i)\ \phi_{ig}$$

$$(6) \quad \Delta VM_{ig} = (M^*_{ig}\ pw^*_i - M^o_{ig}\ pw^o_i)\ \theta_{ig}$$

respectively, where $pw^*_i$ represents the world price for commodity i after trade liberalization. $\phi_{ig}$ equals the ratio of the export unit value of country $g$ ($px^o_{ig}$) to the world price prior to trade liberalization. $\theta_{ig}$ is the corresponding ratio for the imort unit value ($pm^o_{ig}$). Since a preliberalization export unit value does not exist for countries incurring a trade reversal, the regional average $\phi_i$ substitutes for $\phi_{ig}$ in these cases. (5) is the relevant equation in the case where country g is an exporter prior to trade liberalization or experiences a trade reversal from a net importing position to a net exporting trade position because of trade liberalization. Equation (6) is used when country 8 is initially a net importer and remains so after trade liberalization.

If LDC g is exporting in the preliberalization period, its welfare gain deriving from trade liberalization can be approximated by

$$\Delta WX_{ig} = 0.5\ (pw^*_i - pw^o_i)\ (X^o_{ig} + X^*_{ig})\ \phi_{ig}$$

are taken from the Food Balance Sheets of the Food and Agriculture Oranization of the United Nations (FAO). The figures are averages for the years 1979 to 1981. $X^o$ and $M^o$ are net exports and net imports, respectively. Domestic consumption is calculated as a residual from figures on production, exports, imports, and stock changes value and quantity of world exports are from the FAO Trade Yearbook.

The preliberalization world market price ($pw^o$) equals the average deflated world export unit value for the years 1979 to 1981. The base year values of $pw^o$ are US$186.6 for wheat and flour and US$145.6 for maize. They are expressed in 1980 US dollars per metric ton. For each commodity and developing country, preliberalization unit values of trade ($pm_{ig}^o$ and $px_{ig}^o$) are calculated as simple averages of the deflated unit values of the years 1979 to 1981. The raw data come from the 1981 FAO Trade Yearbook.[5]

Values for domestic demand and supply elasticities are taken from the following sources: Askari and Cummings, Caspari et al., Stern et al., Tyers, and Tyers and Anderson.[6] The model is calculated for two sets of domestic supply elasticities. The benchmark run of the model uses the elasticity values for individual countries reported in the sources mentioned above. For countries for which elasticity values could not be obtained on an individual basis, the domestic demand and supply elasticities are set equal to 0.4 for both wheat and maize.[7] These values correspond roughly to those reported in Stern et al. (pp. 354-57) for both developed and developing countries. To check on the sensitivity of model results with respect to the choice of the domestic supply elasticities, a second set of elasticities is utilized for both wheat and maize. For this second model run, the domestic supply elasticities of all developing countries is raised to 0.8[8]

Cross-price elasticities for most developed countries and a number of Asian developing countries are taken from Tyers and Tyers and Anderson. For all other countries, the cross-price

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[5] All base year quantities and values for all countries can be found in the appendix of Zietz and Valdes.

[6] The values reported in Tyers are partially reprinted in Anderson and Hayami.

[7] The own demand and supply elasticities for both commodities and all countries are reported in the appendix of Zietz and Valdes.

[8] Large aggregate supply elasticities for developing countries are favoured among others by Peterson.

## IV. Results

Table 1 provides an overview of the effects on developing countries[11] of a complete removal of trade barriers for wheat and maize as they prevailed in developed countries during 1979 to 1981. It also gives the model's predictions of the changes in the world market price and in world exports, which are defined as the sum of the net exports of all exporting countries. For each commodity, superscript 1 indicates the use of the benchmark elasticities. Superscript 2 identifies the alternative elasticity assumptions described in the data section.

The world price increases are predicted to be between 6 and 12 percent. As one could expect, the use of the larger domestic supply elasticities for developing countries leads to slightly lower world price increases. The differences between the alternative elasticity assumptions, however, are rather minor. This largely reflects the fact that the majority of developing countries are importers of grain rather than exporters. In fact, their share in world exports is a mere 6 percent for wheat and 12 percent for maize for the years 1979-81.

The third column of Table 1 presents the changes in foreign exchange earnings of developing countries. For the benchmark elasticity runs of the model, an increase of close to US$ 1 billion is predicted to occur per year for both commodities taken together. This value is expressed in 1980 dollars. Hence, the equivalent figure in 1986 dollars would be in excess of one and a half billion U.S. dollars.

A comparison of these figures with those for developed countries may be instructive. For wheat, the increase in foreign exchange of developing countries is about of the same order of magnitude as the combined effect for Australia and Canada, the two developed countries to gain the most in the case of wheat. By contrast, the foreign exchange earnings of the United States decrease by about US$200 million. This is the result of her large cross-price elasticity of wheat supply with respect to maize (−1.0). The United States is the country with the largest absolute gains in

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[11] Unless otherwise noted, "developing countries" refers to the 58 countries included in the study.

## Table 1

### EFFECT OF TRADE LIBERALIZATION ON WORLD PRICE
### AND EXPORT QUANTITY, TRADE VALUES
### AND WELFARE OF DEVELOPING COUNTRIES

| | Percent Change in | | Absolute Change in Developing Country | | | |
|---|---|---|---|---|---|---|
| | World Price | World Exports | Foreign Exchange Earnings | Welfare (Exporters only) | Import Bill | Net Welfare |
| | —%— | | —US$ mill. 1980— | | | |
| Wheat[1] | 7.1 | -3.2 | 406 | 57 | -122 | -405 |
| Wheat[2] | 6.0 | -3.0 | 455 | 47 | -213 | -342 |
| Maize[1] | 11.8 | 30.7 | 511 | 141 | -497 | -74 |
| Maize[2] | 10.6 | 30.6 | 772 | 129 | -649 | -55 |

*Note:* Superscripts identify different assumptions regarding the domestic supply elasticities. Details are given in the text. World exports are defined as the sum of net exports of all net exporting countries.

wheat and coarse grains of 20 and 16 percent, respectively. These are larger than the price increases given in Table 1 for wheat and maize, the commodities that match the more aggregate commodity groups chosen by Anderson and Tyers. The difference is particularly pronounced for wheat. One likely cause is that in this study, the changes of consumption and production (equations (1) and (2)) for Japan and Austria are calculated on the basis of different values of the preliberalization protection level. Owing to a subsidy system the protection relevant to producers in these two countries is considerably in excess of the protection that consumers actually have to live with. As a result, a removal of trade barriers will substantially decrease production but increase consumption only slightly. Anderson and Tyers report world export increases of 7.5 and 24.4 million tons for wheat and coarse grains, respectively. The corresponding figures of the current study are a decrease of world wheat exports of 2.6 million tons and an increase of 21.9 million tons of maize if one considers the benchmark results.

If one corrects for the differences in base year and the extent

## Table 2

### REGIONAL IMPACT OF TRADE LIBERALIZATION ON DEVELOPING COUNTRIES — WHEAT

| Region | Change in | | Percent Distribution of Change in Foreign Exchange Earnings | Percent Change in Foreign Exchange Earnings | Change in Import Bill |
|---|---|---|---|---|---|
| | Foreign Exchange Earnings | Net Welfare | | | |
| | — US$ mill. | 1980 — | — % — | — % — | — US$ mill. — |
| Sub-Sahara Africa | 1. | -41 | 0.0 | 642 | 25 |
| North Africa Middle East | 141 | -194 | 34.7 | 185 | -20 |
| Asia | 175 | -90 | 43.1 | na | -186 |
| Latin America | 88 | -81 | 21.7 | 12 | 58 |
| Total | 406 | -405 | 100.0 | 51 | -122 |

*Note:* na indictes that preliberalization exports are zero or negligible. The results refer to the benchmark elasticity assumptions.

could anticipate to experience a trade reversal and become net exporters of maize. Among those countries are Cameroon, Kenya, Malowi and Uganda. The incidence of trade reversals is also very large for Asia. Among others, India, Indonesia, the Philippines, and Pakistan fall into this category. As in the case of wheat, India could expect to reap most of the increase in foreign exchange earnings of the region, close to 50 percent. In the case of North Africa Middle East, most of the increase in foreign exchange would again accrue to Turkey. As for Latin America, Argentina would likely capture about 80 percent of the regions predicted gain in foreign exchange. But similar to Sub-Sahara Africa and Asia, a considerable number of countries experience a trade reversal from a net importing to a net exporting status. This applies, for example, to Brazil, Bolivia, and El Salvador. The countries losing most in absolute terms from trade liberalization in maize are the Republic of Korea, Mexico, and Venezuela, with

with by far the largest potential gains. The share of foreign exchange gains going to the group of low income countries apart from India seems rather low. But again, one has to consider that, for a small developing country, even a negligible share of total benefits may translate into a substantial amount of foreign exchange, in both absolute and relative terms.

## Table 4

### EFFECT OF TRADE LIBERALIZATION ON LOW INCOME COUNTRIES

| | Change in | | Col. (1) as Percent of LDC Total | Col. (3) without India | Change in Import Bill | Change in Welfare of Importers |
| | Foreign Exchange Earnings | Net Welfare | | | | |
| | (1) | (2) | (3) | (4) | (5) | (6) |
| | —US$ mill. | 1980— | —%— | —%— | —US$ mill. — | |
| Wheat[1] | 184 | -56 | 45.5 | 5.1 | -226 | -51 |
| Wheat[2] | 215 | -49 | 47.2 | 6.4 | -245 | -43 |
| Maize[1] | 142 | -5 | 27.7 | 9.5 | -43 | -12 |
| Maize[2] | 163 | -4 | 21.1 | 9.4 | -59 | -10 |

*Note:* The results refer to the benchmark elasticity runs of the model. Superscripts identify different assumptions regarding the domestic supply elasticities of developing countries. Details are in the text:.

## V. Conclusion

This study has tried to predict how a simultaneous removal of all trade barriers by developed countries for wheat and maize would impact upon developing countries. The results seem to support the conclusion that trade liberalization in cereals would likely lead to a net welfare loss to developing countries as a whole. Nevertheless, a number of developing countries could expect considerable percentage and absolute increases in foreign exchange earnings. For wheat and maize together, they amount to about US$1 billion in 1980 dollars per year. For wheat, the increase in foreign exchange earnings are concentrated almost exclusively

point in time after liberalization the postive effects could win out, must remain an open question at this point.

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