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Tell Me Where it Hurts, An' I'll Tell You Who to Call: Industrialized Countries' Agricultural Policies and Developing Countries

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ABSTRACT

This paper accomplishes two objectives. First, it provides simulation results from a computable general equilibrium (CGE) model that have helped focus the debate about the potential effects of agricultural trade liberalization on developing countries. The aggregate numbers show modest net positive effects over a medium-term period (five years out). First, when developed countries fully remove their subsidies and trade barriers, welfare and GDP of the developing countries rise, as do value added in agricultural production and agro-industries, and agricultural exports. Focal point estimates that we provide are increases in welfare and GDP of $10 billion and $15 billion, respectively, while agricultural value added increases $23 billion and agricultural exports by $37 billion. Second, when developing countries also eliminate their subsidies and trade barriers, there is an additional net gain in aggregated developing country welfare and GDP—which now increase by nearly $20 billion and $38 billion. Thus, developing countries gain from developed country liberalization, but there are also gains from reform of their own policies. Our results suggest a fairly even balance between these sources of gains.

The second and equally important contribution of the paper is to describe the heterogeneity among developing countries in terms of their agricultural resources, and to disaggregate the simulated results among 40 developing countries or regions. The basic model includes the innovation of assuming there is unemployed labor in developing countries, so growth in agricultural production has a modest "multiplier" effect. The basic model also allows for a slight positive effect of increased trade on productivity—the focal

results cited above include this impact. Effects are distinguished between elimination of subsidies and trade barriers by the US, the EU, Japan and Korea, and all developed countries simultaneously. Effects on different developing countries and regions differ due to differences in the subsidy and trade barrier instruments utilized by the developed countries, the commodities affected, and the trade patterns and volumes evident in the initial baseline data.

Disaggregation of the impacts among developing countries also demonstrates that while most gain and become more food secure, there are some developing countries that are disadvantaged by agricultural trade liberalization by developed countries. Results are presented with and without the change in productivity. Not surprisingly, rising productivity offsets the negative effects measured with constant productivity in some cases. Reform of developing country's own agricultural trade policies also lead to net welfare gains, although not always to increased value added in agriculture which is a measure we report because it is closely tied to rural well being.

TABLE OF CONTENTS

LIST TABLES

LIST OF CHARTS

TELL ME WHERE IT HURTS, AN' I'LL TELL YOU WHO TO CALL[1]: INDUSTRIALIZED COUNTRIES' AGRICULTURAL POLICIES AND DEVELOPING COUNTRIES

Xinshen Diao, Eugenio Diaz-Bonilla, Sherman Robinson and David Orden[2]

1.   INTRODUCTION

Different studies before and during the Uruguay Round, as well as projections of

possible scenarios for the current negotiations, have tried to quantify the impact of the

agricultural policies of industrialized countries on the world economy, and developing

countries in particular. Those studies usually estimated that an eventual reduction of

agricultural protection and subsidies in industrialized countries would produce positive

effects on welfare, production and exports of agricultural products of developing

countries as a whole (Valdés and Zietz, 1980; Goldin and Knudsen, 1990; Sharma,

Konandreas, and Greenfield, 1996; Goldin and van-der-Mensbrugghe, 1995; ABARE,

2000; Hertel, et al 2000; USDA/ERS, 2001). But some of the studies also raised the

possibility of negative welfare effects for a subset of developing countries due to adverse

changes in the terms of trade. The combination of domestic support, market protection

and export subsidies by industrialized countries depressed world prices and reduced

market opportunities for a variety of food products. This hurt developing countries that

were net exporters but it was also argued that such outcome may have helped developing

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countries that were net importers of those products (Koester and Bale, 1990; see the review in Sharma, Konandreas, and Greenfield, 1996).

Many of the studies presented aggregate results for groups of developing countries. With the advance of current Doha Round negotiations and larger participation of developing countries in the negotiations, there has been more interest in analyzing the disaggregated policy impacts on individual countries. Two recent studies by Vanzetti and Graham (2002), and Poonyth and Sharma, (2003), using world commodity (multi-market) models with 161 countries/regions (the European Union counted as one), calculate that a non-trivial number of developing countries, ranging from 2/3 to 3/4 of the total, may suffer welfare losses from the scenarios of agricultural liberalization in industrialized countries considered in their simulations.[3] In a general equilibrium setting Dimaranan, Hertel and Keeney, 2003, also found that several developing countries may suffer welfare losses in some scenarios, particularly when only domestic support is reduced without changes in market access.[4] Another way of reading the results is that domestic support – but not market protection – in industrialized countries may increase welfare in several developing countries.

Another result that appeared in much of the simulations mentioned and that has been replicated in more recent studies (World Bank, 2001, Tokarick, 2003) is that

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[3] Vanzetti and Graham 2002 simulate a repetition of the cuts agreed during the Uruguay Round, leading to an additional 20% cut in domestic support, a 21% reduction in exports subsidies, and a 36% cut in out-of-quota tariffs. Poonyth and Sharma, 2003 analyze three alternatives of agricultural trade liberalization based on the proposals presented during the WTO negotiations by the US, the EU, and the attempted synthesis proposal presented during March 2003 by the then President of the Committee on Agriculture, Stuart Harbinson.

[4] The relevant simulations are first a 50% cut in domestic support and, second, 50% reductions in tariffs and export subsidies with domestic support in industrialized countries changed to less trade distorting methods.

developing countries appear to benefit far more from their own agricultural liberalization than from liberalization in industrialized countries. The implications for developing countries in the current agricultural negotiations of the double finding that several of them may be hurt by industrialized countries' agricultural liberalization while they would benefit most from their own liberalization, seem the opposite to the approach followed by most of those countries so far which have insisted in reducing protection and subsidies in industrialized countries, while trying to maintain their own legal latitude to maintain their protection (see Diaz Bonilla, Diao, Robinson, 2003).[5]

This paper takes another look at these issues in a world general equilibrium model. In particular, it analyzes again the impact of industrialized countries' policies on developing countries but disaggregates the results along two dimensions: first, it differentiates the source of policy changes by industrialized country/region, and second, it utilizes the full disaggregation of developing countries available in the GTAP (version 5) data base (Dimaranan and McDougall, 2002). The paper also considers agricultural liberalization in both developed and developing countries to assess the relative importance of each scenario.[6]

A main difference with earlier studies is that the model is run with unemployment in developing countries (as opposed to the full employment specification of many general

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[5] Of course industrialized countries also benefit from their own liberalization.
[6] To the extent that the simulations only include changes in agricultural policies, we are still in the murky world of second-best welfare comparisons (see R.G. Lipsey and R.K. Lancaster, 1956) with possibly different results if other scenarios of liberalization were considered (for instance, agriculture plus industry, or both plus services; see the sequential scenarios in Hertel, T. W., K. Anderson, J. F. Francois, and W. Martin. 2000). The simulation of more complex scenarios across all sectors would be appropriate to assess the impact of the Doha negotiations as a whole. In this paper, however, the question is only a limited counterfactual analysis regarding the impact of industrialized countries' agricultural policies on developing countries, *given* the rest of the policies for the other sectors.

equilibrium models), and in some simulations, a modest productivity effect is considered.[7] With that specification the paper finds that agricultural liberalization in industrialized countries has larger and more uniformly positive results on developing countries, and the relative importance of own liberalization versus liberalization in industrialized countries for welfare increases in developing countries is more balanced. The implications for the negotiations are that developing countries seem correct in asking the liberalization of agriculture in industrialized countries, but at the same time those countries must also consider the important potential gains from their own agricultural sector liberalization.

The rest of the paper is organized as follows. First, the variety of situations among developing countries is discussed. Second, the heterogeneity of the agricultural sectors and policies in industrialized countries is also recognized and briefly analyzed. Both aspects are important, given the fact that agricultural policies of industrialized countries, and their possible changes, will have different effects depending on the specific characteristics of individual developing countries. Third, the paper discusses the model and the simulations. Finally, some conclusions close the paper.

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[7] The multimarket models have not incorporated technical change and by their own partial-equilibrium nature do not consider the possible multiplier effects and links to the rest of the economy, including, of course, the possible additional economic expansion caused by labor utilization of previously unemployed workers (see the discussion in the text below).

2. HETEROGENEITY OF DEVELOPING COUNTRIES

Developing countries and regions show a great variety of growth patterns and structural characteristics. Table 1 presents some structural indicators. Agriculture in Latin America and the Caribbean (LAC) is less important as a percentage of the GDP, and rural population is smaller when compared to total population, than in other regions. Sub Saharan Africa (SSA) and South Asia fall on the other extreme, with agriculture production and rural population having larger incidence in those regions. At the same time LAC depends more on agricultural exports, and agriculture appears more productive (per unit of labor), uses more capital (proxied by tractors) and, after South Asia, is the region better served by roads (the large Amazon area in LAC affects the value of this indicator). Africa and LAC have more available arable land per capita than Asian developing countries, but average holdings are far larger in LAC and land appears to be distributed more unequally in Latin America and the Caribbean than Asia, with Africa in between (Table 2). It is important to notice that SSA has an availability of land that is comparable to LAC, but at the same time average holdings are of similar sizes as those in Asia, and the region shows the lowest values for the capital/technology and roads indicators, highlighting some of the opportunities and constraints to expanding agricultural production in that region.

Agricultural production per-capita has been increasing in all developing regions, except for Africa and particularly Sub-Saharan Africa (SSA) (Table 3), where poor production performance has been associated with macroeconomic imbalances, war and civil conflict, and the high incidence of disease in rural areas.

Table 1—Structural Characteristics

	Latin America & Caribbean	Sub-Saharan Africa	Middle East & North Africa	South Asia	East Asia & Pacific	All Developing Countries	Least developed countries
Agriculture, value added (% of GDP)	7.9	17.9	13.9	28.3	15.4	13.2	36.7
Rural population (% of total population)	26.5	68.4	43.6	73.2	67.7	60.6	76.4
Agriculture value added per worker (constant 1995 US$)	2915.5	349.2	2163.6	376.2	418.4	589.8	239.0
Agricultural exports (% merchandise trade)	28.3	23.9	4.7	17.9	11.7	15.3	35.3
Land use, arable land (hectares per person)	0.27	0.26	0.21	0.16	0.11	0.21	0.20
Agricultural machinery, tractors per 100 hectares of arable land	118.2	18.0	117.8	80.9	67.9	102.0	8.0
Roads, km per squared km of total area	0.141	0.052	0.062	0.551	0.139	0.123	0.044

Source: World Bank, World Development Indicators CD 2002.

Table 2—Land Structure: Average Size of Holdings and Concentration

	Average size (unweighted)	Average size (weighted)	Gini Index
Africa a/	2.92	1.20	0.53
Asia Developing b/	2.20	1.62	0.57
LAC w/Argentina c/	87.09	63.25	0.82
LAC w/o Argentina	32.53	27.66	0.82
USA	186.95	na	0.64
EU d/	27.27	17.91	0.59
Japan/Korea	1.12	1.15	0.47
Canada	349.07	na	0.74

Source: FAO, 2001.
a/ Burkina Faso, Congo (Dem. Rep.), Djibouti, Egypt, Ethiopia, Guinea, Guinea, Bissau, Lesotho, Libya, Malawi, Namibia, Reunion, Uganda.
b/ India, Indonesia, Iran, Myanmar, Nepal, Pakistan, Philippines, Thailand, Vietnam.
c/ Honduras, Panama, Puerto Rico, Argentina, brazil, Columbia, Paraguay, Peru.
d/ Austria, Belgium, Denmark, Finland, France, Germany, Greece Ireland, Italy, Luxembourg, Netherlands, Portugal, Spain, Malawi, Namibia, Reunion, Uganda.

Table 3—Agricultural Production per capita (indices: base 1989-91)

	1960s	1970s	1980s	1990s
China	58.65	64.06	87.57	134.09
Asia Developing less China	82.44	84.71	94.95	105.12
Africa Developing	108.84	103.23	96.10	102.10
SSA	115.74	108.28	98.32	101.09
LAC	84.69	89.94	98.00	108.22
Developing Countries	77.78	81.38	93.72	113.11
World	86.98	91.46	97.82	103.86

Source: FAOSTAT

The composition of agrifood exports from developing countries has changed during the last four decades (Table 4), notably with the emergence of fruits and vegetables, and oilseeds and products, as the more dynamic export products. These two categories jumped from about 20 percent of total agricultural exports in the 1960s, to slightly more than 35 percent during the 1990s. They displaced traditional export crops such as sugar and coffee-cacao-tea, which declined from about 35 to 40 percent of agricultural exports during the 1960s-1980s to about 25 percent during the 1990s. Although cereals exports constitute nearly 10 percent of total exports, developing countries, as a group, are net importers of cereals.

Table 4—Structure of Exports: All Developing Countries

	1961-65	1966-70	1971-75	1976-80	1981-85	1986-90	1991-95	1996-99
Cereals and Prep	9.12	9.21	8.72	7.57	9.31	6.58	8.22	9.42
Coffee+Tea+Cocoa+Sp.	22.94	23.84	20.16	28.29	22.29	20.42	13.91	15.22
Fruit + Vegetables	9.43	12.21	11.52	12.18	14.59	18.15	20.35	19.26
Meat and Meat Prep	3.53	4.78	4.96	3.98	4.42	4.72	6.00	5.46
Natural Rubber	7.14	5.81	4.95	5.43	4.38	4.54	4.18	3.64
Oilseed & Products	10.40	9.55	11.21	12.26	14.11	13.97	15.61	16.65
Sugar and Honey	10.79	9.58	16.85	12.73	12.26	9.65	6.71	6.24
Textile Fibres	14.74	13.23	10.63	7.27	6.56	6.72	4.29	3.29
Tobacco	3.13	2.73	3.01	2.78	3.37	3.88	6.58	6.36
Other	8.78	9.04	7.98	7.52	8.70	11.36	14.15	14.47
Total Agricultural Products	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00

Source: FAOSTAT

Within that general structure, there are important regional differences across Africa, Asia, and Latin America and the Caribbean (LAC) (see Diaz-Bonilla, Thomas, Robinson, and Yanoma 2002, for a more detailed analysis and supporting tables). African agricultural exports are still dominated by coffee-tea-cocoa, and have a larger incidence (about 10%) of textile fibers in total exports. Compared to other regions, Asia has a larger incidence of cereal exports, with about 13% of total exports. While all three regions are net exporters of fruits and vegetables, and coffee-tea-cocoa, LAC has a stronger net export position than the other regions in those products. Of the three regions, LAC has the larger incidence of meat exports (around 6% of total).

The combined import shares of cereals, oilseeds, dairy, and meat products together ranged between 50 to 57 percent of total agricultural imports during the 1960s to 1990s (Table 5). In the 1960s and 1970s, developing country imports of cereals represented almost 40 percent of their total agricultural imports, but those import shares slowly decreased to below 24 percent. Dairy products, on the other hand, maintained their share between 6 and 7 percent. Imports of oilseed and products have been increasing over time, and have reached 16 percent of total agricultural imports in the second half of the 1990s, but also have a slightly larger share in agricultural exports. On the import side there are also differences in structure across regions. Although all the regions are net importers of cereals and dairy products, Africa shows the larger incidence of imports of those products. In LAC, net imports of cereals and dairy are more than compensated by net trade surpluses in other agricultural products. Asia developing countries oscillate around positive and negative balances in agricultural trade. Overall, agricultural exports

and imports have also become more diversified in the regional groups (see Diaz Bonilla,

Thomas, Robinson, and Yanoma, 2002).

Table 5—Structure of Imports: All Developing Countries

	1961-65	1966-70	1971-75	1976-80	1981-85	1986-90	1991-95	1996-99
Cereals and Prep	38.28	38.19	39.15	32.48	32.43	26.08	23.70	23.96
Coffee+Tea+Cocoa+Sp.	5.49	5.57	3.92	4.78	4.09	4.12	3.62	3.39
Dairy Products+Eggs	6.61	6.65	6.27	6.97	7.60	7.47	6.73	6.02
Fruit + Vegetables	7.65	8.47	7.34	8.21	8.26	8.83	9.59	9.38
Meat and Meat Prep	3.01	3.46	3.49	5.10	6.12	5.97	5.93	5.92
Natural Rubber	2.33	2.10	1.60	1.62	1.20	1.71	1.41	1.36
Oilseeds&products	5.97	6.12	7.73	10.12	11.03	11.39	12.48	16.05
Sugar and Honey	7.15	4.85	8.74	7.32	6.38	5.73	5.39	5.23
Textile Fibres	8.30	7.62	7.11	6.91	5.70	7.44	7.24	6.20
Tobacco	3.09	3.16	2.54	3.16	3.31	4.39	5.76	5.26
Other	12.13	13.81	12.10	13.33	13.87	16.87	18.16	17.23
Total Agricultural Products	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00

Source: FAOSTAT

Except for rice, for which a few Asian countries' exports account for 70% of

world rice trade, the North, especially the U.S. and Canada, dominates world grain

exports. Exports of non-grain crops, such as vegetables and fruits, cotton, sugar, and

vegetable oil, are largely the domain of developing countries. Excluding intra-EU trade,

developing countries account for 60% to 80% of world exports of these commodities,

most of which are exported to the North. Due to such different export structures, the

pattern of competition of exports and imports between developed and developing

countries is complex and varies across countries and regions: some categories of

agricultural exports (but not all) of developing countries may not compete directly with

the exports of developed countries, but exports of industrialized countries compete with

grain and animal products in the domestic market of developing countries. As discussed

below, changes in those policies may have, at least in the short run, differentiated effects

on overall welfare, on one hand, and production, on the other, in developing countries due to the different effects on consumers and producers. The different positions taken by developing countries in the Doha Round negotiations have reflected this heterogeneity (Diaz-Bonilla, Diao, and Robinsons, 2003).

Developing countries export their larger share of agricultural exports to developed countries. But the shares differ by developing region (Table 6). Africa exports mostly to the EU and other African countries (57% and 14%, respectively). The export partners of Latin American developing countries are mostly the EU (34%) and US/Canada (26%), followed by LAC countries (18%), but with large differences from north to south in the Continent.[8] Developing countries in Asia, on the other hand, sell mostly to other developing countries in the region (37%), and only after that to Japan (20%) and the EU (17%). This diverse trade pattern implies that changes in trade and agricultural policies in industrialized countries will have very different impacts on developing countries. In particular, for Asia it may matter more what other developing countries in the region do.

McCalla and Valdes (1999) provide further evidence of heterogeneity by looking at individual countries: among 148 developing countries they identify 105 countries that are net food importers and 43 that are net food exporters (15 from the low income group). In total agriculture, 85 are identified as net importers and 63 as net exporters (33 from the low income group). Among the most vulnerable economic groups, over one third of UN-defined Least Developed Countries (LDCs) are net agricultural exporters, more than half of the low-income food deficit countries (LIFDC) are net agricultural exporters.

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[8] For instance 70% of Mexico's agricultural exports are oriented to US/Canada, while for Argentina and Uruguay only about a third of their exports go to developed countries.

Table 6—Direction of Agricultural Exports (average 1990/99)

Origin	Industrialized Countries	North America	EU(15) and EFTA(3)	Japan	Australia and New Zealand	Economies in Transition	Developing Countries	Africa	Developing Asia	LAC	Middle East	Other
Africa	70.7	5.4	57.0	3.5	0.3	4.5	29.3	14.3	9.2	1.4	3.3	1.0
Asia	51.3	8.7	16.8	19.8	1.5	4.4	48.7	4.0	36.9	1.1	6.2	0.5
LAC	68.3	25.8	34.0	3.2	0.3	5.0	31.7	3.3	6.4	17.6	3.7	0.7
Middle East	48.2	4.2	36.2	1.6	0.3	5.9	51.8	4.7	6.3	1.0	37.2	2.7
Total 4 developing regions	60.7	14.9	30.2	10.0	0.8	4.7	39.3	5.2	19.2	7.8	6.3	0.8

Source: Calculated from WTO 2001.

Similarly, Diaz-Bonilla, Thomas, Robinson, and Cattaneo (2000) using cluster analysis across a world sample of developed and developing countries, show the heterogeneity of food security conditions among developing countries. This study classifies 167 countries encompassing all levels of income into 12 clusters using five indicators of food security: food production per capita, the ratio of total exports to food imports, calories per capita, protein per capita, and the share of the non-agricultural population share. Developing countries appear scattered across all levels of food security and insecurity, except in the very high food-secure group. Among food-insecure countries, the profiles also differ: some are predominantly rural (mostly in Africa and South Asia) whereas for others the urban population is more important (like many countries in Latin America and the Caribbean and in transition economies). Obviously the same policy (such as maintaining high prices for producers) will have different impacts in these two types of countries. Also some countries are food insecure mostly because of low levels of calories and proteins per capita, although they do not use large percentages of their exports to buy food. In the terminology of Diaz-Bonilla, Thomas, Robinson, and Cattaneo (2000), these countries are "consumption vulnerable" but not "trade stressed." Other food-insecure countries are a mirror image: they appear trade stressed (using a large percentage of their exports to buy food) but less consumption vulnerable (their current levels of calories and proteins per capita are close to the average for all countries considered). Again, the policy options for these two types of countries are different, to the extent that the first group may increase imports to improve availability of calories and proteins, whereas the second group appears more constrained.

The analysis also suggests that some of the country categories utilized by the WTO may not be adequate to capture food security concerns, particularly the Net Food Importing Developing Countries, group that is split about 60%-40% between food insecure and food neutral groups. LDCs, on the other hand, include mostly countries suffering from food insecurity, but some countries that appear in food insecure categories, are neither LDCs nor NFIDCs.

3. DIFFERENCES ACROSS DEVELOPED COUNTRIES

Industrialized countries are also very different in terms of their agricultural sectors and policies. Table 2 already showed the differences in average farm size and land concentration. Japan and Korea show mostly small farms with a more egalitarian land distribution, while the USA and Canada have larger average holding and more unequal land structure, and the European Union is somewhere in between.

The share in world agricultural production (measured in 1989-1991 world prices) is about similar for the USA and the EU (15) at around 12-13% (Table 7). The size of their agricultural sector is smaller than China's but larger than India's the other two large individual agricultural producers. Looking at trade shares (Table 8), the USA has been losing market share in world exports while maintaining its import share. On the other hand, the change in the net trade position in the European Union during the 1980s as a result of the impact of the Common Agricultural Policy (CAP), has been one of the most dramatic developments in world agricultural markets: it significantly increased its export share, while reducing its participation in world imports. The result has been that EU's

net demand for agricultural products from the rest of the world (Chart 1), which amounted to about 30 billion dollars at the beginning of the 1980s (in current dollars), almost disappeared by the end of the 1990s.

Both Japan and Korea have been increasing slowly their import shares (Table 8), and their net trade (Chart 1), while Canada appears to have maintained both export and import shares about stable.

Table 7—Shares of World Agricultural Production

	(average 1991-2001)
USA	12.0
EU-15	12.8
Japan/Korea	1.8
China	20.1
India	9.5
Cairns Group (of which)	16.5
Canada	1.4
Australia/New Zealand	2.2
Indonesia	2.0
Thailand	1.1
Philippines	0.8
Argentina	1.9
Brazil	4.5
South Africa	0.6
Sub-Saharan Africa (of which)	4.9
Nigeria	1.2
Subtotal	77.6

Source: FAOSTAT

Table 8—Shares of Exports and Imports, Developed Countries

	Exports			**Imports**		
	1960-1980	1981-1994	1995-2001	1960-1980	1981-1994	1995-2001
United States of America	16.3	15.0	13.6	9.7	8.1	9.1
European Union (15)	28.1	41.0	42.5	47.2	43.8	41.4
Japan	0.4	0.4	0.4	7.1	7.9	8.2
Korea, Republic of	0.2	0.3	0.4	0.7	1.6	1.9
Canada	3.4	3.2	3.5	2.2	2.0	2.3

Source: FAOSTAT

**Chart 1—Net Agricultural Trade of Developed Countries, 1961-2001
(current values, million US dollars)**
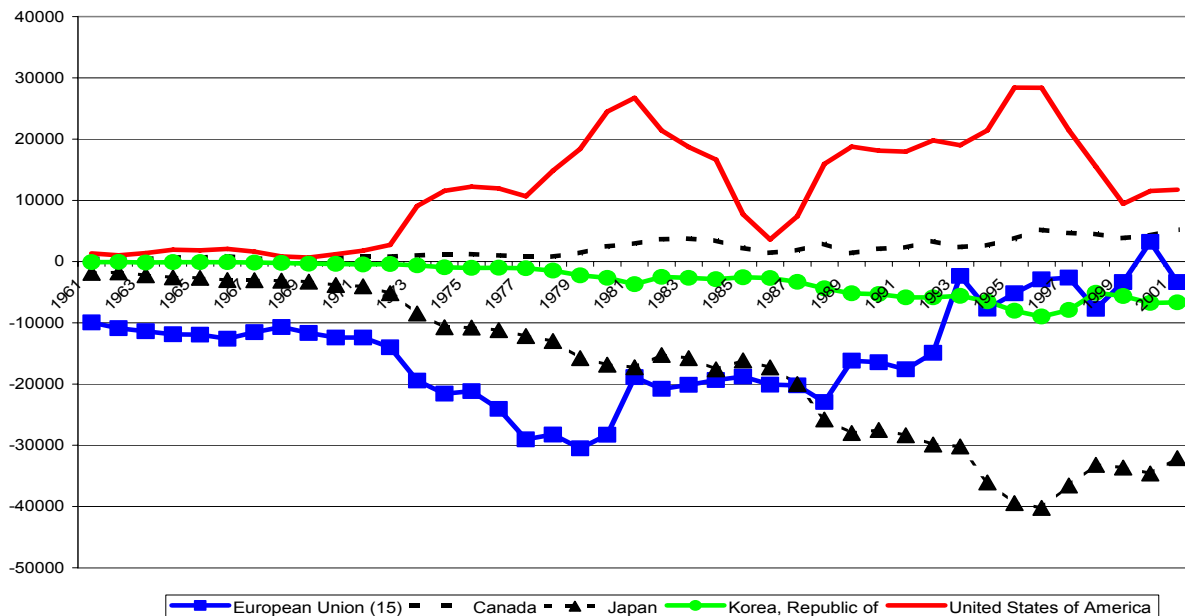
Developed countries also differ in their agricultural policies. A synthetic

indicator of market orientation is the Nominal Assistance Coefficient (NAC), calculated

by the OECD for different industrialized countries. A value of 1 indicates that all the

income received by farmers comes from the market, and any number above 1 indicates

transfers from consumers and/or taxpayers. [9] Japan and Korea have NACs above 2.5

indicating that farmers in those countries receive, on average, 150% more than the market

values (Chart 2). The NACs values for Canada, the US and the EU in 2000 indicate that

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[9] The NAC shows how much of the final price received by farmers comes from the market, valued at world prices, and how much the farmer receives as transfers from consumers (in the form of higher prices due to trade protection) or from taxpayers (as payments from the government). It does not include government's expenditures in general services such as research and extension, pest control, and the like. Another indicator of the OECD, which is quoted more often, is the Producer Support Estimate (PSE). In simplified terms, the PSE shows transfers (from consumer and taxpayers) as percentage of the full price received by the farmer (i.e. transfers (TR) divided by the sum of world price (WP) plus transfers, or TR/(WP +TR), then shown in percentages), while the NAC is the ratio of the sum of world price and transfers divided by the world price ((WP+TR)/WP).

farmers were receiving about 25%, 28%, 60% more than the market value. On average,
support to agriculture in those countries has not decreased much, if at all, since the mid
1980s when the Uruguay Round began, and at least in the case of Korea it has increased
above the 1986-87 levels (Chart 2). They appeared to have reached some temporary lows
around 1997 (due to high world agricultural prices in 1996-1997) but began to increase
again since then. This temporal pattern of support (with the low in transfers coinciding
with the world data baseline year of 1997 for the simulations) has implications for the
model results reported below.

Chart 2—Nominal Assistance Coefficients, Developed Countries, 1986-2000
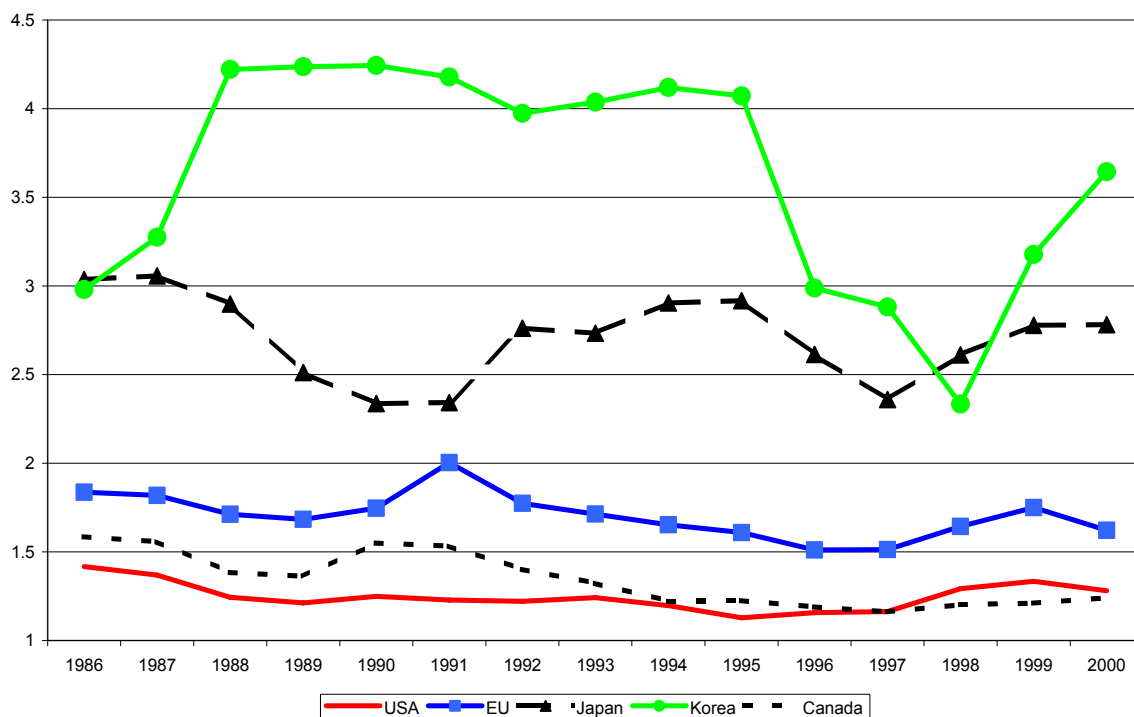
Besides the difference in levels, it is important to determine whether the transfers come from consumers or taxpayers, because they have different implications and treatment under the WTO legal system based on the three pillars of market access, domestic subsidies, and export subsidies. Transfers from consumers are caused by tariffs, quotas, and similar instruments that, within the WTO framework, are discussed under market access issues; transfers from taxpayers are some form of farm payments more or less linked to production, which are discussed under the rubric of domestic support or subsidies; while export subsidies have usually aspects of both, transfers from consumers (by maintaining domestic prices higher than would have been otherwise the case) and from taxpayers (due to the payment involved). Chart 3 shows the percentage of NAC that comes from consumers in those countries. In Japan and Korea, transfers to farmers come mostly from consumers (about 90%). For the European Union and Canada, the share of consumer transfers is still around 60% (although for Europe it represents a decline from about 80% in the mid-1980s), while for the US it has been around 50% and has dropped below 40% in 1999 and 2000. In terms of the WTO negotiations, these patterns imply that Japan and Korea rely mostly on market protection through high tariffs and small quota access (and are more concerned about market access liberalization), while the US uses more domestic subsidies (and is interested in maintaining the legal possibility of making those payments under domestic support disciplines), with European Countries and Canada in between.

Chart 3—Transfer from Consumers, Developed Countries, 1986-2000
(percent of total transfer to farmers)
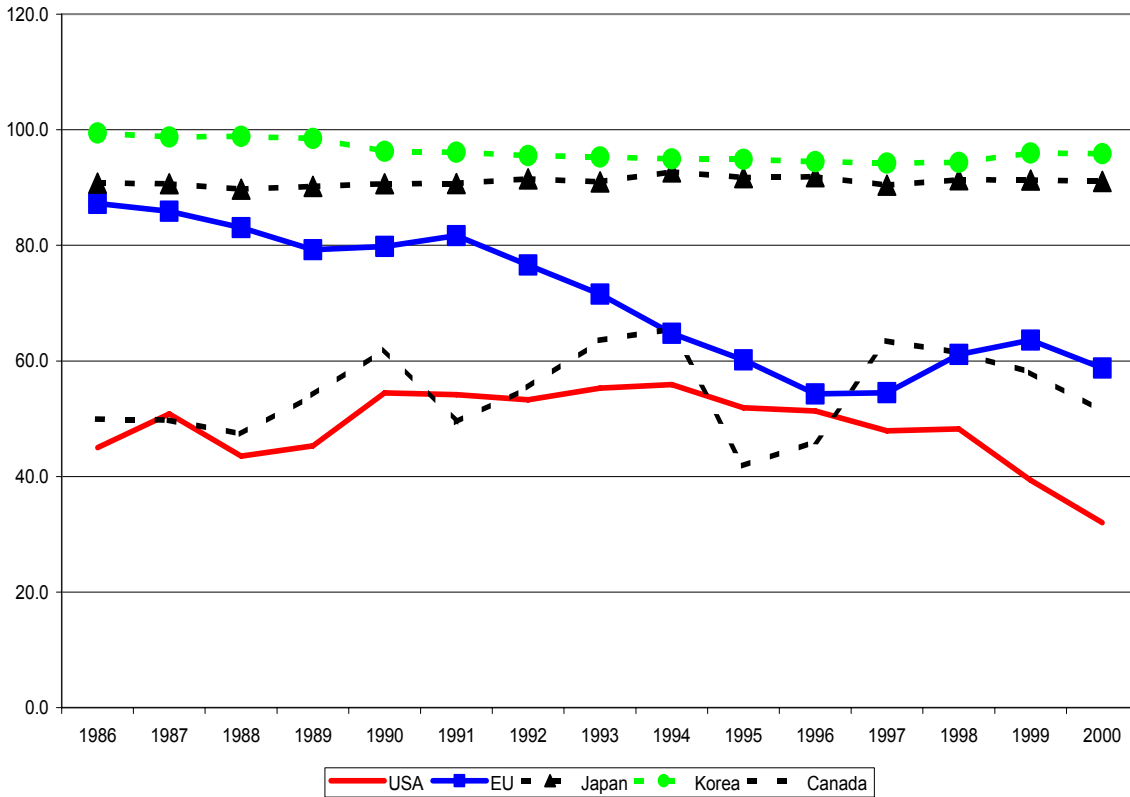
The NAC also varies by products in the different countries. Table 9 shows average NACs for wheat, feed grains, rice, oilseeds, sugar, milk, and beef and veal over the 1990s and the percentage that comes from the consumer. In general, the levels of transfers are the highest in Japan and Korea, except for the case of oilseeds and beef and veal in Japan, products in which the EU has larger transfers. Japan and Korea have maintained NACs in the 4-8 range for rice, and between 3-6 for milk, during most of the 1986-2001 period.

Table 9—NAC and Percentage of Transfer from Consumers (average 1990-2000)

	Wheat	Maize a/	Rice	Oilseeds	Sugar	Milk	Beef and Veal
NAC							
USA	1.61	1.26	1.53	1.12	2.15	2.04	1.04
EU	1.88	1.74	1.81	1.91	2.09	2.16	3.22
Japan	6.41	6.96	6.05	1.78	2.60	5.09	1.53
Canada	1.33	1.17	na	1.16	na	2.34	1.07
Korea	na	5.33	6.24	7.02	na	3.44	2.99
% Consumer Transfers							
USA	14	0	1	0	81	82	5
EU	28	53	67	0	75	80	59
Japan	74	74	81	0	82	82	76
Canada	19	2	na	11	na	79	na
Korea	na	86	89	88	na	89	89

Source: OECD, 2002.
a/ Other Grains for Japan and Korea

The EU has larger transfers than the US in all commodities (except sugar), with transfers close to, or above, 100% of market value, except for beef where transfers represent about 200% of market values. Transfers to farmers in those commodities are not only high but also rising in different commodities, such as rice for Japan and Korea, oilseeds for USA and Japan, and beef and veal for the EU and Korea. The method of transfer also differs, with Canada and the US relying more on domestic subsidies for grains and oilseeds, and also for beef and veal. Japan, Korea, and, to a lesser extent the EU, resort to consumers transfers for most of the commodities. The exceptions for the EU are oilseeds and wheat. Sugar and milk are uniformly supported through consumer transfers (border protection). Similar calculations for some other commodities of importance to developing countries, such as fruits and vegetables, are not as readily available.

The variety of situations in industrialized and developing countries in terms of agricultural structure, performance and policies means that the impacts of world trade liberalization are potentially very different by country. Identifying and measuring the extent of developing countries' gains and losses by region from liberalizing world agricultural markets are important for understanding the nature of their interest in trade reform, as well as for facilitating possible policies to minimize the losses of the adjustment process.

4.   MODEL AND SIMULATIONS

The framework of analysis is a computable general equilibrium (CGE) model with a multi-region and multi-sector specification. The base year is 1997 and most of the data come from the database of the Global Trade Analysis Project (GTAP), version 5 (Dimaranan, B. and R. McDougall, 2002).

The structure of this class of static world CGE is described in greater detail elsewhere (see for instance Diao, Diaz-Bonilla, and Robinson, 2002). The model focuses on the real side of the economy, including domestic production, consumption, real income and GDP within each country/region, and international trade flows across countries/regions. There are 40 developing countries or country groups (including transition economies and central European countries) in the model (see Annex 1). That is the maximum disaggregation of the GTAP database for those categories of countries. There are also five other industrialized countries or regions: the US (with Canada), the

EU (with EFTA), Japan (with Korea), Australia/New Zealand, and Other Developed.[10]

The model includes 17 agricultural and processed food products and the rest of activities

in the economy are aggregated in only one sector.[11]

Those products are either sold to the domestic markets, or exported to the other

countries/regions. On the demand side, there are four different types of demand:

intermediate demand, consumer demand, government demand, and investment demand.

All the demands are met either by domestic supply or imports. International trade is

traced by import destination and export sources, i.e., the bilateral and multilateral trade

flows among countries/regions are included in the model. There are 5 factors of

production: skilled labor, unskilled labor, capital, land, and other natural resources.

The main institutions of the model are as follows. First, there is a single private

household in each country that saves a constant proportion of disposable income and

buys consumption goods. Since there is only a single representative household, the model

can not be used to assess within-country distributional effects on income or other variable

resulting from trade liberalization. The assumed aggregate household in each country

owns the firms but also works there, receiving wages, distributed profits, and lump-sum

transfers (which may be negative) from the government. The government spends all its

tax revenues on consumption or lump-sum transfers to households. A capital account

collects savings and buys investment goods. Producers within a country/region are

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[10] Other Developed is a residual mostly from Asia (Hong Kong, Singapore). From now onwards the references, for brevity, will be to USA, EU, and Japan only.
[11] The complete list includes: Rice; Wheat; Other grains; Vegetables, fruit, and nuts; Oil seeds; Plant-based fibers; Other crops; Bovine cattle, sheep and goats, horses; Other animal products; Wool, silk-worm cocoons; Bovine meat products; Other meat products; Vegetable oils and fats; Dairy products; Sugar; Other food products; Beverages and tobacco products; Non-agricultural sector.

aggregated into one representative firm for each sector, which produces the respective good or service, buying intermediate goods and hiring factors of productions. In making production decisions, the firms choose the levels of labor and intermediate inputs to produce a single sectoral output, taking into account the price of sectoral outputs, the wage rate, the prices of intermediate inputs, and the existent stock of capital. Sectoral outputs are either sold in the domestic market or exported to foreign markets.

In a multi-region and multi-sector global model, with an Armington specification, the domestically produced and consumed good from each sector is different both from the export good generated in that same sector (with that differentiation captured through a CET function), and from the imported good corresponding to that sector (utilizing a CES function). The composite export and import goods from each sector are differentiated by country of origin/destination based on constant elasticity functions acting as an aggregator. Commodity trade flows are differentiated by their geographical and sectoral origin and destination.

Domestic and world markets for goods and services equilibrate through changes in endogenously determined prices. Domestic production and consumption prices interact with world prices, the real exchange rate per country, different levels of border protection, and, if applicable, consumption, production, and export subsidies.

Factor markets also equilibrate through the interaction of demand, supply and prices. In the simulations the supply of all factors of production other than labor are kept at the base levels, and there are no changes in inter-country savings and investments flows.

One innovation in the model developed herein is that the model assumes different labor market regimes for developed and developing countries. Following a long tradition in development analysis (see for instance Lewis, 1954) labor markets in developing countries are run considering the existence of significant unemployment, with non-flexible consumption real wages.[12] This approach differs from many exercises with this class of world trade models that consider full employment scenarios with flexible wages as the equilibrating variable in developing countries. In the case of developed countries the level of employment remains fixed at the base year, and wages change to clear labor markets. Returns to factors of production (including wages) may vary across sectors in the same country due to other imperfections in their markets that are modeled as invariant to the policy experiments discussed here.

A second specific dimension of the model is that it is assumed that trade liberalization affects country productivity through different channels such as: a) the learning-by-doing, access to new knowledge, and scale effects associated to increased exports; b) technological spillovers due to greater availability through imports of better capital and intermediate goods for production; and c) the increase in competition in previously protected domestic markets due to increased international trade (see the discussion of the links between trade, technology and productivity in Balassa, 1989; Grossman and Helpman, 1995; and Romer, 1994; for CGE applications with productivity linked to trade see, for instance, de Melo and Robinson, 1995).

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[12] The labor markets can be run with full employment (with wages as the equilibrating variable) or two alternative specifications with endogenous unemployment: one with nominal wages fixed and one with real wages fixed. The model reported considers the consumption real wage fixed, i.e. the nominal wages deflated by the consumer price index.

In each sector's value-added function that relates sectoral value-added Qt to the use of factors of production (e.g. labor (L), capital (K), natural resources (NR))[13], the model includes an endogenously determined variable for the level of total factor productivity (TFP):

$$Qt = TFPt*F_1(Lt, Kt, NRt,)$$

Within each country, sectoral TFPs depend on the ratio of total trade (exports plus imports divided by two) to GDP. A constant calculated at the base year embodies accumulated TFP up to that time, and β is the coefficient linking the trade ratio to TFP:

$$TFPt = Constant*(Trade/GDP)^\beta$$

The assumed annual elasticity of TFP growth to trade openness is 0.06 (see for instance Wacziarg, 1998). In this model it applies only to agricultural products (primary and processed). It implies that an increase of 10 percentage points in the ratio of trade openness, increases permanently the growth rate by 0.6% annually. The model is in levels and assumes an accumulation of annual growth over a medium run of five years. As a comparison the equivalent elasticity utilized by the World Bank (2001), in the Global Economic Prospects 2002, applying to both agriculture and industry, is about 0.2 per year. Dessus et al (1999) estimate a value of 0.09 that they apply to all sectors in their simulations.

The US dollar is the world numeraire (i.e. US nominal exchange rate is fixed at 1), and world prices are expressed in US dollars. Every country has its own nominal exchange rate, which floats against the dollar. There are also endogenously determined

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[13] Inputs are combined with value added through a Leontieff technology.

and country-specific numeraire price indices of domestic goods. The real exchange rate, defined as the ratio of the prices of traded goods to non-traded goods in each country/region, is also endogenous in the model. Capital inflows and components of the current account other than trade are considered fixed exogenously at the base levels. In addition to foreign savings, also domestic savings, and government consumption of goods and services are kept constant at base levels. In the simulations when import tariffs or domestic subsidies are removed, government transfers to consumers (which may be negative) adjust to maintain public accounts in equilibrium.

We use the world trade model to evaluate 5 basic scenarios in the simulations: 1) elimination of protection and subsidies[14] only in the US (and Canada); 2) only in the EU (and EFTA); 3) only in Japan (with Korea); 4) in all industrialized countries at the same time, but not developing countries; 5) in all countries in the world. Unfortunately, the data available on tariffs did not allow us to take account of existing preferential access which can be important for some developing countries, as more recent studies have shown. To the extent that tariff preferences are important, our results will overestimate the positive and underestimate the negative effects of liberalization by a developed country or region. Conversely, relatively low levels of subsidies and protection in our base year (as noted above) implies that our results may underestimate the positive effects of liberalization. With these caveats in mind, the simulations can be interpreted as the gains (or losses, as the case may be) of changing the current policies, or the losses (gains) of maintaining current policies. The simulations consider each one of those

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[14] The simulations consider the full elimination of protection (tariffs and tariff-equivalent trade barriers), trade-distorting domestic subsidies, and export subsidies.

countries/regions only, one at a time. Simulations for all industrialized countries include those three countries/regions at the same time, plus others, such as Canada and Australia.[15] Each one of those scenarios is run first without, and then with, productivity effects from trade liberalization on agricultural products only.[16]

5.   RESULTS

BACKGROUND

Tables 10 to 20 show the results of the simulations for different variables of interest: welfare, total real GDP, agricultural and agroindustrial real GDP, net trade and exports, agricultural consumption, and the ratio of agricultural imports to total exports. In economic terms, welfare is considered the broadest synthetic indicator measuring additional consumption that occurs with the simulated policies.[17] It is important to have adequate macroeconomic closures to avoid misleading results such as when consumption (and welfare) increases but only because the model allowed to run down assets or accumulate liabilities (see Lofgren et al, 2002). The consumption-based welfare measure accounts for the combination of both additional production and the changes in prices of goods and services that determine the real purchasing power of the additional incomes

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[15] Because of the complexities of agricultural trade and countries' trading practices, the effects of liberalization will change depending on which markets are being liberalized. Consequently, individual scenarios depicted in the model simulations should not necessarily add up to the total when all industrialized countries liberalize their markets.

[16] Contrary to what has been assumed in much of the development literature, productivity in agriculture has been growing faster than in industry in developing countries (see Mitra and Martin, 1999). Including all sectors produce stronger results in terms of increased welfare.

[17] The measure can be constructed as the minimum payment that the consumer would require for foregoing the policy change (with that payment the consumer is as well off under base prices and income as he/she would have been if the change had taken place) or the maximum payment the consumer would be willing to make to avoid
having the simulated change undone (after the payment the consumer would be just as well off as without the change).

resulting from expanded production. At the aggregate national level, this implies that changes in national product must be adjusted by changes in the terms of trade.

Total GDP presents a general value of production, which for an economy not changing assets or liabilities in the policy experiment (as it should), differs from the previous measure mainly because of terms of trade adjustments. Some analysts prefer to emphasize this production focused indicator rather than the previous one, oriented to consumption.

Besides the issue of general GDP, which includes agricultural and non-agricultural activities, many countries and development advocates, may be more interested in the GDP generated in agriculture-related sectors. After all, some 60% of the total population in developing countries lives in rural areas, as it is the case with about three-fourths of the 1.2 billion people living with less than $1/day (IFAD, 2001). Therefore, the simulation results reported also include changes in agricultural and agroindustrial value added.

WTO negotiations are obviously interested in changes in trade variables. Here, as mentioned, the two indicators presented are net agricultural trade (exports minus imports) and total agricultural exports. Another important topic in trade liberalization is the impact on food security. The two final indicators presented (agricultural consumption, and the ratio of agricultural imports to total exports) are related to food security at the national levels (see the discussion of different indicators in Diaz-Bonilla, Thomas, Robinson, and Cattaneo, 2000).

All these variables measure different things and may move in different directions. Welfare may fall even as GDP increases if terms of trade decline significantly. Agricultural-related GDP may increase while total GDP decline, if the policies are expanding the first sector beyond its more efficient levels, drawing resources from other parts of the economy. Net agricultural trade may increase, while at the same time indicators of food security, such as food consumption or the ratio of food imports over total exports, may deteriorate. With those caveats in mind, the different indicators are discussed separately.

WELFARE

Tables 10 and 11 present the welfare impacts resulting from changes of agricultural and trade policies. The elimination of policy distortions only in industrialized countries benefit all developing regions, for a total of about 4 billion dollars of net gains. The exceptions is the region of Turkey, North Africa and the Middle East (TNAME, from now onwards),[18] which show losses of about 1.9 billion dollars. Several countries in this region face constraints to expand agricultural production, and the negative terms of trade effect appears to be larger than the gains from more efficient allocation of resources plus the employment effect.

Without TNAME the welfare gains for the rest of the developing countries amount to about 5.9 billions. Assuming productivity effects for agricultural products, net welfare gains go up to 9.4 billion dollars, but TNAME still shows net losses of

[18] North Africa here includes Morocco (which is disaggregated in the GTAP database) and Rest of North Africa (which includes Algeria, Egypt, Libya, and Tunisia). Middle East is also an aggregate region in GTAP (Annex 1).

somewhat less than 1.8 billion dollars. However, when developing countries eliminate

their own protection and distortions, there are net welfare gains for all developing regions

of about 10.5 billions that increase even further to almost 20 billion dollars if productivity

effects from agricultural trade liberalization are considered. The negative impact on

welfare of TNAME from increases in world prices due to the liberalization in

industrialized countries is compensated by reduction in their own trade protection, for a

net gain to the consumers (which is what the welfare indicator is measuring), even before

considering productivity effects. The implied division of welfare gains in developing

countries between how much of those gains come from agricultural liberalization in

industrialized countries and how much from their own liberalization is about 50/50 (with

productivity gains) and about 40/60 (without TFP effects). It has been already noticed

that in several other simulations (see for instance, World Bank, 2001, Tokarick, 2003)

most of the benefits (typically more than 75% of welfare gains) come from the change in

developing countries' own policies.

Table 10—Welfare by Regions (change from base, millions of constant US dollars)

	Liberalization in:									
	US	US plus TFP	EU	EU plus TFP	Japan	Japan plus TFP	All DCs	All DCs plus TFP	All countries	All countries plus TFP
Asia Developing	-832	244	526	679	1421	1446	1127	1955	3004	5219
LAC	200	1618	2536	4733	607	616	3409	7268	4513	10119
SSA	99	295	421	512	107	107	635	916	1244	1739
(SSA without South Africa)	129	297	359	427	121	121	627	856	1072	1487
Transition Economies	-26	145	452	523	112	113	571	793	1347	1734
Turkey, North Africa, Middle East	-708	-458	-861	-814	-263	-263	-1912	-1770	286	690
RoW	-22	94	139	165	28	28	152	285	136	389
Total Developing	-1290	1939	3212	5796	2012	2047	3982	9449	10530	19891

Table 11—Welfare by Countries (change from base in %)

	US	US plus TFP	EU	EU plus TFP	Japan	Japan plus TFP	All DCs	All DCs plus TFP	All countries	All Countries plus TFP
China	-0.1	-0.1	0.0	0.0	0.1	0.1	0.0	0.0	0.2	0.3
Indonesia	-0.1	0.0	0.0	0.0	0.0	0.0	-0.1	0.0	0.0	0.1
Malaysia	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.2	0.4	0.4
Philippines	-0.1	0.0	0.0	0.0	0.2	0.2	0.1	0.1	0.0	0.1
Thailand	0.1	0.1	0.1	0.1	0.4	0.5	0.6	0.7	0.9	1.0
Vietnam	0.2	0.2	0.0	0.0	0.2	0.2	0.5	0.5	1.2	1.2
Bangladesh	-0.1	0.0	-0.1	-0.1	0.0	0.0	-0.2	-0.2	0.0	0.2
India	0.0	0.2	0.1	0.1	0.0	0.0	0.1	0.3	0.2	0.5
Sri Lanka	-0.2	-0.1	-0.1	-0.1	0.1	0.1	-0.2	-0.2	0.2	0.4
Other South Asia	-0.1	0.0	0.1	0.1	0.0	0.0	0.0	0.1	0.2	0.4
México	-0.2	-0.2	0.1	0.1	0.0	0.0	-0.1	-0.1	0.0	0.0
Central America and Caribbean	0.3	0.4	0.5	0.5	0.3	0.3	1.1	1.2	0.9	1.1
Colombia	0.0	0.2	0.1	0.1	0.0	0.0	0.1	0.3	0.2	0.4
Peru	0.0	0.1	0.2	0.3	0.0	0.0	0.2	0.4	0.2	0.4
Venezuela	-0.1	-0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.1
Rest of Andean Pact	0.2	0.3	0.2	0.3	0.0	0.0	0.5	0.6	0.8	1.1
Argentina	0.1	0.2	0.3	0.6	0.0	0.0	0.3	0.8	0.5	1.2
Brazil	0.0	0.1	0.1	0.3	0.0	0.0	0.2	0.5	0.2	0.6
Chile	0.1	0.2	0.1	0.1	0.0	0.0	0.2	0.3	0.4	0.5
Uruguay	0.1	0.2	0.6	0.8	0.1	0.1	0.8	1.1	1.3	1.8
Rest of South America	0.3	0.4	1.2	1.4	0.0	0.0	1.6	1.9	1.8	2.2
Hungary	0.0	0.0	1.3	1.4	0.1	0.1	1.5	1.5	1.8	1.9
Poland	0.0	0.0	0.4	0.5	0.0	0.0	0.4	0.5	0.6	0.7
Rest of C. European Associates	0.0	0.0	0.1	0.1	0.0	0.0	0.1	0.2	0.3	0.4
Former Soviet Union	0.0	0.0	-0.1	-0.1	0.0	0.0	-0.1	-0.1	-0.1	0.0
Turkey	0.0	0.0	0.1	0.1	0.0	0.0	0.1	0.2	0.3	0.4
Middle East	-0.1	-0.1	-0.2	-0.2	-0.1	-0.1	-0.4	-0.4	0.0	0.1
Morocco	-0.1	0.0	0.1	0.2	0.0	0.0	0.1	0.2	0.1	0.4
Rest of North Africa	-0.1	-0.1	-0.2	-0.2	0.0	0.0	-0.3	-0.3	-0.3	-0.2
Botswana	0.0	0.0	0.0	0.0	0.1	0.1	0.0	0.1	0.2	0.2
South Africa and Rest of SACU	0.0	0.0	0.1	0.1	0.0	0.0	0.0	0.1	0.2	0.2
Malawi	0.3	0.6	0.1	0.4	0.0	0.0	0.4	1.1	0.7	1.5
Mozambique	0.3	0.9	0.4	0.5	0.1	0.0	0.7	1.5	0.9	1.8
Tanzania	0.2	0.4	0.7	0.9	0.1	0.1	1.0	1.5	1.7	2.7
Zambia	0.0	0.1	0.4	0.6	0.0	0.0	0.4	0.6	0.4	0.6
Zimbabwe	0.1	0.2	0.5	0.6	0.0	0.0	0.6	0.7	3.7	4.4
Other Southern Africa	-0.1	-0.1	0.6	0.7	0.1	0.1	0.6	0.7	0.9	1.0
Uganda	0.1	0.5	0.3	0.6	0.0	0.0	0.5	1.2	0.6	1.7
Rest of SubSaharan	0.1	0.1	0.1	0.1	0.1	0.1	0.3	0.3	0.4	0.5
Rest of the World	0.0	0.0	0.1	0.1	0.0	0.0	0.1	0.1	0.1	0.2

In Table 11 the disaggregated welfare effects show that trade liberalization by industrialized countries, has positive effects on most developing countries (including Turkey that before appeared together with the North Africa and Middle East regions), with some exceptions: in addition to the negative effect on Rest of North Africa and Middle East, there are some negative impacts on Indonesia, Bangladesh, Sri Lanka, Mexico and the group of countries of the Former Soviet Union (see Annex 1). However, once these countries liberalize their own agriculture, all negative signs disappear except for the Former Soviet Union and the Rest of North Africa. If, in addition, productivity effects are incorporated, only the Rest of North Africa still shows a small negative sign. This is a heterogeneous region that combines oil producers with a large net importer of cereals such as Egypt, a country that would also benefit from better market access to developed countries in other agricultural products. It would be important that in future versions of the GTAP data base Egypt is considered separately.[19] This is still a second-best result considering that the simulations do not include liberalization of the industrial sector, which in some cases, as textiles, may be important for some of the countries in the region.

Looking at the impact of different industrialized countries' policies, liberalization of the European Union brings the larger aggregate gains in welfare for developing countries as a whole (some 3.2 billion dollars, that go up to 5.8 billion if productivity effects are considered), with the larger gains accruing to Latin America and the Caribbean (Table 10). The next larger effects is for Japan (about 2 billion dollars, with or

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[19] For instance simulations with a dynamic CGE model for Egypt alone suggest that expanding market access for agricultural products (particularly in the European Union) have strong positive effects on growth and poverty alleviation (see Moataz El-Said, Hans Lofgren and Sherman Robinson, 2001). Also it can be noticed that for Morocco, which appears as an individual country, the results are positive.

without productivity effects), which benefits mostly Asia. Liberalization in the US

without productivity effects shows an aggregate negative welfare effect (-1.3 billion),

resulting basically from the negative impacts on China (about 670 million), Mexico

(some 520 million), and the Middle East (about 510 million). Not counting these

countries/regions, the aggregate is positive (about 400 million dollars). Considering

productivity effects the net welfare for developing countries from elimination of US

protection and subsidies now turn positive in about 1.9 billion dollars. Looking at the

disaggregation in Table 11 the results of liberalization (counting productivity gains) in

Europe generates the largest number of positive values (29 cases over 40), followed by

US (19), and then Japan (13). The largest number of negatives comes from the

liberalization of US policies (7), followed by the EU (5) and Japan (1)—with other values

essentially zero. The positive welfare impacts of liberalization in the EU appear to be

larger for Africa[20] (in percentage of base consumption), followed by LAC. The same

pattern applies to the US, although the percentage values are smaller. The positive

impact of Japan concentrates in Asia.

The differences in welfare impact from liberalizing industrialized countries

agricultural policies (such as the US versus the EU) is due to the different combination of

instruments and products. Domestic and export subsidies from industrialized countries

affect producers in developing countries but may help consumers there, at least on the

demand side through lower world prices (there is still the question of displaced

production and employment opportunities, but the relative balance of both effects will

vary by country). Market protection in industrialized countries, although it may also

have a depressing effect on world prices (and in that case would also benefit consumers),

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[20] See Annex 1 for the composition of "Other Southern Africa" and "Rest of Sub-Saharan Africa."

appears to have a larger negative impact on production and export opportunities of developing countries. As indicated, the consumption-based welfare measure combines both the potential additional income from higher production and employment and the benefits to consumers from lower prices. These two effects need not move in the same direction, with the possibility that a reduction (expansion) in production and employment may be more than compensated by lower (higher) domestic prices for an overall welfare gain (loss).[21]

It has been noted that US uses relatively more domestic subsidies, and they concentrate more on cereals, which for a number of developing countries constitute an important component of food imports and an input to other activities (such as animal feed). Therefore for some countries there may be a negative impact on the consumption side but also on the production of other activities that use grains as inputs. The US (with Canada) also have relatively lower levels of market protection than other industrialized countries. The EU/EFTA and Japan/Korea, on the other hand, rely more on market access restrictions, and, in the case of the European countries, market access restrictions cover a larger number of commodities. Therefore, liberalization of agriculture in the EU and Japan has a more uniform positive welfare effect than similar changes in the US (see Table 9 and Chart 3). However, it should be noticed that in the benchmark year 1997, the 2002 US Farm Bill was still not in place, and, the US did not have large cotton subsidies,

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[21] Other simulations (for instance, Dimaranan, Hertel, and Keeney, 2003) have estimated that reduction of agricultural protection in industrialized countries have larger positive welfare gains for developing countries compared to the elimination of domestic subsidies in rich countries (which in fact, in those simulations with a full employment specification, may result in welfare losses for several developing countries).

that later emerged as an important issue for developing countries, particularly in Africa (see Minot and Daniels, 2002).[22]

In general, it should also be noticed, that all developed countries in the 1997 year had the lowest level of domestic support and transfers for most of the decade (see Chart 2), which would lead to the underestimation of the positive effect on developing countries of the elimination of current and higher distortions in industrialized countries.

TOTAL GDP

The elimination of policy distortions only in industrialized countries increases GDP in all developing regions by about 8.6 billion dollars (Table 12). Again the exception is the TNAME region with losses of about 600 million dollars. As indicated this region faces constraints to expand primary agricultural production and because in this simulation developing countries maintain their own protection, higher prices in world markets affect activities that now must use more costly agricultural raw materials (including several agroindustrial productions, but also other primary agricultural activities, such as some livestock and dairy productions that may use grains as inputs). Assuming productivity effects for agricultural products, total GDP increases by about 14.3 billion dollars, with TNAME still showing a net loss of some 500 million dollars. However, when developing countries eliminate their own protection and distortions, GDP increases for all developing regions by about 28.6 (without productivity effects) to some 38 billions (with productivity effects). The differences in welfare (consumption) and GDP (production) results result from price and terms-of-trade effects.

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[22] These subsidies on a product that is not utilized internally by the low income producers in Africa, lead to welfare losses by displacing production without compensatory welfare effects from lower domestic prices.

The larger expansionary effects on the GDP of developing countries' regions result from the elimination of protection and subsidies in the European Union, and LAC is the region that shows largest GDP gains. Agricultural liberalization in the US shows negative effects on GDP for developing countries as a whole due to the negative impact on Asia and TNAME, but only if productivity effects are not considered. As indicated above, agricultural liberalization in the US concentrates relatively more on grains. These are inputs to other activities that may be affected negatively by higher prices of those inputs.

Table 13 looks at the disaggregated GDP effects. The elimination of protection and subsidies in industrialized countries have positive effects on most developing countries and developing countries' regions, with the exception of Middle East, Bangladesh, Sri Lanka, the countries of the Former Soviet Union (although the small negative impact disappears once productivity gains are considered), Botswana, and Other Southern Africa. For another 3 developing countries or regions the impact is about zero. But again, once these countries liberalize their own agriculture all negative signs (and zeroes) disappear even without factoring productivity gains. Liberalizing agriculture only in developed countries while maintaining protection and subsidies in developing countries seems to lead to a larger expansion of agriculture in the latter countries than what would be efficient, limiting the expansion of total GDP. When agriculture is also liberalized in developing countries, resources are utilized more efficiently across the whole economy, leading to an expansion of total GDP.

Table 12—GDP by Developing Regions (change from base, millions of constant US dollars)

	US	US plus TFP	EU	EU plus TFP	Japan	Japan plus TFP	All DCs	All DCs plus TFP	All countries	All countries plus TFP
						Liberalization in:				
Asia Developing	-363	590	1442	1530	2402	2445	3611	4328	10498	12354
LAC	172	1751	2679	5116	554	564	3469	7780	7433	13639
SSA	121	274	442	523	119	105	696	928	1740	2169
(SSA without South Africa)	143	274	364	423	141	127	673	850	1473	1823
Transition Economies	14	182	990	1044	119	119	1176	1416	4332	4700
Turkey, North Africa, Middle East	-375	-154	66	71	-260	-260	-613	-520	3898	4218
ROW	0	99	222	247	25	25	271	395	691	913
Total Developing	-430	2742	5840	8532	2958	2997	8609	14327	28592	37993

Table 13—GDP by Developing Countries (change from base in %)

	Liberalization in:									
	US	US plus TFP	EU	EU plus TFP	Japan	Japan plus TFP	All DCs	All DCs plus TFP	All countries	All countries plus TFP
China	0.0	0.0	0.1	0.1	0.2	0.2	0.2	0.2	0.7	0.7
Indonesia	0.0	0.0	0.1	0.1	0.0	0.0	0.1	0.1	0.3	0.3
Malaysia	-0.1	0.0	0.0	0.1	0.2	0.2	0.1	0.2	0.7	0.7
Philippines	-0.2	-0.1	0.0	0.0	0.2	0.2	0.1	0.1	0.7	0.8
Thailand	0.1	0.1	0.1	0.1	0.4	0.4	0.6	0.7	1.2	1.3
Vietnam	0.3	0.3	0.0	0.0	0.2	0.2	0.6	0.6	1.5	1.5
Bangladesh	-0.1	-0.1	-0.1	-0.1	0.0	0.0	-0.2	-0.2	0.4	0.5
India	0.0	0.1	0.1	0.1	0.0	0.0	0.2	0.3	0.3	0.6
Sri Lanka	-0.2	-0.1	-0.1	-0.1	0.1	0.1	-0.2	-0.2	0.6	0.8
Other South Asia	0.0	0.1	0.1	0.1	0.0	0.0	0.2	0.2	0.5	0.7
Mexico	-0.1	-0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.2	0.2
C. America and Caribbean	0.4	0.5	0.5	0.6	0.3	0.3	1.3	1.4	1.8	2.0
Colombia	0.0	0.2	0.1	0.1	0.0	0.0	0.1	0.3	0.4	0.7
Peru	0.0	0.1	0.1	0.2	0.0	0.0	0.2	0.3	0.4	0.6
Venezuela	-0.1	-0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.3	0.3
Rest of Andean Pact	0.3	0.4	0.3	0.3	0.0	0.0	0.6	0.7	1.4	1.6
Argentina	0.1	0.2	0.2	0.6	0.0	0.0	0.3	0.8	0.5	1.3
Brazil	0.0	0.1	0.1	0.3	0.0	0.0	0.1	0.4	0.2	0.7
Chile	0.1	0.2	0.1	0.1	0.0	0.0	0.2	0.3	0.5	0.6
Uruguay	0.1	0.2	0.5	0.6	0.1	0.1	0.6	0.9	1.6	2.1
Rest of S.America	0.5	0.5	1.5	1.7	0.0	0.0	2.1	2.4	3.7	4.1
Hungary	0.0	0.0	1.6	1.6	0.0	0.0	1.7	1.8	2.4	2.5
Poland	0.0	0.0	0.5	0.5	0.0	0.0	0.5	0.6	1.1	1.2
Rest of C. European Assoc.	0.0	0.0	0.3	0.3	0.0	0.0	0.3	0.3	0.8	0.8
Fr. Soviet Union	0.0	0.0	-0.1	-0.1	0.0	0.0	-0.1	0.0	0.3	0.4
Turkey	0.0	0.0	0.2	0.2	0.0	0.0	0.2	0.2	0.6	0.6
Middle East	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.3	-0.3	0.6	0.6
Morocco	0.0	0.1	0.4	0.4	0.0	0.0	0.4	0.5	0.7	1.0
Rest of N. Africa	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.4
Botswana	0.0	0.0	-0.2	-0.2	0.1	0.1	-0.2	-0.1	0.1	0.2
South Africa, Rest SACU	0.0	0.0	0.1	0.1	0.0	0.0	0.0	0.1	0.2	0.3
Malawi	0.3	0.6	0.1	0.4	0.0	0.0	0.4	1.0	0.7	1.4
Mozambique	0.3	0.7	0.3	0.4	0.0	0.0	0.6	1.2	0.9	1.6
Tanzania	0.2	0.4	0.7	0.9	0.1	0.1	1.1	1.5	2.1	2.9
Zambia	0.0	0.0	0.5	0.6	0.0	0.0	0.5	0.7	0.5	0.7
Zimbabwe	0.2	0.2	0.4	0.5	0.0	0.0	0.6	0.7	4.2	4.9
Other Southern Africa	-0.2	-0.1	-0.3	-0.2	0.1	0.1	-0.3	-0.2	0.2	0.4
Uganda	0.1	0.5	0.4	0.6	0.0	0.0	0.5	1.1	0.8	1.6
Rest of SubSaharan	0.1	0.1	0.2	0.2	0.1	0.1	0.4	0.4	0.6	0.7
Rest of the World	0.0	0.0	0.1	0.1	0.0	0.0	0.1	0.2	0.3	0.4

As before, reduction in protection and subsidies in the EU benefits the largest

number of developing countries (31 positives, 6 negatives, and 3 about unchanged),

followed by the US (20 positive, 7 negative, and 13 unchanged). Liberalization in Japan

leaves unaffected the largest number of developing countries, with most of the positive

effects appearing in the Asian region.

AGRICULTURAL GDP

Considering the importance of agriculture in developing countries, and the

significance of rural poverty, it seems important to analyze the impact of agricultural

liberalization on value added in that sector (including agroindustrial activities). Table 14

shows the changes in agricultural value added in constant dollars[23] (i.e. payment to

factors of production in agriculture and food processing production in developing

countries, but not counting related jobs in transportation, commerce, and non-agricultural

inputs) if current policies were modified. For developing countries as a whole,

agricultural value added increases by between 20.3 billion dollars (no productivity

effects) to almost 23 billion dollars per year (with productivity effects) when

industrialized countries eliminate their subsidies and protection, with the largest increase

in production (in absolute value) taking place in LAC (between 6.1 to 7.9 billion dollars)

followed by Asia (5.9 to 6.4 billion dollars). However, calculated as percentage of the

value added the impact is larger for SSA: between 3.1-3.4%, while for LAC is between

2.2-2.9% and for Asia is less than 2%. Changes in EU policies have the largest impact

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[23] Other simulations presented in Diao, Diaz-Bonilla, and Robinson, August 2003 are in nominal values,
i.e. the constant values presented here adjusted by the corresponding price deflator resulting from the
simulations. The nominal values have been reported widely in the press.

overall (between 11.4 and 12.6 billion dollars), followed by the US (between 5-6.7 billion dollars) with the most important negative effects (in absolute values) of maintaining current policies being felt by LAC. Japan's policies affect mostly other Asian countries: more than 2/3 of the displacement of production if current policies are maintained takes place there.

SSA is hurt relatively more by EU policies: while total displacement of agricultural and agroindustrial value added (resulting from current agricultural policies in industrialized countries) amounts to 1.7-1.9 billion dollars for that region, EU alone would displace between 1.2-1.3 billion dollars of agricultural value added.[24]

Table 15 shows the percentage changes for all 40 developing countries and regions included in the model. Primary agriculture and agroindustrial production expands in all developing countries when industrialized countries reduce their agricultural protection and subsidies. These results have implications for the debate, mainly in rich countries, about the "multifunctional" effects of agriculture, i.e. the notion that additional positive results flowing from agriculture – such as beautiful landscapes or environmental protection – justify its subsidization and protection. It seems clear that subsidies and protection in rich countries displace agricultural production in developing countries, which, if the argument about the multifunctional nature of agriculture were true, would imply that those effects, along with the displaced production, are also negated to developing countries (see Díaz-Bonilla E. and J. Tin 2002).

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[24] As already indicated, individual scenarios in the simulations should not necessarily add up to the total when all industrialized countries liberalize their markets. Therefore the comparison in the text is just an approximation.

Table 14—Agricultural Value Added by Developing Regions (change from base, millions of constant US dollars)

	US	US plus TFP	EU	EU plus TFP	Japan	Japan plus TFP	All DCs	All DCs plus TFP	All countries	All countries plus TFP
					Liberalization in:					
Asia Developing	1528	2228	1945	2021	2214	2235	5929	6462	4882	6275
LAC	2169	2863	3231	4244	552	558	6078	7936	6403	9153
SSA	341	458	1210	1267	140	141	1738	1911	1880	2190
(SSA without South Africa)	288	397	905	956	76	76	1299	1458	1433	1728
Transition Economies	241	305	2375	2402	183	183	2872	2953	2520	2667
Turkey, North Africa, Middle East	635	750	2217	2206	110	110	3094	3092	960	1069
RoW	64	124	423	437	46	46	552	621	405	534
TOTAL	4977	6728	11402	12577	3246	3273	20263	22977	17050	21887

Note: Includes primary and agroindustrial sectors.

Table 15—Agricultural Value Added by Developing Countries (change from base in %)

	Liberalization in:									
	US	US plus TFP	EU	EU plus TFP	Japan	Japan plus TFP	All DCs	All DCs plus TFP	All countries	All countries plus TFP
China	0.4	0.5	0.4	0.4	0.6	0.6	1.5	1.5	0.5	0.7
Indonesia	0.3	0.5	0.5	0.5	0.3	0.3	1.1	1.2	1.2	1.4
Malaysia	0.6	0.8	1.1	1.0	0.4	0.4	2.4	2.4	6.7	6.8
Philippines	0.6	0.7	0.4	0.4	0.2	0.2	1.3	1.4	-0.1	0.1
Thailand	2.0	2.2	2.3	2.3	5.8	6.0	10.3	10.7	11.6	12.2
Vietnam	1.2	1.3	0.8	0.8	0.6	0.6	2.8	2.9	6.2	6.4
Bangladesh	0.3	0.4	0.2	0.2	0.1	0.1	0.6	0.6	-0.1	0.2
India	0.2	0.5	0.4	0.4	0.1	0.1	0.7	1.1	0.7	1.4
Sri Lanka	0.1	0.3	0.3	0.3	0.2	0.2	0.6	0.7	0.8	1.3
Other South Asia	0.3	0.5	0.5	0.6	0.1	0.1	1.0	1.2	0.6	1.1
México	1.0	1.1	0.6	0.6	0.2	0.2	1.8	2.0	1.0	1.2
C. America and Caribbean	3.8	4.2	3.3	3.4	1.1	1.1	8.3	9.0	7.6	8.7
Colombia	1.0	1.5	0.5	0.6	0.1	0.1	1.6	2.1	1.5	2.3
Peru	0.7	1.0	1.7	2.1	0.2	0.2	2.6	3.2	2.5	3.3
Venezuela	0.6	0.7	0.4	0.4	0.0	0.0	1.1	1.2	0.2	0.3
Rest of Andean Pact	1.8	2.2	1.0	1.2	0.2	0.2	3.0	3.6	4.2	5.4
Argentina	0.3	0.6	1.1	1.9	0.1	0.1	1.5	2.6	2.3	4.1
Brazil	0.4	0.6	1.1	1.5	0.2	0.2	1.7	2.4	1.9	2.9
Chile	0.8	1.0	1.1	1.2	0.2	0.2	2.3	2.5	3.2	3.6
Uruguay	0.6	0.7	2.8	3.3	0.4	0.4	3.8	4.6	6.6	8.3
Rest of South America	2.5	2.8	10.5	11.8	0.1	0.1	13.3	15.0	14.7	17.1
Hungary	0.4	0.5	13.3	13.6	0.7	0.7	14.5	15.0	16.6	17.3
Poland	0.2	0.3	4.2	4.3	0.1	0.1	4.6	4.8	4.5	4.9
Rest of Centr.Europ.Assoc	0.2	0.3	2.8	2.8	0.2	0.2	3.3	3.3	2.7	2.8
Former Soviet Union	0.5	0.6	3.0	3.0	0.4	0.4	4.0	4.1	3.0	3.2
Turkey	0.7	0.8	1.5	1.5	0.1	0.1	2.3	2.4	2.1	2.3
Middle East	0.8	0.8	3.7	3.7	0.2	0.2	4.8	4.8	-0.4	-0.5
Morocco	0.4	0.5	2.5	2.5	0.1	0.1	3.0	3.2	1.1	1.7
Rest of North Africa	0.6	0.7	1.7	1.7	0.1	0.1	2.5	2.4	0.9	1.0
Botswana	0.1	0.2	14.4	14.3	0.1	0.1	14.6	14.7	13.1	13.0
South Africa and Rest SACU	0.6	0.7	3.4	3.4	0.7	0.7	4.9	5.0	5.0	5.1
Malawi	0.7	1.4	0.8	1.4	0.1	0.1	1.6	2.9	2.0	3.7
Mozambique	2.5	3.8	1.1	1.4	0.1	0.1	3.7	5.3	4.1	6.0
Tanzania	0.5	0.9	1.3	1.8	0.2	0.2	2.1	2.9	2.6	4.4
Zambia	0.1	0.2	4.4	4.9	0.0	0.0	4.5	5.1	4.6	5.1
Zimbabwe	0.7	0.9	3.3	3.5	0.1	0.1	4.1	4.5	12.8	15.5
Other Southern Africa	0.8	0.9	10.5	11.2	0.2	0.2	11.3	12.1	10.2	11.0
Uganda	0.3	0.9	0.6	1.1	0.1	0.1	1.0	2.2	1.2	2.9
Rest of SubSaharan	0.6	0.7	1.6	1.5	0.2	0.2	2.4	2.5	2.3	2.6
Rest of the World	0.1	0.3	0.9	1.0	0.1	0.1	1.2	1.4	0.9	1.2

If developing countries liberalize their own agricultural policies, there are 20 developing countries and regions that expand further their own agricultural production, showing the importance of South-South trade. For another 13 countries/regions, the levels of primary and processed agricultural products once developing countries liberalized their own policies stay below the levels that would have been attained only under liberalization of the agricultural policies of industrialized countries. Finally, in the case of two countries (Philippines and Bangladesh) and Middle East region, agricultural production declines compared to the baseline if productivity effects are not considered. However, for the first two countries the impact turns positive if productivity effects are present, but not for the Middle East. In fact, for the latter, the increase in productivity in the rest of developing countries due to agricultural liberalization seems to more than compensate its own productivity improvements, and in a region that may lack the necessary natural resource base, its own agricultural production declines a little further.

AGRICULTURAL TRADE

The impact of changes in policies on trade are shown in Tables 16 and 17. Net trade (exports minus imports) in billion dollars increase from about 20.4 billion dollars in the base year to some 60-61 billion dollars if only industrialized countries liberalize their agricultural policies (an increase of about 40 billion dollars). The result is the combination of an increase in exports of about $37 billion (from total exports of $147 billion to $184 billion, see Table 17), and a substitution of previous imports of about $3 billion. All developing regions either increase their net trade position (if already positive) or reduce the negative values (if imports exceed exports) compared to the baseline.

43

Table 16—Agricultural Net Trade by Developing Countries (billion US dollars)

					Liberalization in:					
	base	US	US plus TFP	EU	EU plus TFP	Japan	Japan plus TFP	All DCs	All DCs plus TFP	All countries	All countries plus TFP
Asia Developing	12.3	15.5	15.6	15.6	15.6	15.6	15.7	22.7	22.8	15.1	15.3
LAC	31.7	36.9	37.1	39.0	39.3	32.5	32.5	45.8	46.4	44.4	45.4
SSA	7.4	8.1	8.1	9.6	9.6	7.6	7.6	10.6	10.7	10.8	10.9
(SSA without South Africa)	6.3	6.9	6.9	7.8	7.8	6.4	6.4	8.5	8.6	8.8	8.9
Transition Economies	-11.1	-10.7	-10.6	-6.1	-6.0	-10.7	-10.7	-4.9	-4.8	-7.9	-7.8
Turkey, North Africa, Middle East	-17.3	-16.5	-16.5	-14.1	-14.1	-17.0	-17.0	-12.8	-12.8	-18.7	-18.8
RoW	-2.5	-2.3	-2.3	-1.7	-1.7	-2.4	-2.4	-1.4	-1.4	-1.9	-1.9
Total Developing	20.4	31.0	31.4	42.4	42.6	25.7	25.7	60.1	60.8	41.9	43.1

Table 17—Agricultural Exports by Developing Countries (billion US dollars)

					Liberalization in:					
	base	US	US plus TFP	EU	EU plus TFP	Japan	Japan plus TFP	All DCs	All DCs plus TFP	All countries	All countries plus TFP
Asia Developing	46.4	49.3	49.4	49.4	49.4	49.7	49.7	56.3	56.3	61.0	61.1
LAC	59.1	63.9	64.1	66.6	66.9	60.0	60.0	73.1	73.7	78.4	79.3
SSA	14.6	15.3	15.3	16.6	16.6	14.9	14.9	17.6	17.7	19.0	19.1
(SSA without South Africa)	11.8	12.4	12.4	13.1	13.1	11.9	11.9	13.8	13.9	15.0	15.1
Transition Economies	13.9	14.6	14.6	18.7	18.7	14.3	14.3	20.0	20.1	21.8	21.8
Turkey, North Africa, Middle East	10.1	10.5	10.5	12.0	12.0	10.2	10.2	12.7	12.7	13.8	13.8
RoW	3.2	3.3	3.3	3.7	3.7	3.3	3.3	4.0	4.0	4.3	4.3
Total Developing	147.2	157.0	157.3	167.0	167.2	152.3	152.3	183.8	184.4	198.2	199.3

The largest effect on net trade creation in developing regions comes from liberalization in the EU (for a total of somewhat more than 42 billion dollars), followed by the US (about 31 billion dollars), and then Japan (almost 26 billion dollars). The developing region that expand their net trade the most when only industrialized countries liberalize is LAC, followed by Asia. These benefits are distributed based on regional trading patterns. For sub-Saharan Africa, nearly two-thirds of its increase in exports ($2 billion of $3 billion) would result from trade liberalization in the European Union. For Asia's developing countries, the results would be more balanced, with the United States, European Union and Japan each contributing a third to their overall gain. Meanwhile, for many Latin American countries, most of their increase in agricultural exports would be due to opening EU and US markets. As the largest market in world agricultural trade, the European Union's agricultural policies have important effects on developing countries. While the majority of developing countries share a common interest in calling for more open EU trade, more open Japanese, Korean and US markets also are in the interest of developing countries, especially those located in Asia and the Western Hemisphere.

The increase in net trade by developing countries is smaller if both industrialized and developing countries eliminate protection and subsidies (an increase of around 22 billion dollars, moving from the baseline value of some 20 billion dollars in net trade to about 42-43 billion dollars). When all countries liberalize, the largest value of net trade creation is still in LAC, but now followed by SSA. It was mentioned that all developing regions increased their net trade position when only industrialized countries liberalize. However, if all countries liberalize, TNAME moves toward a more negative net trade

position compared to the baseline, while Asia, Transition Economies and ROW give back some of the net trade gains compared to the scenario where only industrialized countries liberalize agricultural production, but still remain above the baseline value.

Table 17 shows that exports expand for all developing regions, both when only industrialized countries liberalize and when all countries do, suggesting that the declines in net trade position for some regions when developing countries reduce protection and subsidies is caused by larger imports and not by displacement of exports.

Table 18 presents disaggregated data on net trade. When only industrialized countries liberalize all countries either expand their positive net trade, or reduce the absolute value of their negative trade position (i.e. for all of them exports expanded more than imports). But if all countries liberalize, there are six countries or regions where total imports expand more than total exports compared to the base: China, Philippines, Bangladesh, Venezuela, Middle East, and Botswana. China in fact moves from a positive value of net agricultural trade in the base to a negative one in the scenario of world liberalization. Although a narrow trade focus would seem to imply a negative effect of their own agricultural liberalization, it must be remembered that these countries also benefited from consumption effects (through lower prices), and production effects (due to better allocation of resources), leading to improved welfare and larger total GDP when they also liberalize their own agriculture.

Table 18—Agricultural Net Trade by Developing Countries (billion US dollars)

		Liberalization in:								
	base	US	US plus TFP	EU	EU plus TFP	Japan	Japan plus TFP	All DCs	All DCs plus TFP	All countries	All countries plus TFP
China	1.1	2.1	2.2	2.3	2.3	2.5	2.5	4.8	4.8	-1.1	-1.1
Indonesia	1.1	1.5	1.6	1.5	1.5	1.3	1.3	2.2	2.2	1.9	1.9
Malaysia	2.0	2.1	2.1	2.1	2.1	2.0	2.0	2.4	2.4	2.6	2.6
Philippines	-1.3	-1.1	-1.1	-1.2	-1.2	-1.2	-1.2	-0.9	-0.9	-1.6	-1.6
Thailand	5.0	5.7	5.7	5.6	5.6	6.5	6.5	7.8	7.9	7.8	7.9
Vietnam	1.4	1.5	1.5	1.5	1.5	1.5	1.5	1.6	1.6	1.8	1.8
Bangladesh	-0.7	-0.6	-0.6	-0.6	-0.6	-0.7	-0.7	-0.6	-0.6	-0.8	-0.8
India	4.9	5.4	5.4	5.6	5.6	5.0	5.0	6.3	6.3	5.8	5.9
Sri Lanka	-0.1	-0.1	-0.1	0.0	0.0	-0.1	-0.1	0.0	0.0	-0.1	-0.1
Other South Asia	-1.3	-1.2	-1.2	-1.1	-1.1	-1.2	-1.2	-0.9	-0.9	-1.3	-1.2
Mexico	-0.5	0.6	0.6	0.1	0.1	-0.3	-0.3	1.4	1.4	0.1	0.1
Central America and Caribbean	3.5	4.8	4.8	4.5	4.6	3.8	3.8	6.2	6.3	5.4	5.6
Colombia	2.7	3.2	3.2	2.8	2.9	2.7	2.7	3.4	3.4	3.2	3.2
Peru	0.9	1.1	1.1	1.2	1.2	1.0	1.0	1.4	1.4	1.2	1.3
Venezuela	-1.0	-0.9	-0.9	-0.9	-0.9	-1.0	-1.0	-0.8	-0.8	-1.1	-1.1
Rest of Andean Pact	2.4	2.6	2.7	2.6	2.6	2.4	2.4	2.8	2.8	2.9	2.9
Argentina	11.0	11.6	11.6	12.7	12.8	11.0	11.0	13.4	13.6	14.4	14.8
Brazil	8.6	9.6	9.7	11.1	11.2	8.8	8.8	12.7	12.9	12.6	12.9
Chile	2.8	3.1	3.1	3.1	3.1	2.9	2.9	3.4	3.4	3.6	3.6
Uruguay	0.9	0.9	0.9	1.1	1.1	0.9	0.9	1.2	1.2	1.3	1.3
Rest of South America	0.3	0.4	0.4	0.7	0.7	0.3	0.3	0.8	0.9	0.8	0.8
Hungary	1.5	1.6	1.6	2.7	2.7	1.6	1.6	2.8	2.8	2.9	2.9
Poland	-0.5	-0.4	-0.4	0.7	0.7	-0.5	-0.5	0.8	0.8	0.4	0.4
Rest of Central European Associates	-1.2	-1.2	-1.2	-0.2	-0.3	-1.2	-1.2	-0.1	-0.1	-0.7	-0.7
Former Soviet Union	-11.0	-10.7	-10.7	-9.2	-9.2	-10.7	-10.7	-8.5	-8.5	-10.4	-10.4
Turkey	0.2	0.5	0.5	0.9	0.9	0.3	0.3	1.2	1.2	0.8	0.8
Middle East	-11.3	-11.1	-11.1	-9.9	-9.9	-11.2	-11.2	-9.4	-9.4	-13.4	-13.4
Morocco	0.2	0.2	0.2	0.5	0.5	0.2	0.2	0.6	0.6	0.2	0.2
Rest of North Africa	-6.4	-6.1	-6.1	-5.6	-5.6	-6.3	-6.3	-5.2	-5.2	-6.4	-6.4
Botswana	-0.2	-0.2	-0.2	-0.1	-0.1	-0.2	-0.2	-0.1	-0.1	-0.1	-0.1
South Africa and Rest of SACU	1.0	1.2	1.2	1.8	1.8	1.2	1.2	2.1	2.1	2.1	2.1
Malawi	0.4	0.5	0.5	0.5	0.5	0.4	0.4	0.5	0.5	0.5	0.5
Mozambique	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Tanzania	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.5	0.5	0.5
Zambia	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Zimbabwe	1.0	1.0	1.1	1.1	1.1	1.0	1.0	1.1	1.1	1.6	1.7
Other Southern Africa	-0.1	-0.1	-0.1	0.3	0.3	-0.1	-0.1	0.3	0.3	0.2	0.2
Uganda	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Rest of SubSaharan	4.2	4.6	4.6	5.0	4.9	4.2	4.2	5.5	5.5	5.3	5.3
Rest of the World	-2.5	-2.3	-2.3	-1.7	-1.7	-2.4	-2.4	-1.4	-1.4	-1.9	-1.9

FOOD SECURITY

Certainly, from the point of view of food security it is more relevant to look at consumption, and not production, of food. For instance, Smith and Haddad, 2000, have shown that, along with other factors (such as women education and health care), increases in total national availability of food (which includes imports along with domestic production) have a positive impact on the decline of child malnutrition. When only industrialized countries liberalize their agricultural policies there is more production of agricultural and food processed goods in developing countries (see Tables 14 and 15). But at the same time there may be less domestic agricultural consumption overall, because imports are curtailed by more than the amount of increased production (in the case of net importers), or because the expansion of exports (due to better world prices) is larger than the growth in production (in the case of net sellers).

Table 19 shows changes in consumption of all agricultural goods (a somewhat larger set than only food items). When only industrialized countries liberalize and technological change is not considered, about 21 countries or regions show declining consumption compared to the base while 15 countries or regions present increases (the rest remain without changes, at one decimal). If technical change is allowed, then the reverse occurs: more countries or regions show increases (21) than declines (18). Middle East and the Rest of North Africa are the regions showing the largest percentages declines in agricultural consumption as a result of agricultural trade liberalization in developed countries.

Table 19—Agricultural Consumption by Developing Countries (change from base in %)

	Liberalization in:									
	US	US plus TFP	EU	EU plus TFP	Japan	Japan plus TFP	All DCs	All DCs plus TFP	All countries	All countries plus TFP
China	-0.2	-0.1	0.0	0.0	0.0	0.0	-0.2	-0.2	0.4	0.6
Indonesia	-0.3	-0.1	-0.1	-0.1	-0.1	-0.1	-0.4	-0.4	-0.2	0.0
Malaysia	-0.3	-0.2	-0.2	-0.2	0.0	0.0	-0.5	-0.5	1.9	2.0
Philippines	-0.6	-0.5	0.0	0.0	0.1	0.1	-0.6	-0.6	0.8	1.0
Thailand	-0.1	0.0	-0.2	-0.2	-0.3	-0.3	-0.7	-0.5	1.9	2.1
Vietnam	-0.1	0.0	-0.1	-0.1	0.0	0.0	-0.3	-0.2	1.0	1.2
Bangladesh	-0.1	0.0	-0.1	-0.1	0.0	0.0	-0.2	-0.2	0.1	0.4
India	0.0	0.3	0.0	0.0	0.0	0.0	-0.1	0.3	0.2	0.9
Sri Lanka	-0.2	0.0	-0.2	-0.2	0.0	0.0	-0.3	-0.3	0.3	0.7
Other South Asia	-0.2	-0.1	0.0	0.0	0.0	0.0	-0.3	-0.1	0.8	1.3
Mexico	-0.6	-0.5	0.0	0.0	0.1	0.1	-0.5	-0.4	0.1	0.3
C. America and Caribbean	-0.1	0.1	0.2	0.3	0.2	0.3	0.2	0.5	1.6	2.1
Colombia	-0.2	0.1	0.0	0.1	0.0	0.0	-0.2	0.2	0.3	0.8
Peru	-0.1	0.0	0.2	0.4	0.0	0.0	0.0	0.5	0.8	1.4
Venezuela	-0.3	-0.2	0.0	0.0	0.0	0.0	-0.3	-0.2	0.5	0.6
Rest of Andean Pact	0.2	0.4	0.1	0.2	0.0	0.0	0.4	0.7	1.7	2.3
Argentina	0.0	0.3	0.1	0.6	0.0	0.0	0.1	0.9	0.4	1.7
Brazil	0.0	0.2	0.1	0.4	0.0	0.0	0.1	0.7	0.4	1.3
Chile	0.2	0.3	0.1	0.2	0.0	0.0	0.4	0.5	1.1	1.4
Uruguay	0.1	0.2	0.7	1.0	0.0	0.1	0.9	1.3	2.8	3.7
Rest of South America	0.4	0.5	1.5	1.8	0.0	0.0	2.0	2.4	5.9	6.5
Hungary	0.0	0.1	-0.6	-0.5	0.1	0.1	-0.6	-0.4	1.8	2.0
Poland	0.0	0.0	-0.3	-0.3	0.0	0.0	-0.4	-0.2	1.5	1.8
Rest of C. European Assoc.	0.0	0.1	-0.4	-0.4	0.0	0.0	-0.4	-0.3	1.2	1.3
Fr. Soviet Union	0.0	0.0	-0.7	-0.7	0.0	0.0	-0.7	-0.7	0.7	0.8
Turkey	-0.1	0.1	0.1	0.1	0.0	0.0	0.0	0.1	0.6	0.8
Middle East	-0.5	-0.4	-1.1	-1.1	-0.1	-0.1	-1.8	-1.7	2.2	2.3
Morocco	-0.2	0.0	-0.1	0.0	0.1	0.1	-0.2	0.0	1.1	1.7
Rest of North Africa	-0.3	-0.2	-0.5	-0.5	0.0	0.0	-0.9	-0.9	-0.2	-0.1
Botswana	0.1	0.1	0.0	0.0	0.1	0.1	0.2	0.3	1.3	1.5
South Africa, Rest SACU	0.0	0.0	0.1	0.1	0.0	0.0	0.0	0.1	0.7	0.8
Malawi	0.2	0.6	0.1	0.4	0.0	0.0	0.3	1.0	0.5	1.5
Mozambique	-0.2	0.8	0.3	0.6	0.0	0.0	0.1	1.4	0.4	1.9
Tanzania	0.2	0.4	0.7	1.0	0.1	0.1	0.9	1.5	1.7	3.0
Zambia	0.0	0.1	0.2	0.6	0.0	0.0	0.2	0.6	0.2	0.6
Zimbabwe	0.1	0.2	0.2	0.4	0.0	0.0	0.3	0.5	4.4	5.4
Other Southern Africa	-0.1	0.0	0.3	0.5	0.1	0.1	0.2	0.5	2.3	2.6
Uganda	0.0	0.6	0.2	0.6	0.0	0.0	0.2	1.3	0.3	1.9
Rest of SubSaharan	0.0	0.1	0.0	0.0	0.1	0.1	0.0	0.1	0.4	0.6
Rest of the World	0.0	0.0	-0.2	-0.2	0.0	0.0	-0.3	-0.1	0.3	0.5

Looking at the policy impacts of different industrialized countries and not allowing for technical change in developing countries, agricultural trade liberalization in the US generates the largest number of countries or regions with declining consumption compared to those increasing it (20 to 8). However, with technical progress in developing countries the numbers switch completely for the US with 9 declines against 20 increases (as before the balance is composed by countries or regions with negligible changes). For the EU negative changes in consumption are less than increases (14 cases of countries/regions with declines versus 16 with increases), and the balance turns even more positive with technical change (13 declines against 18 increases). Those results are driven by the assumption in the model that agricultural productivity is related to trade. As overall trade increases for the developing countries in these scenarios, then changes in TFP lead to larger production and consumption. Agricultural trade liberalization in Japan leaves agricultural consumption unchanged in the majority of developing countries and regions (Table 19).

Overall, even with technical change there appears to be a non-trivial number of developing countries and regions that would reduce their consumption of agricultural goods with agricultural trade liberalization in industrialized countries, which, although the percentages are small in most cases, could potentially affect food security (at least in aggregate terms). This result, however, disappears almost completely once developing countries also liberalize agricultural. Then only Indonesia and the Rest of North Africa show small declines in consumption, and, once technical change is allowed, there is only a small decline in the latter. This result highlights the importance for some of the food

importing developing countries with high food import tariffs to consider reducing them progressively to cushion the impact of higher world prices on the domestic markets, while at the same time investing in rural infrastructure and agricultural technology to expand production.

Table 20 presents the value of agricultural imports as percentage over total exports, indicating the trade effort that a country must make to finance the agricultural goods procured in world markets. This percentage, which shows large variation across countries, is a better indicator of trade vulnerability than the ratio of food imports to exports that has been utilized in the WTO to define the Net Food Importing Developing Countries (see Diaz-Bonilla, Thomas, Robinson, and Cattaneo, 2000). At the same time this trade indicator has to be considered in relation to the expansion of domestic consumption, because the results in terms of overall food security are very different if, for instance, a decline in the ratio is due to import and domestic consumption compression, or is related to increased domestic production that allows an expansion in consumption and declines in imports. The simulations show that agricultural trade liberalization by industrialized countries reduces the ratio of agricultural imports to total exports in most developing countries and regions (33 over 40), because of a decline in agricultural imports, an increase in overall exports, or a combination of both. Results with or without technological change do not vary much. If all countries liberalize agriculture, then the

ratio increases in almost all developing countries and regions, with changes mostly in the range of 1-3 percentage points.[25]

About 10 countries or regions show changes smaller than 1 percentage point, but 3 countries (Bangladesh, Peru, Morocco) have increases in the range of 3-4 percentage points. It must be remembered that these simulations only reflect changes in agricultural policies. The current Doha Round includes also negotiations on industry and services which may lead to larger exports in other goods, reducing the percentage value of food imports with respect to total exports. In fact, over the last four decades this percentage for all developing countries fell from about 20% at the beginning of the 1960s to about 5-6% at the end of the 1990s (see Diaz Bonilla Diaz-Bonilla, Thomas, Robinson, and Cattaneo, 2000).

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[25] For example Turkey had a percentage of agricultural imports over total exports of 9.4% in the base that increases to 10.9% with full liberalization, for an increase of 1.5 percentage points.

Table 20—Agricultural Imports by Developing Countries (as percentage of total exports)

						Liberalization in:					
	Base	US	US plus TFP	EU	EU plus TFP	Japan	Japan plus TFP	All DCs	All DCs plus TFP	All countries	All countries plus TFP
China	4.5	4.3	4.3	4.5	4.5	4.5	4.5	4.3	4.3	6.8	6.8
Indonesia	7.4	7.3	7.3	7.4	7.4	7.4	7.4	7.3	7.3	8.4	8.4
Malaysia	4.1	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	5.1	5.0
Philippines	7.9	8.1	8.1	7.8	7.8	7.9	7.9	8.0	8.0	10.1	10.1
Thailand	4.5	4.6	4.6	4.5	4.5	4.7	4.7	4.7	4.7	5.8	5.8
Vietnam	5.9	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.8	6.5	6.5
Bangladesh	20.4	19.9	19.9	20.1	20.1	20.3	20.3	19.4	19.4	24.2	24.2
India	4.8	4.8	4.7	4.7	4.7	4.7	4.7	4.6	4.6	7.0	6.9
Sri Lanka	12.1	12.3	12.3	12.2	12.2	12.2	12.2	12.4	12.4	14.9	14.9
Other South Asia	19.2	18.6	18.5	19.1	19.1	19.1	19.1	18.3	18.3	21.7	21.7
Mexico	5.9	5.7	5.7	5.9	5.9	5.9	5.9	5.6	5.6	6.9	6.9
Central America and Caribbean	13.6	13.2	13.1	13.4	13.4	13.7	13.7	13.0	12.9	16.0	15.9
Colombia	9.5	9.3	9.3	9.5	9.5	9.5	9.5	9.3	9.2	11.6	11.5
Peru	14.0	13.6	13.6	14.0	13.9	14.1	14.1	13.6	13.5	17.1	17.0
Venezuela	6.4	6.2	6.2	6.3	6.3	6.4	6.4	6.1	6.1	7.7	7.7
Rest of Andean Pact	10.4	10.1	10.1	10.4	10.4	10.4	10.4	10.1	10.0	12.5	12.4
Argentina	5.3	5.1	5.1	5.3	5.2	5.3	5.3	5.1	5.0	6.3	6.1
Brazil	9.8	9.5	9.5	9.5	9.5	9.8	9.8	9.3	9.2	11.3	11.2
Chile	6.5	6.4	6.4	6.4	6.4	6.5	6.5	6.3	6.3	7.4	7.4
Uruguay	11.4	11.4	11.3	11.3	11.3	11.4	11.4	11.3	11.2	13.8	13.7
Rest of South America	19.7	19.5	19.5	19.2	19.2	19.7	19.7	19.1	19.0	21.7	21.6
Hungary	4.2	4.2	4.2	4.5	4.5	4.2	4.2	4.5	4.5	5.6	5.6
Poland	10.4	10.3	10.3	10.2	10.2	10.4	10.4	10.2	10.2	12.8	12.8
Rest Central European Assoc.	6.6	6.6	6.6	6.4	6.4	6.6	6.6	6.4	6.4	8.1	8.1
Former Soviet Union	15.4	15.4	15.4	15.1	15.1	15.4	15.4	15.1	15.1	17.2	17.2
Turkey	9.4	9.2	9.2	9.1	9.1	9.4	9.4	8.9	8.9	10.9	10.9
Middle East	7.9	7.8	7.8	7.6	7.6	7.9	7.9	7.4	7.4	9.8	9.8
Morocco	12.7	12.3	12.3	11.9	11.9	12.7	12.7	11.5	11.5	16.2	16.2
Rest of North Africa	17.0	16.5	16.5	16.2	16.3	17.0	17.0	15.6	15.6	18.3	18.3
Botswana	8.0	8.0	8.0	8.1	8.1	8.0	8.0	8.1	8.1	8.5	8.5
South Africa and Rest of SACU	4.8	4.7	4.7	4.7	4.7	4.8	4.8	4.6	4.6	5.1	5.2
Malawi	2.1	2.1	2.1	2.0	2.0	2.1	2.1	2.0	2.0	2.6	2.5
Mozambique	23.0	22.5	22.3	22.5	22.5	22.9	22.9	22.2	21.9	22.9	22.7
Tanzania	21.2	20.9	20.8	20.6	20.6	21.2	21.2	20.3	20.1	24.0	23.7
Zambia	2.1	2.1	2.1	2.0	2.0	2.1	2.1	2.0	2.0	2.1	2.1
Zimbabwe	6.6	6.6	6.6	6.5	6.5	6.6	6.6	6.4	6.4	7.8	7.6
Other Southern Africa	8.7	8.7	8.7	8.9	8.9	8.7	8.7	8.9	8.9	10.1	10.0
Uganda	6.9	6.7	6.7	6.5	6.4	6.9	6.9	6.3	6.2	7.3	7.2
Rest of SubSaharan	9.4	9.2	9.2	8.8	8.8	9.4	9.4	8.6	8.6	10.0	10.0
Rest of the World	14.8	14.7	14.7	14.2	14.2	14.8	14.8	14.1	14.1	16.2	16.2

6. CONCLUSIONS

This paper has tried to identify the separate and overall impacts of agricultural policies of industrialized countries on developing countries, and to compare those results with liberalization of agricultural policies in developing countries. The model incorporates a slight effect of trade on productivity and has a specification in labor markets that, different from most of the simulation with general equilibrium and multimarket models, does not assume full employment in developing countries. General equilibrium models with full employment can only expand agricultural production by taking labor from non-agricultural activities, which is a constraint on the welfare effects projected in models with that specification. Any positive multiplier effects on the rest of the economy of an expanded agricultural sector are assumed away under full employment specifications.[26] In this model, on the other hand, improved world prices from overall agricultural liberalization lead to larger production in agricultural activities utilizing the rural unemployed. Expanded agricultural incomes then lead to increased demand for non-agricultural activities, and to more employment and production there, with further rounds of expansionary effects for the economy as a whole.

Those multiplier effects are limited, however, because, as indicated, the simulations presented here have maintained capital and land at baseline values, and the productivity effects are modest. Other analyses, with stronger dynamic effects linked to capital accumulation and technology diffusion, project larger increases in welfare for all developing countries resulting from liberalization in industrialized countries

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[26] As mentioned already, multimarket models, as partial equilibrium approaches, do not consider the possible multiplier effects and links to the rest of the economy.

(USDA/ERS, 2001, World Bank, 2001). It has also been mentioned that Africa, and in part LAC, seem to have a margin for agricultural expansion on new land that, with better world agricultural prices, those countries may find profitable to utilize. By maintaining land fixed in the model, this potential increase in production and employment from changes in current agricultural policies has not been factored in. Therefore, current policies by industrialized countries may have larger negative effect than the ones simulated here if the dynamic effects on capital accumulation and land expansion are considered.

Other aspect that may tend to underestimate the negative impact of current policies of industrialized countries relates to the use of a recent baseline year, and 1997 in particular. In this year protection and subsidization in industrialized countries (as measured by the NACs) were the lowest in the last decade. In particular they do not capture the full impact of cotton subsidies, particularly in the US, and the 2002 US Farm Bill is not included in the database. Simulations with updated values may indeed show that the negative impacts of industrialized policies on developing countries is larger.

A related point is that many of the current simulations (including the one presented) use a relatively recent benchmark year. Whatever impact the policies of industrialized countries may have had over the years on the agriculture and economy of developing countries, it has been already embedded in that base year.[27] Depressed world prices of many food products related to agricultural protectionism and subsidies in industrialized countries may have contributed to some developing countries becoming net

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[27] Other analyses based on a historical perspective suggested important negative effects over time in several developing countries for production and employment linked to agroindustrial products such as meat, sugar, cotton and canned tomatoes, as a result of industrialized countries' agricultural policies (OXFAM, 1987 and 2002; Eurostep, 1999).

food importers of those products, pushing them into a more extreme specialization in tropical products than would have been the case under a different set of prices. Given that distorted starting position, the short-term, static impact of liberalization may have a negative terms of trade effect on some developing countries, if, for instance, they have access to high-priced industrialized countries' markets for some products (say sugar) and buy cheap subsidized temperate products (say wheat) from developed countries.

To the extent that past effects from industrialized countries' policies are taken as bygones embedded in the current structure of developing countries, and that, as discussed above, the possible future changes in that structure are constrained by assuming full employment and limiting additional investments and productivity effects, then those simulations may well be underestimating the negative effects on developing countries from maintaining current agricultural policies in industrialized countries.[28]

Finally another caveat relates to trade preferences: this issue, in opposition to those discussed so far, may lead to the underestimation of the costs for some developing countries of agricultural liberalization in industrialized countries. While GTAP database 5 includes the volume of trade flows which presumably incorporate the quantity of the preferences, there is no separate treatment of preferential tariffs for developing countries in industrialized countries. The relevance of this issue varies by products, depending on the structure of trade of each developing country. Some countries, even losing access to a high priced market for a (usually smaller) percentage of their production may gain more

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[28] The more general issue of why general equilibrium models seem to underestimate the growth and trade effects of trade agreements is discussed in Robinson and Thierfelder, 1999.

from better world prices for what typically is the larger percentage of their exports. But

for others, the rents accruing from preferential access may be important. [29]

Keeping the caveats in mind, the results in this paper, only by relaxing the full

employment assumption and by allowing some small productivity effects, show a more

uniformly positive effect on developing countries of agricultural trade liberalization in

industrialized countries: welfare and total GDP expand for most of the developing

countries and regions considered, with the main exceptions of some countries in North

Africa and the Middle East, regions that have a predominance of oil producers and a

relatively more limited natural resource base for agricultural production. Also

Bangladesh and Sri Lanka appear to have some welfare and GDP losses,[30] and the group

of Other Southern Africa show a small GDP decline, in an scenario of agricultural trade

liberalization only by industrialized countries. On the other hand, the main winners, in

percentage terms over baseline values of welfare and GDP, appear to be smaller countries

in South and Central America, and several in SSA. When all countries liberalize only the

region Other North Africa shows a small negative sign in welfare, while total GDP

increases for all developing countries and regions. The difference between changes in

real GDP and welfare in some of these countries results, of course, from the fact that the

expansion in GDP does not compensate the negative terms of trade effects on

consumption.

Overall about 40-50% of the improvements in welfare in developing countries

and regions result from the elimination of protection and subsidies in industrialized

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[29] For instance, in the case of sugar, ABARE 2000, estimates that although overall benefits for developing countries of liberalizing sugar markets are significant, about a third of the countries considered may suffer losses.
[30] 0.2% or 2/100 of 1%.

57

countries, compared to other simulations where less than a quarter comes from policy changes in rich countries (see, for instance, World Bank, 2001; Tokarick,2003). These results do not contradict the strategy of most developing countries of keeping pressure on industrialized countries to liberalize their agriculture, but at the same time (and in line of most of the literature) suggest important gains from more market-oriented policies in developing countries themselves.

The outcomes in terms of welfare and GDP refer to the entire economy. Those that consider that agriculture is in itself very important in developing countries (because of poverty, food security and related problems) and/or do not believe that the full dynamic effects on the rest of the economy of a vibrant agricultural sector are fully captured through these models, would rather focus on agricultural and agroindustrial value added.

The behavior of this variable suggests that the policies of industrialized countries consistently displace agricultural production (primary and processed) in developing countries. While in absolute values the displacement effects are bigger in countries like China, Brazil, Thailand, Argentina, and India (see Diao, Diaz-Bonilla and Robinson, 2003), in percentage terms they seem more important, again, for smaller countries in South and Central America, in SSA, and for some Asian countries such as Vietnam. As indicated, the notion of supporting agriculture in industrialized countries on account of multifuncional effects cannot avoid facing the issue that those same policies are reducing production, and the presumed multifunctional effects, in developing countries.

The uniform expansion of the agricultural and agroindustrial sectors in developing countries when industrial countries liberalize their agricultural policies, declines

somewhat when also developing countries reduce protection. But, in this last scenario, only in Middle East the value of primary and processed agriculture drops below the baseline (even if productivity effects are allowed), although as shown before, overall GDP and welfare would expand under this scenario. This illustrates the fact that policies that artificially expand the agricultural sector may reduce overall GDP and welfare.

These results also suggest that the majority of developing countries share a common interest in calling for a more open EU agricultural market, while more open US and Japanese markets are in the interest of a smaller group of countries located in LAC and Asia. It appears that the policies of the EU have the larger negative effect on welfare, total GDP, and agricultural value added in developing countries, affecting (in percentage terms) mainly smaller countries of Central and South America and countries in SSA. In absolute values the main negative effects occur in LAC. Current US policies affect negatively LAC and SSA, but their elimination may also lead to decreases in welfare in some countries in Asia and in the North Africa and Middles East area (as is also the case with Europe's policies), with the caveats noted regarding the lower levels of support in the baseline year, especially for cotton. Changes in Japan's policies will have beneficial effects mainly in Asia, with mostly small positive or neutral effects in the rest of developing countries.

Because of the complexities of agricultural trade, the overall impact of liberalization on specific countries would vary. Still, and even without allowing for all possible dynamic benefits resulting from capital accumulation, land expansion, and stronger technological effects, the results suggest that if industrialized countries were to substantially reduce their protection and subsidies, most Third World farmers would

produce more food and agricultural goods domestically, leading to expanded incomes not only in the agricultural sector but in the rest of the economy as well.

Higher prices resulting from agricultural liberalization in industrialized countries could still hurt some groups, especially poor urban consumers. Yet better farm incomes and related employment benefits to rural communities from higher prices of traditional crops, greater access to global markets for other products, such as fruits, vegetables and sugar, and the multiplier effects on employment and income for the rest of the economy resulting from a more vibrant agricultural sector, would likely more than compensate these vulnerable populations, thereby not harming overall food security. It is nonetheless important to expand the efforts for more disaggregated policy analysis of the different scenarios of agricultural liberalization (see Robillard, Bourguignon, and Robinson, 2001; Hertel, Preckel, and Reimer, 2001, S. Morley and C. Diaz-Bonilla, 2003; and Brooks, 2003).

In any case, countries must ensure that poor and vulnerable populations are compensated in the case of adverse effects, and that food security is not compromised by agricultural liberalization, or other policy changes. Fortunately, poverty-focused assistance is more effective – because it is more easily targeted – in urban communities, where poor consumers most likely would be harmed by higher food prices. International food aid can help in this regard, provided it stops being pro-cyclical (i.e. abundant when there is ample supply of food and prices are low, and scarce when the opposite occurs and food aid would be more needed) and it is managed in a way that does not displace domestic production in the recipient countries. In addition, some of the food importing developing countries with high food import tariffs should consider reducing them

progressively to cushion the impact of higher world prices on poor consumers. After all, high tariffs on imported food operate as a regressive tax on poor consumers. At the same time, all developing countries, particularly the poorest, should expand investments in rural development, poverty alleviation and health and nutrition. For this to happen additional funding from international institutions and bilateral donors will be needed, as well as firm political commitment and good governance in the countries involved.

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ANNEX 1—COUNTRIES

US (with Canada), EU (with EFTA[31]), Japan (with Korea), Australia/New Zealand, and Other Developed.[32]
China, Indonesia, Malaysia, Philippines, Thailand, Vietnam, Bangladesh, India, Sri Lanka, Other South Asia.[33]
Mexico, Central America and Caribbean[34], Colombia, Peru, Venezuela, Rest of Andean Pact[35], Argentina, Brazil, Chile, Uruguay, Rest of South America[36].
Hungary, Poland, Rest of Central European Associates[37], Former Soviet Union.[38]
Turkey, Middle East[39], Morocco, Rest of North Africa.[40]
Botswana, South Africa and Rest of SACU[41], Malawi, Mozambique, Tanzania, Zambia, Zimbabwe, Other Southern Africa[42], Uganda, Rest of Sub-Saharan[43].
Rest of the World[44].

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[31] Switzerland, Iceland, Leichtenstein, Norway.

[32] Other Developed is a residual mostly from Asia (Hong Kong, Singapore).

[33] Bhutan, Maldives, Nepal, Pakistan

[34] Anguila, Antigua & Barbuda, Aruba, Bahamas, Barbados, Belice, Cayman Islands, Costa Rica, Cuba, Dominica, Dominican Republic, El Salvador, Grenada, Guatemala, Haití, Honduras, Jamaica, Netherlands Antilles, Nicaragua, Panama, Saint Kitts and Nevis, Saint Lucia, Saint Vincent and the Grenadines, Trinidad and Tobago, Virgin Islands (British)

[35] Bolivia, Ecuador.

[36] Guyana, Paraguay, Suriname.

[37] Bulgaria, Czech Republic, Romania, Slovakia, Slovenia.

[38] Armenia, Azerbaijan, Belarus, Estonia, Georgia, Kazakhstan, Kyrgyzstan, Latvia, Lithuania, Republic of Moldova, Russian Federation, Tajikistan, Turkmenistan, Ukraine, and Uzbekistan.

[39] Middle East is also an aggregate region in GTAP encompassing Bahrain, Iran, Islamic Republic of, Iraq, Israel, Jordan, Kuwait, Lebanon, Oman, Qatar, Saudi Arabia, Syrian Arab Republic, United Arab Emirates, and Yemen.

[40] Rest of North Africa includes Algeria, Egypt, Libya, and Tunisia.

[41] Lesotho, Namibia, Swaziland.

[42] Angola and Mauritius

[43] Benin, Burkina Faso, Burundi, Cameroon, Cape Verde, Central African Republic, Chad, Comoros, Congo, Cote d'Ivoire, Djibouti, Equatorial Guinea, Eritrea, Ethiopia, Gabon, Gambia, Ghana, Guinea, Guinea-Bissau, Kenya, Liberia, Madagascar, Mali, Mauritania, Mayotte, Niger, Nigeria, Rwanda, Sao Tome and Principe, Senegal, Seychelles, Sierra Leone, Somalia, Sudan, Togo, and Zaire.

[44] Rest of the World includes Afghanistan, Albania, Andorra, Bermuda, Bosnia and Herzegovina, Brunei, Cambodia, Croatia, Cyprus, Faroe Islands, Fiji, French Polynesia, Gibraltar, Greenland, Guadeloupe, Kiribati, Lao People's Democratic Republic, Macau, Macedonia, the former Yugoslav Republic of, Malta, Marshall Islands, Micronesia, Federated States of, Monaco, Mongolia, Myanmar, Nauru, New Caledonia, Democratic People's Republic of Korea, Papua New Guinea, San Marino, Solomon Islands, Tonga, Tuvalu, Vanuatu, Western Samoa, Yugoslavia.

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