

4-2008

# What Effect Does Free Trade in Agriculture Have on Developing Country Populations Around the World?

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## Recommended Citation

Fabiosa, Jacinto F., "What Effect Does Free Trade in Agriculture Have on Developing Country Populations Around the World?" (2008). *CARD Working Papers*. 486.  
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## **Abstract**

Highlighted in the "battle in Seattle" in 1999, anti-trade sentiments still persist, even with development considerations placed at the core of reform negotiations at the World Trade Organization, in which two-thirds of the members are developing countries.

In this paper, the impact of agricultural trade liberalization on food consumption through changes in income and prices is considered. First, agricultural trade liberalization is estimated to raise economic growth by 0.43% and 0.46% in developing and industrialized countries, respectively. Since food consumption of households with lower income are more responsive to changes in income, their food consumption increases more under a trade liberalization regime.

Second, trade liberalization is expected to raise world commodity prices in the range of 3% to 34%. Since, in general, border protection is much higher in developing countries and the level of their tariff rates are likely to exceed the rate of price increases, 87% to 99% of the 83 to 98 countries examined would have lower domestic prices under liberalization. Again, given that low-income countries are more responsive to changes in prices, food consumption in these countries would increase more.

Finally, empirical evidence shows that if there is any harm on small net selling producers in a net importing country, it is neither large in scale nor widespread because the substitution effect dominates the net income effect from the lower domestic prices.

## **Keywords**

agricultural trade liberalization, income and price elasticity, income distribution, developing countries

## **Disciplines**

Agricultural and Resource Economics | Agricultural Economics | Economic Policy | Growth and Development | International Economics | International Trade Law

# What Effect Does Free Trade in Agriculture Have on Developing Country Populations Around the World?

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**Working Paper 08-WP 466**

*April 2008*

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This paper was presented at the Annual Trilateral Academic Conference on Trade and Investment in the Americas at Michigan State University, College of Law, Institute for Trade in the Americas, on the topic, "Understanding the Growing Complexities of International Trade and Agriculture," September 27-28, 2007, East Lansing, Michigan.

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## Abstract

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## **Introduction**

The Doha Development Agenda was launched at the Doha Ministerial Conference in November 2001. World Trade Organization (WTO) members, of which two-thirds of the current 151 members are developing countries, have placed this agenda's development issues at the core of the WTO's reform negotiations.

However, as was brought into sharp focus during the so-called "battle in Seattle" in 1999, opposition to the reforms of the WTO still persist. Although the mass protest did not speak with a single voice, an anti-trade sentiment was clearly prominent. It is at these gatherings where blanket accusations that multilateral trade reforms are harmful to underrepresented stakeholders—such as net food importing countries; small farmers; indigenous, rural, and developing populations; and other small stakeholders—gain currency and are received and circulated without question. As a result, shaping public consensus favorable to the WTO reform can become an up-hill challenge.

This paper focuses on developing countries because it is here that most of the underrepresented groups can be found in large numbers, and they share a common characteristic of having low incomes. Specifically, the discussion here focuses on the impact of liberalization on low-income households, particularly on small farm households in net food importing countries. The objective of the paper is to review the major economic impacts of free trade in agriculture on developing countries and trace their likely consequences on low-income and underrepresented population groups. The objective is to provide empirical evidence as to whether low income and underrepresented stakeholders are better off or worse off under a free trade regime.

The paper is organized as follows. Section 1 examines the impact of agricultural trade liberalization on economic growth (i.e., income) and prices of agricultural commodities. This is followed by sections 3 and 4, which trace the impacts of income and prices on the food consumption of the population group of interest. Section 4 presents a summary and conclusion.

## **1. Impact of Free Trade in Agriculture**

The impact of liberalization in agriculture on income and prices is of particular consequence to developing countries because low-income countries derive a significant share of their incomes from the agricultural sector, and at the same time they allocate a significant share of their consumption expenditure budget on food. We illustrate this relationship for 158 countries based on their 2006 per capita GDP,<sup>1</sup> income share by sector, and consumption expenditure share by expense categories. Figure 1 shows an inverse relationship between the share of income derived from the agricultural sector and the level of per capita income. For example, countries with per capita income that is higher than \$21,323 derived less than 10% of their income from agriculture. As countries with lower per capita income are considered (say, \$5,228), the household share of income from agriculture correspondingly rises to 10% to 20%. The share rises further to 20% to 30% for countries with lower per capita income of \$3,383. Countries in the lowest per capita income category of \$1,668 had households deriving more than 30%, the highest share of their income from the agricultural sector. The same inverse pattern emerges

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<sup>1</sup> GDP is measured using purchasing power parity (PPP). A nation's GDP at PPP exchange rate is the sum value of all goods and services produced in the country valued at prices prevailing in the United States. Data is taken from the 2006 World Fact Book (CIA, 2006).

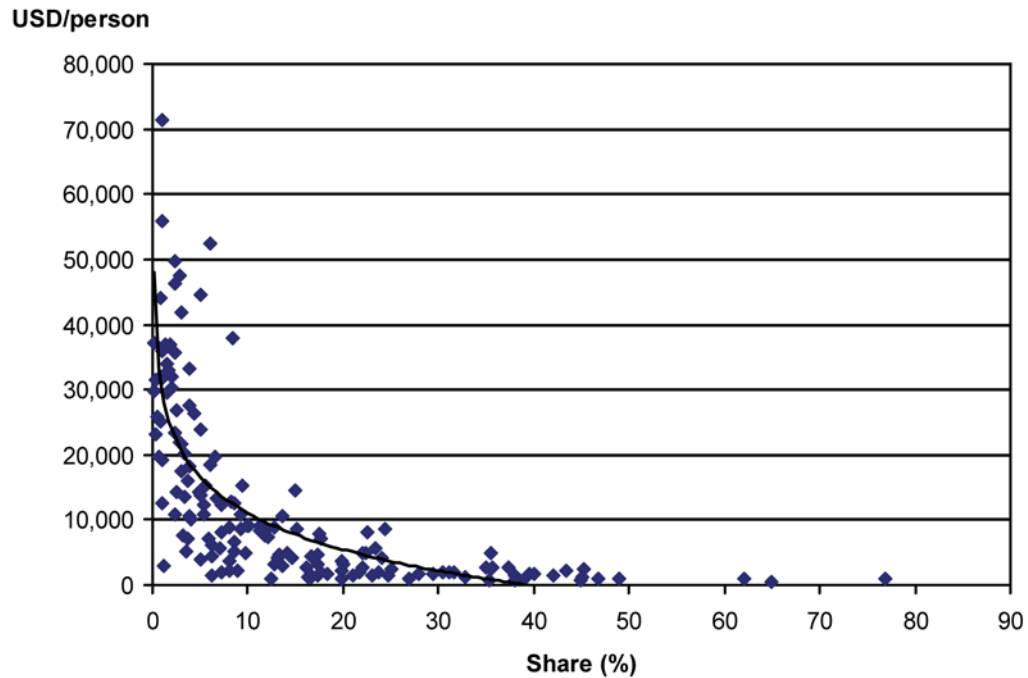


Figure 1. Share of income derived from the agricultural sector and per capita income level

with the share of expenditure spent on food (see Figure 2). That is, starting at a high-income category, countries with per capita income of \$34,854 had households allocating less than 15% of their expenditure budget on food. As countries with lower per capita income (say, \$22,680) are considered, the allocation of expenditure on food correspondingly rises to 15% to 30%. The share rises further to between 30% and 50% with household income at \$8,327. Countries in the lowest per capita income category of \$2,799 or less had allocations of more than half of households' expenditure budget on food. So for countries (and households), the agricultural sector is of significance both as a source of income as well as a major expenditure item (i.e., food) in their total budgets. Hence, any policy reform in this sector, such as trade liberalization, will affect more the population groups within a given country, such as indigenous, rural, and developing populations who are more dependent on the agricultural sector.

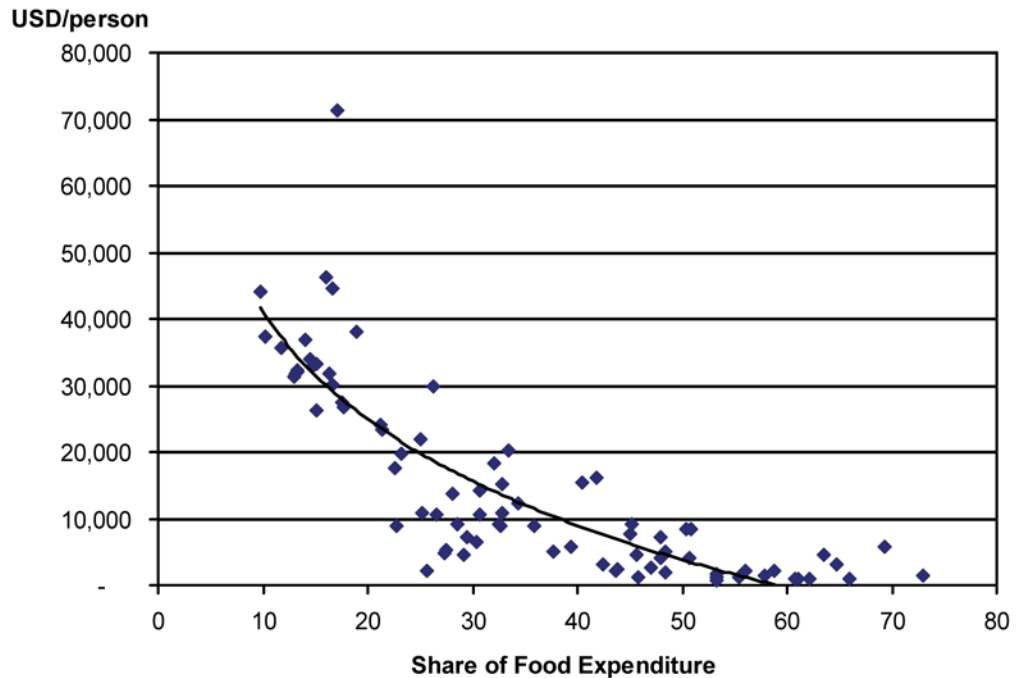


Figure 2. Share of food on total expenditure

We use changes in food consumption as our metric in assessing the impact of agricultural trade liberalization on developing country populations. Of the many ramifications of the impact of agricultural trade liberalization, we only consider the direct impact from changes in income and prices.<sup>2</sup>

## 2. Impact of changes in income

The impact of the Uruguay Round Agreement on Agriculture (URAA) had many facets. This paper focuses on the impacts of the URAA on economic activity and world commodity prices. On the impact of the URAA on economic activity we use the study by Harrison, Rutherford, and Tarr (1997). They used a numerical general equilibrium model, which incorporates increasing returns to scale, 24 regions, 22 commodities, and steady-state growth effects. For developing countries, the impact of the URAA was 1.4% of

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<sup>2</sup> Other studies have examined the institutional impacts (i.e., on market efficiency and integration) of the WTO (see Fabiosa, 1999).



GDP. Isolating only the impacts of agriculture-related reforms such as the URAA and the Multi Fiber Agreement (MFA), the economic impact is estimated at 0.43%. Some regions showed larger impacts, such as Latin America at 0.93% and South Asia at 0.72%. For industrialized countries, the total impact was 0.8% of GDP. The combined impact of the URAA and MFA was 0.46%. Although these magnitudes of economic impacts are not very dramatic, they are not trivial either, given that in 1996 the average growth rate for developing countries was 5.8%, while for industrialized countries the growth rate was 2.8%.

Next, we trace and quantify the likely impact of this improvement in income on food consumption by using the income elasticity of food in the respective countries. We borrow the estimates of Seale, Regmi, and Bernstein (2003), who examined 114 countries and their responses to changes in income and prices. Figure 3 shows their estimates of the income elasticity of food across different countries. It shows that food is a normal good; that is, more is consumed with higher income. Moreover, it shows that food consumption of poorer countries (or households) is more responsive to changes in income. Persons with an income of \$32,967 or above have an income elasticity that is less than 0.50. That is, as their income rises by 1%, the quantity of food consumed rises by less than 0.50%. However, persons with a lower income level of \$6,436 have income elasticity that is larger than 0.50. Assuming the gains from the URAA are distributed equally among households and persons in a given country, the more responsive behavior of persons with lower income suggests that they benefit more from the trade liberalization in terms of the rate of increase of their food consumption.

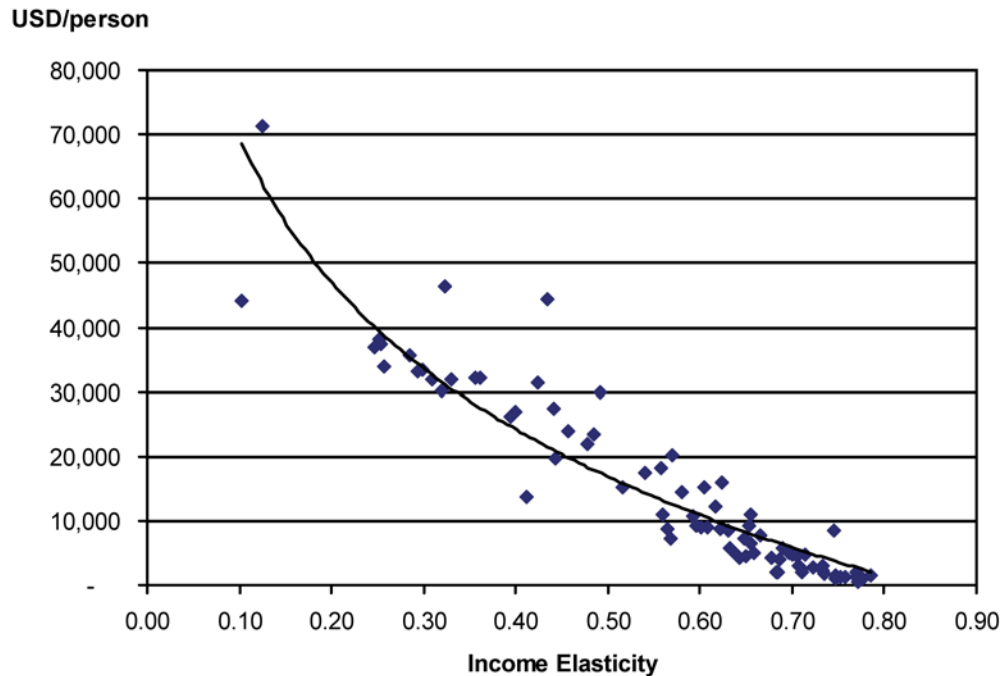


Figure 3. Food income elasticity

However, it is common knowledge that the assumption of equal distribution is suspect. A Gini ratio is commonly used to measure the distribution of income (Wikipedia). It ranges from 0% to 100%, with 0% indicating extreme perfect distribution while 100% indicates extreme imperfect distribution. Figure 4 seems to suggest that income distribution deteriorates (or becomes more unequal) as we move from countries with higher income per person to countries with lower income. That is, countries with average per capita income of \$32,967 have a Gini ratio of less than 50% (a relatively more equal distribution) when compared to countries with much lower per capita income of \$6,436, which have a Gini ratio of more than 50% (a relatively more unequal distribution). Moreover, what is more troubling is that in the last decade the Gini ratio has increased in many countries, suggesting a deterioration of the distribution of income. This has been the case in Brazil, the United States, China, India, the United Kingdom, and Japan (“Income Disparity Since World War II—Gini Index”). Although it can be claimed

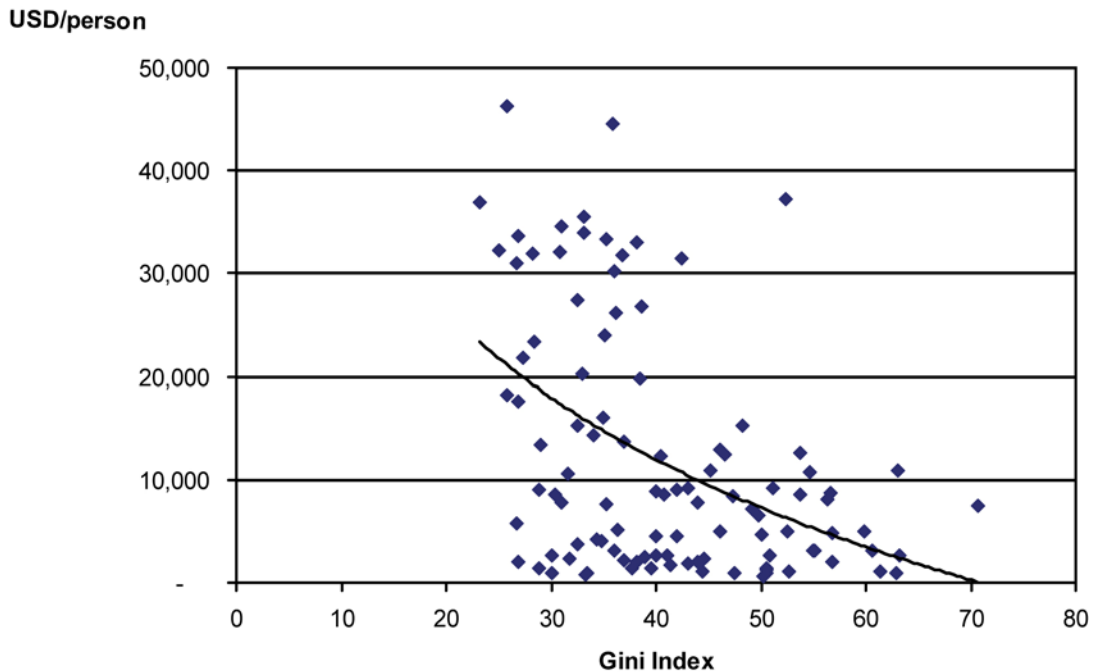


Figure 4. Gini ratio

that because of their greater responsiveness to changes in income, poorer countries (and households) improve their food consumption more from the economic gains of liberalization, the more unequal distribution of wealth that characterizes these countries may impede the widespread impact of this improvement.<sup>3</sup>

### 3. Impact of changes in prices

The second major economic impact of liberalization in the agricultural sector is the changes in world commodity prices. In general, as agricultural trade reforms compel countries to reduce their protection at the border, their domestic prices fall, inducing an increase in quantity demanded and a decrease in domestic quantity supplied, which raises the countries' excess quantity demanded (or imports). Consequently, the rise in world import demand exerts pressure on world commodity prices, causing them to rise. Table 1

<sup>3</sup> The impact of liberalization on income distribution is not addressed in this paper.

Table 1. Price impacts of agricultural liberalization

Commodity	Percent change
Feed Grains	
Corn	6.23
Barley	7.62
Sorghum	7.71
Food Grains	
Wheat	7.60
Rice	10.65
Oilseeds	
Soybean	2.83
Rapeseed	7.27
Sunflower	4.74
Peanut	4.50
Meat	
Beef and Veal	3.28
Pork	10.92
Poultry	7.91
Dairy Products	
Butter	33.56
Cheese	28.58
Non Fat Dry Milk	28.04
Whole Milk Powder	26.62
Others	
Sugar	32.54
Cotton	2.93

summarizes the average price increase from agricultural liberalization for several commodities reported by Fabiosa et al. (2005). For feed grains, world prices increase between 6% and 8%, while food grain prices increase by 8% to 11%. With relatively lower protection, oilseed prices increase by only 3% to 7%. Meat prices increase by 3% to 11%. The largest price change is in dairy products, which increase by 28% to 34% because of the high level of protection in these commodities. Sugar, another highly protected commodity, increases by 33%.

The impact of the change in world commodity prices on the consumption of households would depend first on how the world price changes are transmitted to the domestic market, particularly the effects on the domestic price. The impact of higher

world prices on domestic prices varies from country to country depending on each country's border protection policy. It can be shown that under full liberalization, the domestic price can only increase (decrease) if the increase in the world price is greater (smaller) than the ad valorem duty; that is,

$$[1] \quad \begin{array}{ccc} & > & \\ \% \Delta p^d = 0 & \text{if and only if} & \% \Delta p^w = t \\ & < & \end{array}$$

Table 2 shows the impacts on world and domestic prices for selected commodities. In the case of rice, 92 countries were evaluated. Only 12 countries, or 13%, had ad valorem duties that were smaller than the 10.65% increase in the world rice price, suggesting that in these few countries their domestic prices will increase instead of decrease under a full liberalization scenario. The majority of the countries, however, will have lower domestic prices as a result of liberalization. Moreover, the average per capita income in countries whose domestic prices will increase is \$21,262, which is 142.56% higher compared to the \$8,765 income in countries where the domestic rice price will decrease. This is because, in general, poorer countries showed a higher level of protection.

Table 2. Ad valorem duty and world price impact comparison

Variables	Grains			Meat			Dairy
	Rice	Wheat	Corn	Beef	Pork	Poultry	NFD
World Price change(%)	10.65	7.60	6.23	3.28	10.92	7.91	28.04
Country (number)							
Total	92	90	94	96	96	98	83
High Price	12	5	9	1	4	1	4
Percent of total	13.04	5.56	9.57	1.04	4.17	1.04	4.17
Income (USD/person)							
High Price	21,262	12,401	16,401	29,785	23,289	29,785	23,289
Low Price	8,765	8,963	9,122	10,125	9,978	10,511	9,978
Difference (%)	142.56	38.36	79.81	194.17	133.41	183.38	133.41

The same pattern is revealed in the case of wheat but with fewer, only 6%, of the 90 countries showing ad valorem duties below the 7.6% rise in the world wheat price under a liberalization regime. Again, the per capita income of countries whose domestic wheat price is expected to increase is \$12,401, which is 38.36% higher compared to the \$8,963 income in countries whose domestic wheat price is expected to decrease. For meat products, only 1% to 4% of the 96 to 98 countries examined had ad valorem duties below the 3% to 11% expected increase in meat prices under a liberalization regime. Countries whose domestic meat prices are expected to increase have income that is 133% to 194% higher than countries whose domestic prices are expected to decrease. In the case of dairy products, particularly nonfat dry milk, even the high 28.04% increase in the world price resulted in only 4% of the 83 countries examined having ad valorem duties that are lower than the expected world price increase. Again, the income in countries whose domestic nonfat dry milk price is expected to increase had income that was 133% higher than countries whose domestic price is expected to decrease. Because of the general pattern that low-income countries had higher rates of protection, removing this protection results in lower domestic prices in low-income countries.

We then trace and quantify the impact of the changes in domestic price on consumption using the price elasticity of demand reported by Seale, Regmi, and Bernstein (2003). Figure 5 shows the relationship of the Hicksian own-price elasticity and per capita income. Again, a pattern becomes very evident, namely, that countries with lower income have a higher responsiveness (in absolute value terms) to substitute products in response to price changes compared to countries with higher income. Countries with an average income of \$36,542 had a Hicksian own-price elasticity of

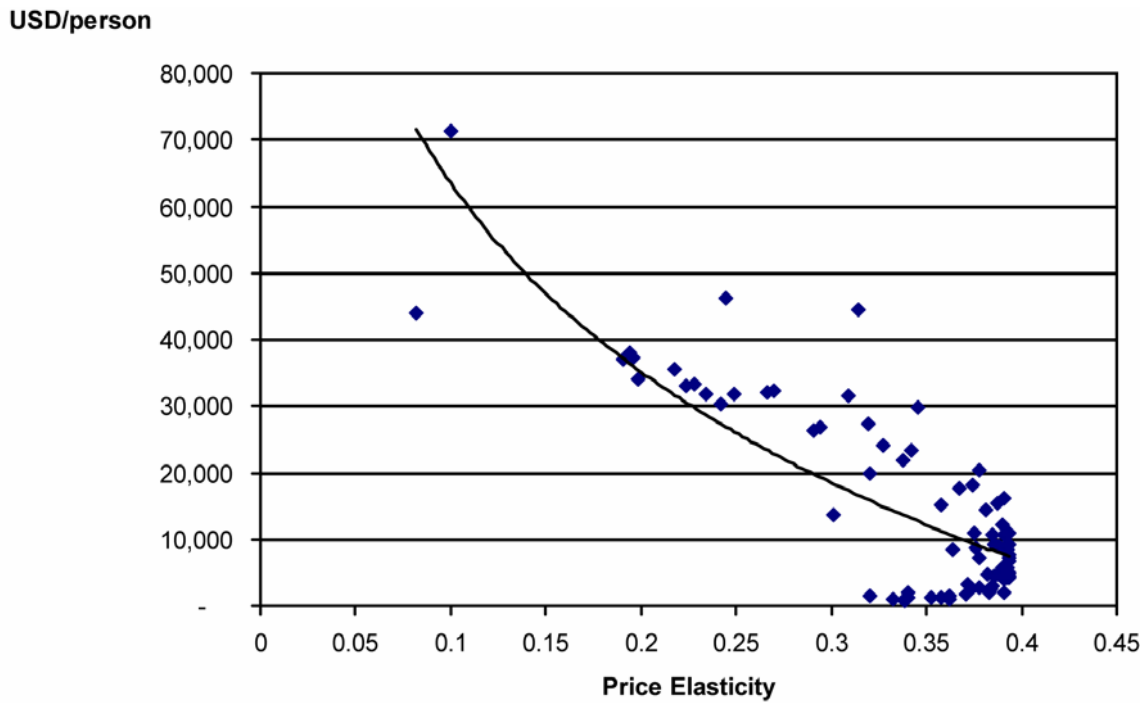


Figure 5. Hicksian own-price elasticity

below 0.30, while countries with much lower income of \$9,239 had a much higher Hicksian own-price elasticity of greater than 0.30. Because countries (and households) with lower income have higher Hicksian elasticity, a higher proportion of total expenditure on food, and higher income elasticity, their Marshallian elasticity, which measures their total response to price changes, is also necessarily higher. So combining all the factors whose impacts are channeled through price changes, because domestic prices are expected to be much lower in countries with low income under a liberalization regime, and because low-income countries (and households) are more responsive to price changes, then the benefit in terms of changes in food consumption to low-income persons from liberalization policies are relatively higher.

#### 4. Impact on small net selling producers in a net importing country

In this last section we focus attention on the impact of agricultural free trade on small net food importing countries and the small farm households in these countries. There seems to be an automatic conclusion among many that net food importing countries are made worse off under a liberalization regime because they now face higher world prices. It is true that world prices are higher under a liberalization regime, but what determines the impact of this policy in a given country is how the country's domestic price changes with the change in the world commodity price and border protection. What happens to the domestic price with a higher world commodity price resulting from liberalization depends on the trade position of a country. True net exporting countries are those whose autarkic price (i.e., the price that would prevail in the domestic market if a country does not engage in trade) is lower than the free-on-board price (i.e., world market price less transportation); that is,

$$[2] \quad P^w - \tau_x > P^a .$$

Because of the natural protection afforded by the lower cost of production, true net exporting countries do not need any duty protection at their borders. Hence, any increase in the world price because of liberalization translates into a higher domestic price, benefiting a country's producers while harming its consumers. The opposite is true in the case of a true net importing country. The condition is reversed, whereby its autarkic price is higher than the world price plus transactions cost of importing. That is,

$$[3] \quad P^w + \tau_m < P^a .$$



Because they need high border protection to keep imports away, in the case of true net importing countries, the domestic price will be lower under a liberalization regime. In this case, domestic producers are harmed while domestic consumers benefit.

But in many of the net importing countries, small farm households are unique in the sense that they are both producers and consumers of the product that is traded, say, grains. Because the domestic price is expected to decline, small farm households that are net buyers will clearly benefit from liberalization with higher consumption. What is not clear is the impact on consumption for small farm households that are net sellers. In this case, there are opposing impacts of the decline in domestic prices on households' consumption response. First, with lower domestic prices there is a positive impact on consumption through substitution in response to changing relative prices of goods in the household's consumption basket. On the other hand, because they are net sellers, the income that they derive from their farming enterprise is adversely affected by the lower domestic price. As a result, there is an income effect, which lowers their consumption. The resulting net effect on consumption becomes an empirical question as to which effect dominates: the favorable substitution effect in response to the lower domestic price of the goods they consume, or the adverse income effect in response to the lower domestic price of the goods they sell. Chang and Sumner (2004) developed a necessary and sufficient condition to determine the direction of impact on the consumption of small farm households who are net sellers under a regime of liberalization that brings about a lower domestic price. That is, small farm households who are net sellers of a good whose domestic price falls under liberalization increase their consumption if the condition in

equation [4] is satisfied. Equation [4] expresses the condition that the substitution effect dominates the income effect in terms of demand parameters:

$$[4] \quad (S_g - S_c) < \frac{|\eta_h|}{\beta}.$$

On the left-hand side of the condition,  $S$  is the share, the index  $g$  is income, and  $c$  is the consumption expenditure, that is, the share of revenue from a given good produced by the small farm households to their total income, and the share of expenditure of the same good that is consumed by the small farm households to their total expenditure. In the right-hand side are two demand parameters. The numerator is the Hicksian own-price elasticity in absolute value terms and the denominator is the income elasticity. The share of income accounts for the change in income due to the change in the price (i.e., lower domestic price under a liberalization regime). The share of expenditure appears because the Marshallian price elasticity has two elements. One is the substitution effect, which is measured by the Hicksian elasticity, and the other is an income effect, because a change in price is equivalent to a change in real income. The share of consumption expenditure accounts for the income-effect part of the change in price in the Marshallian price elasticity. Since they move in opposite directions with a given change in price, the two are netted out in the left-hand side of the equation. The net income effect then is the difference of the two shares multiplied by the income elasticity. This is compared to the substitution effect. The condition simply requires that a decline in the domestic price due to liberalization will have a favorable impact on the consumption of small farm households if and only if the substitution effect is larger than the income effect. Chang and Sumner investigated this empirical issue on small farm households that produce grain in China. Their results are reproduced in Table 3. With an estimated Hicksian own-price

Table 3. Survey of small grains farm households in China

$(S_g - S_c)$	Number of Households
$\leq -1$	5
$-1 \sim 0$	257
$0 \sim 0.33$	197
$0.33 \sim 0.43$	34
$0.43 \sim 0.67$	28
$0.67 \sim 1$	16
$>1$	6
Total	543

elasticity of -0.20 and income elasticity of 0.30, the condition requires that the difference in the income share and the consumption expenditure share must be larger than 0.67 for liberalization to have an adverse effect on the consumption of small farm households. Of the 543 households that they surveyed, 22, representing only a small 4.05% of the sample, would potentially be adversely affected by liberalization because the grains concerned represented a large proportion of their income and a relatively smaller proportion of their consumption expenditure. Using parameters estimated by the author on Indonesia (see Fabiosa, 2004), the ratio is 19 because of the high Hicksian own-price elasticity of -0.42 and very low income elasticity of 0.02, which is almost impossible to exceed given that both the income and consumption expenditure shares are bounded between zero and one. Because in Indonesia rice consumption is almost nonresponsive to income changes (some even claim rice is already an inferior good with negative income elasticity), the substitution effect always dominates the income effect, increasing rice consumption of small rice households in Indonesia when the domestic price of rice falls with liberalization.

## 5. Summary and conclusions

Even with the launching of the Doha Development Agenda, which put development issues at the very heart of the work of the WTO, anti-trade opposition to the reforms of the WTO has persisted since the “battle in Seattle” in 1999.

Agricultural liberalization is of great consequence to poor developing countries and households because this sector is a significant source of income as well as a major expenditure item (i.e., food) in their household budget.

We used quantified impacts of agricultural liberalization on economic growth and world commodity prices and traced their likely impacts on the food consumption of small and underrepresented stakeholders in developing countries. One estimate of the impact on economic growth puts the number at 0.43% and 0.46% for developing and industrialized countries, respectively. Although modest, it is not trivial considering that the growth rate in these countries in 1996 was 2.8% to 5.8%. With food consumption more responsive among poorer countries (or households) to changes in income, we argue that in relative terms these countries benefited more from the economic gains resulting from agricultural liberalization. However, this claim needs to be tempered by the fact that income distribution in poorer countries is more unequal and has deteriorated over the last decade in many countries.

Also, agricultural trade liberalization brings significant changes in world commodity prices, ranging from 6% to 11% in grains, 3% to 11% in meats, and 26% to 34% in dairy. Because the border protection is much higher than changes in world prices, especially in poorer countries, we expect domestic prices to fall. For net importers (buyers), poorer households benefit more in relative terms from these price changes

because they are more responsive and thus adjust consumption and substitute for relatively cheaper products.

Finally, we showed empirical evidence for China and Indonesia that because the substitution effect in response to price changes from net selling producer households dominates the net income effect from the lower price, their consumption actually increases with lower domestic prices.

Clearly, there is more overriding evidence that poorer households in developing countries actually benefit more in terms of higher consumption (in relative terms) as a result of agricultural trade liberalization.

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