

AGRICULTURAL TRADE REFORM AND POVERTY IN THE ASIA-PACIFIC REGION: A SURVEY AND SOME NEW RESULTS

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We review the literature on the relationship between agricultural trade policy reform and poverty, and the results of recent detailed simulation studies applied to economies in the Asia-Pacific region. We then use the Global Trade Analysis Project model to evaluate the possible impacts of the most recently proposed modalities for agricultural trade reform under Doha on the economies of the Asia-Pacific region, which we compare to a benchmark of comprehensive agricultural trade reform. The current proposal does not result in significant cuts to applied tariffs, and has very modest overall effects on welfare. Average poverty in the region would decrease overall, but the distribution across countries is uneven. By contrast, comprehensive agricultural trade reform, with developing economies fully engaged, tends to benefit most economies in the region in the aggregate, and consistently lowers poverty.

I. INTRODUCTION

Agricultural trade liberalization and its effect on developing economies have long been issues of contention in international trade negotiations, and the Doha Development Agenda is no exception. Key concerns include the potential for aggregate harm through preference erosion, that small economies dependent on food imports would be harmed by rising agricultural prices, and that changes in world prices could have adverse effects on food security and poverty. Concerns over rural poverty led to demands by India and China for enhanced safeguards for

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developing countries in agriculture. In July 2008, the talks collapsed as negotiators failed to reach agreement on this issue.

It is important then, to analyse the likely implications of the Doha Development Agenda proposals on both the economic system as a whole, and on social measures, such as poverty. Several studies have used computable general equilibrium (CGE) for this purpose. Anderson and Martin (2005) assess aggregate welfare, suggesting that most developing economies would gain at the aggregate level from Doha, in particular when they undertake trade reforms themselves and when the full agenda (both agricultural and non-agricultural market access reforms) is considered. The results also indicate that agricultural trade reform is the primary source of global aggregate efficiency gains.

On the poverty side, Hertel and Winters (2006) and the Organisation for Economic Cooperation and Development (OECD) (2006) each recently used a global model to assess aggregate effects of multilateral trade reform (specifically agricultural reform, in the case of the OECD study), and then a series of case studies with models of various specifications built at the national level to explore income distribution issues. Hertel and Winters (2006) include studies of Bangladesh, China, Indonesia and the Philippines. Gilbert (2007) and Panda and Ganesh-Kumar (2008) consider India.

In the present paper, the economic implications of agricultural trade reform under the Doha Development Agenda are assessed, with a focus on the developing economies of the Asia-Pacific region. We first briefly review the current proposal and highlight some key concerns for developing economies. Then we discuss the linkages between trade reforms of the type proposed under the Doha Development Agenda and poverty, and review the latest empirical results for countries in the region. Finally, we present new results from an evaluation of recent modalities at the aggregate level, including poverty impacts, for economies of the Asia-Pacific region.

II. AGRICULTURAL TRADE REFORMS UNDER DOHA

The proposed modalities in agriculture on which we base our analysis were presented at the special session of the Committee on Agriculture on 17 July 2007. The document sets out formulas for cuts in the areas of domestic support, market access (tariffs) and export competition, in addition to treatments of sensitive products, safeguards and related issues (WTO 2007).¹ Key features of the proposal

¹ A further revision of the Draft Possible Modalities on Agriculture was released in July 2008. However, the amendments have focused more on technical issues; the big-picture numbers on required cuts remain largely unchanged.

are set out in detail in the annex. Briefly, it calls for cuts of 45 to 70 per cent in bound tariffs and domestic support in developed economies, with lower commitments for developing economies, and elimination of export subsidies. While the proposals appear ambitious, there are several areas of contention. First, how much actual liberalization will occur? Second, how much flexibility will developing countries have in dealing with the consequences of reform? And third, how will economies be affected by the erosion of preferential access?

On the first issue, tariff overhang (where the bindings on tariffs are significantly higher than the actual applied rates) and limited binding coverage (where only a proportion of tariffs are actually bound) mean that commitments to cuts made on bound tariffs could leave actual distortions at high levels. A summary of current applied and bound tariff rates is presented in table 1. This issue is discussed further in Laborde, Martin and van der Mensbrugge (2008).

Table 1. Tariffs in agricultural/food products for Asia-Pacific and other economies circa 2006
(Percentage)

Country/region/area	Year	Applied tariff		Bound tariff		
		Weighted average	Standard deviation	Weighted average	Standard deviation	Binding coverage
<i>Agriculture</i>						
Australia	2006	0	1	3	4	100
New Zealand	2006	0	2	1	4	100
China	2005	10	9	16	9	100
Hong Kong, China	2006	0	0	0	0	98
Japan	2006	2	6	3	7	100
Republic of Korea	2004	200	123	167	130	99
Indonesia	2006	1	3	34	9	100
Malaysia	2005	1	6	8	13	100
Philippines	2005	7	10	34	14	97
Singapore	2005	0	0	10	1	100
Thailand	2005	11	18	36	25	98
Viet Nam	2005	11	15	–	–	0
Bangladesh	2006	3	10	158	56	94
India	2005	31	27	87	37	100
Sri Lanka	2006	17	13	49	4	96
Russian Federation	2005	7	5	–	–	0
Canada	2006	0	6	1	7	100

Table 1. (continued)

Country/region/area	Year	Applied tariff		Bound tariff		
		Weighted average	Standard deviation	Weighted average	Standard deviation	Binding coverage
Mexico	2005	3	12	34	11	100
United States of America	2006	2	44	5	49	100
European Union	2006	2	4	4	5	100
All countries	2006	10	25	24	47	77
<i>Food products</i>						
Australia	2006	1	2	5	5	100
New Zealand	2006	1	3	10	9	100
China	2005	12	10	12	11	100
Hong Kong, China	2006	0	0	0	0	100
Japan	2006	8	10	10	10	99
Indonesia	2006	9	45	73	28	100
Malaysia	2005	4	7	14	21	93
Philippines	2005	7	12	31	9	84
Republic of Korea	2004	29	102	38	107	94
Singapore	2005	0	0	8	2	100
Thailand	2005	10	17	36	29	99
Viet Nam	2005	27	26	–	–	0
Bangladesh	2006	12	7	193	43	81
India	2005	66	51	186	60	87
Sri Lanka	2006	21	14	48	4	94
Russian Federation	2005	11	5	–	–	0
Canada	2006	1	4	5	16	100
Mexico	2005	5	19	37	8	100
United States of America	2006	2	14	4	23	100
European Union	2006	4	7	9	9	100
All countries	2006	8	40	24	65	73

Source: Data from the Trade Analysis and Information Systems database of the United Nations Conference on Trade and Development, available at http://r0.unctad.org/trains_new/index.shtml by subscription only.

On the second issue, special and differential treatment is the principle that developing countries have special needs and should not be subject to the same commitments as developed economies. In the proposal, the requirements for developing economy liberalization are lower, and least developed countries (LDCs) are not required to liberalize at all. While this grants extra flexibility, it also limits the scope for efficiency gains within those economies. Exceptions for sensitive

products have also been high on the agenda. From a developing economy perspective, this is a concern if developed economies use such restrictions to shield the products in which developing economies are most competitive. But developing countries, in particular India and China, have also sought latitude to subject a set of products to reduced disciplines on the grounds that certain products are particularly important for livelihoods or for food self-sufficiency. It is possible that exemptions for sensitive products could lead to many of the most highly protected markets remaining untouched under the Doha Development Agenda package (see Jean, Laborde and Martin 2005).

Preference erosion refers to the effect that lowering barriers to other countries has on those who already have preferential access to developed country markets through a variety of schemes, including the Generalized System of Preferences and a series of provisions within the European Union and the United States of America. Despite recent evidence suggesting that the utilization rate of such preferences is quite low (UNCTAD 1999), this remains a major issue.² As Anderson and Martin (2005) note, these schemes may reduce demands from preference-receiving countries for agricultural reform in developed economies, but at the same time worsen the positions of other countries excluded from such programmes.

III. ASSESSING POVERTY LINKAGES OF AGRICULTURAL TRADE REFORM

To assess the potential impact of Doha on the region we need a conceptual framework. Trade theory provides solid predictions on the aggregate consequences of agricultural trade reform. One such consequence is the likelihood that average world prices of food and agricultural products will rise. In developing economies that are net exporters of food and agricultural products (for example India, Indonesia, Malaysia and Thailand, see table 2), we might expect the aggregate effect of an increase in agricultural prices to be positive, *ceteris paribus*. On the other hand, in developing economies in the region that are net importers of food and agricultural products (for example Bangladesh and the Philippines), we might expect the aggregate effect to be negative, *ceteris paribus*, although this may change depending on exact sectoral price shifts.

² The more recent work of Francois, Hoekman and Manchin (2006) reaches similar overall conclusions, and suggests that preference erosion is primarily a bilateral issue, as utilization rates are significant in only a few cases, usually with respect to the European Union. Similarly, Low, Piermartini and Richtering (2006) find the risk of preference erosion is small on average and limited to a small number of sectors.

Table 2. Base pattern of trade/production in agricultural/food products for Asia-Pacific and other economies, 2001

Country/region	<i>Imports</i>	<i>Exports</i>	<i>Production</i>	<i>Net exports</i>	<i>Self sufficiency (percentage)</i>
	<i>millions of United States dollars)</i>				
<i>Agriculture</i>					
Australia	624	8 340	24 071	7 716	132
New Zealand	279	1 720	7 143	1 441	120
China	12 006	7 265	279 963	-4 741	98
Hong Kong, China	2 431	17	2 159	-2 414	-12
Japan	16 194	1 275	71 768	-14 919	79
Republic of Korea	4 958	580	27 153	-4 378	84
Indonesia	2 310	2 445	21 935	135	101
Malaysia	2 275	1 173	3 545	-1 102	69
Philippines	1 100	783	17 162	-317	98
Singapore	1 537	548	689	-989	-44
Thailand	1 593	2 922	14 450	1 329	109
Viet Nam	333	1 195	6 050	862	114
Bangladesh	1 020	131	12 534	-889	93
India	2 374	3 209	138 120	836	101
Sri Lanka	394	924	4 503	530	112
Russian Federation	3 011	888	29 330	-2 124	93
Canada	4 856	9 588	25 205	4 732	119
Mexico	5 661	4 057	34 786	-1 603	95
United States of America	19 235	33 662	206 040	14 427	107
European Union	72 192	44 178	260 956	-28 015	89
South and Central America	8 708	27 588	137 102	18 881	114
Rest of world	29 915	24 366	417 596	-5 549	99
<i>Food products</i>					
Australia	2 606	10 444	35 301	7 837	122
New Zealand	960	6 596	11 045	5 636	151
China	5 971	9 634	170 843	3 663	102
Hong Kong, China	4 943	361	4 911	-4 582	7
Japan	34 842	2 318	310 018	-32 524	90
Republic of Korea	5 432	2 044	43 102	-3 389	92
Indonesia	1 829	4 585	33 997	2 757	108
Malaysia	2 870	5 501	9 742	2 632	127
Philippines	2 439	1 572	21 120	-867	96

Table 2. (continued)

Country/region	Imports	Exports	Production	Net exports	Self sufficiency (percentage)
	millions of United States dollars)				
Singapore	3 150	2 333	4 340	-816	81
Thailand	2 926	9 984	23 820	7 059	130
Viet Nam	1 227	1 858	5 483	630	112
Bangladesh	927	322	10 530	-605	94
India	2 297	3 822	50 463	1 525	103
Sri Lanka	389	131	1 501	-259	83
Russian Federation	7 899	3 101	31 409	-4 798	85
Canada	9 176	11 264	56 527	2 089	104
Mexico	5 778	4 202	105 080	-1 576	99
United States of America	35 522	32 551	754 507	-2 971	100
European Union	137 037	137 280	812 591	244	100
South and Central America	13 994	32 680	221 491	18 687	108
Rest of world	44 214	25 797	359 719	-18 417	95

Source: Dimaranan, B.V. (2006).

To assess poverty is more difficult. Winters (2002) identifies seven linkages between trade reform and poverty: changes in (a) consumer prices and availability of goods; (b) factor prices and quantities employed; (c) taxes and transfers influenced by shifts in tariff revenue; (d) the terms of trade and other external shocks; (e) investment and innovation that affect the long-run growth path; (f) remittances; and (g) short-run risk and adjustment costs.

At a fundamental level, changes in international trade policy affect relative prices. Changes in relative prices drive changes in the returns paid to factors of production, which are owned by households in varying proportions. Factors may also have to absorb adjustment costs in the short run. Trade reform therefore alters both the pattern of household income and the prices faced by households. Changes in revenue may affect incomes directly or indirectly as other sources are adjusted to make up lost tariff revenue. Again, theory provides some guidance. The Stolper-Samuelson theorem (1941) would predict an increase in the return to factors used intensively in agriculture, for example land and agricultural labour. Since in many cases these factors are "owned" by the rural poor, we might expect to see an improvement in the incomes of those groups. On the other hand, the increase in price may negatively affect those who spend a significant fraction of their income on food product (the urban poor, for example).

The picture may be clouded when we consider not only the effect that agricultural trade reform in developed countries may have on developing countries through changes in world prices, but also the direct effect of tariff reform within the developing countries themselves. In many developing economies in the region, the average tariff on agricultural products remains high. As Winters (2002) notes, this provides an avenue for importing economies to combat the effect of world price rises. If tariff reductions are significant, it is possible that domestic agricultural prices may fall even as world prices rise, tending to hurt the owners of agricultural factors (and benefit those who spend a high fraction of their income on food products).

Distortions within the economic system may further alter the predictions of the classical theory. Hence, for example, if there are restrictions on the degree of labour mobility, owners of labour may be prevented from moving to the activities in which their primary resource is most valued, increasing the potential for negative impacts on those groups. On the other hand, if there is unemployment or underemployment in the economic system, it is possible for trade reform to have employment-expanding effects which may have a positive impact on, for example, the urban poor.

IV. RESULTS OF RECENT COMPUTABLE GENERAL EQUILIBRIUM ANALYSES

Beyond the broad ideas outlined in the preceding section, applying theory to real-world examples of trade reform is a complex task. As we move beyond simple models, the predictions of theory with regard to factor price movements are weak, and depend on the exact structure of production. Moreover, real-world economic systems vary considerably, and are riddled with a multiplicity of distortions. Hence, to assess the implications of reform requires quantitative techniques. As Winters, McCulloch and McKay (2004, 73) simply put it: "Outcomes depend on the specific trade reform measures being undertaken, and the economic environment in which they take place".

Quantitative analyses of the poverty impacts of trade reform can be divided into two literatures. Ex post analyses look at cases of reform in the past and try to ascertain the effect that the reform had. Ex ante analyses try to predict what the effect of a proposed reform will be before the reform has occurred. Winters, McCulloch and McKay (2004) surveyed ex post analyses of the impacts of unilateral trade reform, concluding that the evidence supports the view that trade liberalization

will reduce poverty in the long run and on average, although there can be no simple and general conclusions.³

Hertel and Reimer (2005) review *ex ante* studies and provide a method of classification by simulation type: partial equilibrium models, general equilibrium models, and micro/macrosimulation models that combine macrolevel simulation with microlevel household models. They conclude that CGE techniques and micro/macro methods have the best potential for fully evaluating the complex web of determinants of changes in poverty. CGE models are numerical models based on general equilibrium theory. They turn abstract models of theory into a practical tool for policy analysis. A number of features distinguish CGE. The models are multisectoral, and in many cases multiregional, and the behaviour of economic agents is modelled explicitly through utility and profit-maximizing assumptions. In addition, economy-wide constraints are rigorously enforced. Distortions in an economic system will often have repercussions beyond the sector in which they occur. By linking markets, CGE techniques are effective at capturing feedback and flow-through effects.

One of the more popular current CGE models is the Global Trade Analysis Project (GTAP) created and maintained by the Center for Global Trade Analysis at Purdue University. This model is a multiregional, competitive, Armington trade model.⁴ The code for the model is publicly available, as is the database on which the model is built. This allows simulation results to be replicated, and the model is in widespread use. It can be considered the current benchmark model in the literature. For detailed discussion of CGE models and recent surveys of their application, see Scollay and Gilbert (2000), Gilbert and Wahl (2002), Robinson and Thierfelder (2002), Lloyd and MacLaren (2004) and Hertel and Winters (2005).

In terms of trade reform and poverty, most of the attention in the CGE literature so far has been on the two largest developing economies in the Asia-Pacific region, namely, China and India.⁵ Kuiper and van Tongeren (2006) consider the poverty/income distribution aspects of Doha for China, as do Zhai and Hertel (2006). Both of these studies use different and quite innovative techniques.

³ Goldberg and Pavcnik (2007) provide a similar conceptual framework to Winters (2002), and have also surveyed the *ex post* analyses of the impact of globalization on income distribution. They find a contemporaneous increase in globalization and inequality in most developing countries, but also conclude that establishing a causal link between these two trends is challenging.

⁴ An Armington model replicates intra-industry trade flows by assuming that goods in the same product category from different countries are imperfect substitutes.

⁵ Bandara (2007) also surveys recent Doha simulation results with a focus on the Asia-Pacific region, but in terms of aggregate welfare effects rather than poverty.

Kuiper and van Tongeren (2006) take a village modelling approach. Rather than considering a complete set of households within the national economy, they use a general equilibrium model of a single farming village. The model differs from standard CGE approaches in that the production and consumption decisions are not separable, they are made jointly by the individual farm households. They distinguish four groups of households, using ownership of draft power and access to outside employment as grouping criteria. The resulting groups represent households with differential capacity for earning a living from agriculture and from migration to urban areas.

The model is integrated with the results from the GTAP model, which generates global price shocks and changes in wages outside the village. A “Doha liberalization scenario” and a comprehensive trade reform benchmark are considered. Under the Doha scenario, the model projects average income gains within the farm village in the region of 5 per cent, with ownership of capital in the form of draft power a defining factor in determining the distribution of the gains from price changes, and engagement in non-farm activities the defining factor in gains from employment. The results also suggest a widening income inequality, in particular between those with access to outside employment opportunities (tied to migration) and those without, as the latter group have fewer opportunities for adjustment.

Zhai and Hertel (2006) use a model distinguishing 53 productive sectors and 100 households (40 rural and 60 urban). It is a competitive Armington-type model, and is used in conjunction with GTAP for global impacts. Interesting features of the model include imperfect labour mobility and rural-urban migration, both of which are important characteristics of the rural-urban divide in China. The model identifies several labour categories (unskilled, semi-skilled and skilled), with rural and urban workers distinguished and imperfectly substitutable in production (an indirect means of building geographic dispersion into the model). The model is benchmarked to a 1997 base year, and is updated through recursive dynamic simulation to 2005—prior to the trade reform simulations. The trade reform scenarios (Doha and several other benchmarks) are run as comparative statics with a steady-state closure. In this approach, the rental rate on capital is held constant and the adjustment of stock of capital is allowed, in an attempt to approximate capital accumulation effects.

In terms of poverty, Zhai and Hertel (2006) report that the urban-rural income ratio declines in all global trade liberalization scenarios, although the magnitude of this change is small. There is no change in inequality within the urban and rural areas. Poverty headcount ratios decline for all household groups. The results of Zhai and Hertel (2006) also suggest that the largest increases in welfare following global trade liberalization and Doha would accrue to rural

households, which benefit from the fact that returns to agricultural land increase relative to other factor prices.

In the case of India, there are two recent studies.⁶ Gilbert (2007) considers the impact of the current proposed modalities for reform in agriculture only under Doha at the household level for India, in addition to more comprehensive agricultural reform. The study uses the GTAP model to estimate the world market effects, after first modifying the underlying GTAP6 data to reflect the latest available applied protection levels (using the Trade Analysis and Information System (TRAINS) database of the United Nations Conference on Trade and Development). The global results are then fed into a single-economy CGE model of India.

The India model identifies 43 productive sectors and five factors of production, along with nine households (four rural and five urban). Household data are obtained from Pradhan and Sahoo (2006) and matched to the GTAP data on aggregate consumption, production and trade. The simulations are run as comparative statics, with two different adjustment time horizons (short- and long-run) represented by mobility/immobility of capital across productive sectors. Tax replacement is (implicitly) through lump-sum transfers from the households. Parametric sensitivity is addressed with unconditional analysis of the trade elasticities, implemented using Monte Carlo (stochastic simulation) techniques, with the distributions of underlying parameters based on Hertel and others (2007).

Under the Doha scenarios, the welfare of the poorest households (agricultural labour and other rural labour) falls, while the welfare of the richest group (urban self-employed) rises, in both the short and long run. The income of the rural self-employed (landowners) also rises under the Doha scenarios, suggesting that ownership of land and capital helps to insulate this group from the terms of trade shifts. The result is similar to that of Annabi and others (2006) for Bangladesh, but the change is not robust to variation in the model parameters. Under comprehensive reform, the results are quite different. The aggregate welfare gains are several orders of magnitude larger, and income of all households except the rural self-employed rises. The results are robust to variation in the model parameters, and suggest that the landowning class in India is able to benefit from rising world prices under Doha reform when India does not engage in significant reforms of its own, but faces considerable falls in income if domestic prices are allowed to fall (in the long run, the fall in the return to agricultural land is estimated at 10 per cent).

⁶ Polaski and others (2008) do not directly consider Doha, but do consider the impact of price changes in agricultural commodities. They find that a decrease in the price of rice could have a significant negative impact on Indian poverty levels.

Overall, the results suggest that India would gain from agricultural reform, but that a small increase in rural poverty is possible under the Doha agreement as it stands. On the other hand, comprehensive reform is likely to increase the incomes of the poorest groups, but at the expense of a slight increase in income inequality, and a substantial reduction in the incomes of landowners.

Panda and Ganesh-Kumar (2008) specifically consider the issue of food security. Their modelling approach is very similar to that used in Gilbert (2007), with the exception that they use the MIRAGE model developed by the International Food Policy Research Institute rather than GTAP as the source of their global price changes. They consider a Doha scenario, and find that all households experience a rise in welfare, and a decline in poverty. However, they argue that this does not necessarily translate into increased food security, in the sense that the poorest households decrease their consumption of protein and calories, while increasing consumption of fats. These conclusions are based on an ex post assessment of the household consumption patterns which drive the CGE model.

As an example of a smaller South Asian economy, results for Bangladesh are available from Annabi and others (2006). This study uses the GTAP model to estimate the overall effect of trade reform under the Doha proposals (both agriculture and non-agriculture) at the world level, and then inputs the world market effects into a single-economy CGE model for Bangladesh. The single country model is used to generate detailed results at the household level. The study also considers the potential impact of more comprehensive global reform, and of unilateral reform by Bangladesh.

The simulation procedure is recursive dynamic, with growth of the labour stock and productivity at fixed levels, and the capital stock growth path endogenized by a simple investment rule that is sector specific. Tax replacement is (implicitly) through lump-sum transfers from the households. The simulations extend for a 20-year period; comparisons are made relative to a baseline growth path. The results indicate aggregate welfare losses for Bangladesh under the Doha scenarios, along with small increases in the headcount ratio (diminishing somewhat but remaining negative in the long run). The negative aggregate welfare effect is driven by adverse terms of trade movements. These remain even in a scenario with complete liberalization in the rest of the world. The poverty effect is driven by increased prices, even as nominal unskilled wages rise slightly. When broken down to the household level, Annabi and others (2006) find poverty increases for all household categories except large farmers.

Within the Association of Southeast Asian Nations, studies have been undertaken for Indonesia, the Philippines and Viet Nam. The Robilliard and Robinson

(2006) study of Indonesia uses a set of three models to estimate poverty effects (the only one to do so in that country). At the top level, the GTAP model is used to estimate the overall effect of trade reform under the Doha proposals (agriculture and non-agricultural market access) at the world level. The world market effects are then used as input into a single-economy CGE model for Indonesia. At the third level, a detailed microsimulation model is used to estimate household results. In addition to Doha, the authors consider comprehensive global reform and unilateral reform within Indonesia as benchmarks.

The Indonesia CGE model identifies 21 productive sectors and 15 productive factors (land, plus eight types of labour and six types of capital). The model does not identify different households. It attempts to characterize the dual nature of the Indonesian economy by distinguishing between formal and informal activities in each sector. The two subsectors differ in the type of factors they use, and consumers purchase a composite of formal and informal production of the same commodity (i.e., an Armington-type specification). Also of note is the characterization of rural and urban labour as separate factors of production, which implies that rural workers cannot shift out of rural production activities. The simulations are comparative static, with a medium/long-run time frame represented by mobility of capital across economic activities. Prices, wages and aggregate employment variables from the CGE model are used as input to a microsimulation model that generates changes in individual wages, self-employment incomes and employment status. The microsimulation model is based on household and individual level data from the survey data for the year 1996 and simulates income generation mechanisms for 9,800 households.

The Doha scenario results indicate very small impacts on Indonesia, at just a 0.1 per cent impact on per capita consumption and less than a 1 per cent rise in aggregate imports and exports. There is a negligible impact on inequality, but rising incomes boost a small number of people out of poverty (about 50,000). By contrast, the results of the unilateral liberalization scenario indicate an increase in the average per capita household income of 0.6 per cent and a decrease in the headcount ratio from 18.3 down to 18.1 per cent, with the greatest impact on urban households. Full global reform generates still larger results, pulling an estimated 1.7 million out of poverty, although this scenario must be regarded as a benchmarking exercise more than a realistic outcome of current negotiations.

The impact of the Doha proposals (agriculture and non-agriculture) on the Philippines is analysed in Cororaton, Cockburn and Corong (2006). Again, the study uses the GTAP model to estimate the overall effect of trade reform under the Doha proposals at the world level, and then inputs the world market effects into a single economy CGE model for the Philippines. The latter model is then used to

generate household level results.⁷ In addition to the Doha scenarios, the authors also consider comprehensive global reform and unilateral reform within the Philippines as benchmarks. Tax replacement (making up the lost tariff revenue through alternative policy interventions) is considered using indirect taxes and income taxes.

The Philippines model identifies 35 productive sectors and six productive factors, with agricultural labour distinguished from non-agricultural labour and mobile only across agricultural sectors. Twelve household categories are distinguished, six each of rural and urban. The simulations are comparative static, with a short-run adjustment time horizon represented by specificity of capital across productive sectors.

Cororaton, Cockburn and Corong (2006) estimate increases in income for all household groups under the Doha scenario, with roughly equal gains, on average, to rural and urban households. However, they do not present a household welfare measure, so it is unclear whether households are better off in real terms. Poverty calculations by the authors suggest that perhaps they are not, as poverty increases slightly under the Doha scenario. The authors argue that the deterioration is due to the fact that consumption prices rise more, on average, than household nominal incomes, primarily due to deterioration in the terms of trade. In general, rural households are somewhat more affected than urban households. When considering the results of comprehensive global agricultural reform on poverty levels in the Philippines, Cororaton, Cockburn and Corong (2008) find a positive, though modest, effect.

Finally, Viet Nam, as a newly acceded member of the World Trade Organization, will not be required to make further cuts under the current Doha Development Agenda proposals. Nonetheless, it will be affected by reforms in other countries. Studies are limited, but Linh, Burton and Vanzetti (2008) have recently considered the possible impact of a Doha scenario using GTAP combined with an estimated household demand model for farm households in Viet Nam. The scenario is quite rudimentary: a 50 per cent reduction in tariffs/export subsidies and domestic support across the board, and a complete elimination of all barriers (a comprehensive benchmark). They consider the possibility of unemployment. Their main finding is that comprehensive global reform is likely to raise the welfare of farm households.

⁷ Cororaton, Cockburn and Corong (2008) use the same regional model in combination with the World Bank's LINKAGE model to analyse the implications of global agricultural reform.

V. GLOBAL TRADE ANALYSIS PROJECT RESULTS BASED ON NEW MODALITIES

To further analyse the implications of the recent Doha modalities on the economies of the Asia-Pacific region, we take an approach similar to that used in Anderson, Martin and van der Mensbrugghe (2006), using the GTAP model. The GTAP model uses the GTAP6 database (Dimaranan 2006), which is the most recent and comprehensive data of its kind available. It has a base year of 2001. While GTAP6 identifies 87 regions and 57 sectors, as a practical matter it is necessary to aggregate. Because the database does not have comprehensive measures of services protection, we have chosen to aggregate the services sectors, while maintaining the greatest possible degree of sectoral detail in agriculture and manufactures. The regions are aggregated to 22, with a focus on the economies of the Asia-Pacific region.

Before undertaking our analysis of the Doha scenario, we first updated the agricultural protection data in GTAP6 to the latest available applied levels, using information in the TRAINS database. This is undertaken to give a more realistic picture of the actual level of agricultural protection in the region.⁸ After updating the tariff data, we consider the effect of the agricultural trade reform described in the annex. The required tariff cuts are calculated on the basis of the latest bound rates in TRAINS, adjusted for binding coverage, and are assumed not to take effect if post-cut rates are above current applied levels. Export subsidies in agriculture are eliminated and domestic support measures cut by 60 per cent for developed economies and 40 per cent for developing countries. Viet Nam, as a newly acceded member, is assumed not to make any further commitments. Accession by the Russian Federation is assumed, and it also does not make any further commitments. Bangladesh, as an LDC, is exempted from cuts and the recipient of zero agricultural tariff preferences from developed economies. In the light of the fact that the Republic of Korea declares itself as a developing economy under the World Trade Organization, its commitments are those of a developing economy.

In order to gain some sense of the significance of our results, it is useful to have a benchmark simulation with which they can be compared. Earlier work (for example, Anderson, Martin and van der Mensbrugghe 2006) has used global

⁸ GTAP6 data is drawn from MacMaps, and while older (based on 2001), it does have some significant advantages over the raw data in TRAINS, in particular with respect to identifying preferential tariffs. Because of the risk of incorrectly replacing preferential rate with higher most favoured nation rates, where GTAP6 indicates that the applied tariff is lower than recorded in TRAINS, we leave it in place.

liberalization of merchandise trade as a benchmark. Given our focus on agricultural trade reforms, we run an alternative benchmark of comprehensive agricultural liberalization. In this scenario all tariffs, export subsidies and domestic support in agricultural and food products are eliminated. The running of this scenario is not meant to suggest that this is a likely outcome of current global negotiations.

Both scenarios (Doha and comprehensive) are run as comparative statics. The results should be interpreted as representing the change in the economic system that would occur given the proposed shock, with sufficient time to adjust to the new equilibrium. The model does not identify the path taken. We allow capital to adjust by reallocating across sectors, making our analysis medium/long-run.

Aggregate welfare

Table 3 presents the aggregate welfare results from our scenarios, using the equivalent variation measure.⁹ The first result is that the magnitude of the estimated welfare gains is modest, at around \$5.2 billion globally. Of this, approximately one third accrues to developing economies in the Asia-Pacific region. It should be reiterated that we are considering only agricultural trade reform here, and not the full Doha trade reform agenda. Nonetheless, agriculture is among the most protected sectors of economies in the region, and is a major part of the agreement. The small aggregate gains reflect the relatively small degree of actual reform that is anticipated if the proposal on agriculture remains in its current form. That is, given the degree of binding overhang, the current proposal in most cases results in only small reductions in the actual applied tariffs of the economies in the model. If sensitive products are excluded, as discussed in Jean, Laborde and Martin (2005), the potential for economically significant gains to arise from agricultural reform could be eroded even further.¹⁰

To gain perspective on the potential efficiency gains left on the table by the currently proposed modalities, we consider the welfare estimates from comprehensive agricultural trade reform. In this case, the estimated global welfare gains exceed \$37 billion in the long run. These figures are seven times larger than the corresponding estimates for the Doha scenario. This clearly indicates just how

⁹ Equivalent variation is the monetary value of the increment in income that would have to be given to (or taken away from) a household at today's prices to make it as well off today as it would be under the proposed policy change. The changes are sometimes called a "one-off" gain/loss, but this is somewhat misleading, since the changes are permanent.

¹⁰ It is also worth noting that GTAP data does suffer from aggregation bias. The weighted average tariffs in the database may not adequately reflect the potential for gains from elimination of peaks at the tariff line level.

much reform is left undone by the current modalities. For developing economies in the Asia-Pacific region, the contrast is particularly sharp. These countries would gain (in aggregate) roughly 10 times more from comprehensive reform than from the current Doha proposals.

Not all countries are expected to gain from agricultural trade reform, in either scenario, and in fact the gains from the Doha scenario in particular are quite uneven across regions. In order to understand the distribution of the welfare gains and losses across different regions, it is useful to go back to basic economic theory. The welfare effect of reform can be broken down into two components: the allocative efficiency effect and the terms of trade effect. The former is the impact of reallocating resources across economic activities. As an economy removes its own barriers, this effect is generally positive.¹¹ The terms of trade effect is the result of changes in the world price. For a country engaging in its own tariff liberalization, this effect is negative, *ceteris paribus*, and increases along with the economic size of the country (that is, the degree of market power).¹² The overall impact of own reform will be determined by the balance of these two factors, with allocative efficiency dominating when the degree of reform is large, and terms of trade dominating when the economy is large and/or the degree of tariff reform small. The liberalization of other countries is also reflected in the terms of trade; when country A lowers its barriers to country B, the terms of trade of country B improve.

Table 3, which also presents a breakdown of equivalent variation into its allocative efficiency and terms of trade components, could be reconsidered with the above ideas in mind. Some countries in the region are likely to be large gainers from positive external shifts in the terms of trade that they face. These are countries that have a strong comparative advantage in agricultural products (reflected in their position as net exporters in table 2). Such economies include Australia and New Zealand, who are the largest beneficiaries in proportional terms. Other net importing economies benefit substantially from their own reform as the benefits of increased efficiency outweigh the negative effects of terms-of-trade shifts. The two primary examples of this type are Japan and the Republic of Korea. Thailand benefits from both increased efficiency as a result of lowering its substantial tariffs, and from positive terms of trade shifts from improved market access, as does India (although the effects are proportionally much smaller).

¹¹ It is possible for allocative efficiency effects to be negative when there are other distortions in the economic system (such as taxes on other activities).

¹² Where the liberalization involves removing export subsidies, as opposed to tariffs, terms of trade movements are positive, *ceteris paribus*, and increase along with the economic size of the country.

Table 3. Estimated aggregate welfare effect of agricultural trade reform

Country/area	Doha scenario				Comprehensive scenario			
	EV	AE	TOT	Percent- age of GDP ^a	EV	AE	TOT	Percent- age of GDP ^a
	(millions of United States dollars)				(millions of United States dollars)			
Australia	755	11	745	0.21	2 146	84	2 061	0.60
New Zealand	325	-13	337	0.64	506	-19	525	1.00
China	-441	-115	-326	-0.04	-919	-189	-730	-0.08
Hong Kong, China	-4	-1	-3	0.00	201	6	196	0.12
Japan	2 117	2 908	-790	0.05	17 614	19 781	-2 167	0.42
Republic of Korea	955	1 176	-221	0.22	2 113	3 160	-1 046	0.49
Indonesia	-54	-15	-38	-0.04	-26	-127	101	-0.02
Malaysia	-23	18	-41	-0.03	831	76	754	0.94
Philippines	-38	-30	-8	-0.05	-73	50	-123	-0.10
Singapore	23	4	19	0.03	17	9	8	0.02
Thailand	156	76	80	0.14	416	268	148	0.36
Viet Nam	-13	-9	-4	-0.04	44	39	4	0.13
Bangladesh	-28	-3	-25	-0.06	-19	58	-77	-0.04
India	95	41	54	0.02	844	1 392	-548	0.18
Sri Lanka	4	4	0	0.02	116	7	109	0.73
Russian Federation	-274	-179	-95	-0.09	109	322	-213	0.04
Canada	71	-155	226	0.01	442	507	-65	0.06
Mexico	-144	270	-414	-0.02	-126	721	-847	-0.02
United States of America	1 483	405	1 079	0.01	2 692	923	1 768	0.03
European Union	1 197	1 662	-466	0.01	7 588	6 811	777	0.09
South and Central America	466	39	427	0.03	263	389	-126	0.02
Rest of World	-1 416	-872	-544	-0.06	2 340	2 911	-571	0.09

Source: Global Trade Analysis Project simulations by author.

Abbreviations: AE allocative efficiency component of equivalent variation

EV equivalent variation

GDP gross domestic product

TOT terms of trade component of EV

^a Percentage of GDP = equivalent variation as a percentage of base GDP

Most of the other developing economies in the region are estimated to bear negative overall welfare effects of reform under Doha, although the magnitudes are small.¹³ In all cases this is a consequence of adverse terms of trade movements, suggesting that rising agricultural prices under Doha would be harmful in aggregate to many developing economies in the Asia-Pacific region (excepting India, the Republic of Korea and Thailand), although by small margins.

¹³ To put the measures in perspective, we have provided equivalent variation as a proportion of the initial gross domestic product levels.

The case of Bangladesh is interesting because as an LDC it is not required under the current proposal to make any commitments to reciprocal multilateral trade liberalization. Moreover, as an LDC it is the recipient of preferential access in agriculture to all developed economies. We might normally expect the latter to be reflected in a positive welfare effect through shifts in the terms of trade, but our results do not bear out this expectation. The aggregate effect on Bangladesh, while small, is negative, and appears to be driven by terms of trade shift. This suggests that tariffs faced by Bangladesh in the developed world are already low, and there is little to be gained in aggregate from preferential access. Rather, Bangladesh is hurt as world prices rise (it is a net importer of both agricultural and food products, as shown in table 2) and/or through preference erosion as barriers to other countries are lowered.

How could Bangladesh and similar economies counteract this effect? It is possible that allocative efficiency improvements could counter terms of trade movements if such economies were to liberalize their own relatively high (see table 1) tariffs in agriculture and food products. This would require significant commitments in the case of Bangladesh, however, since binding overhang is probably more severe in Bangladesh than in any other country in the region. A similar case can be made for Viet Nam and the Russian Federation, which, as newly acceded members (assumed in the case of the latter), do not make any further commitments under this scenario. Substantial reductions in developing country tariffs also create new potential pathways to positive terms of trade shifts (such as through expansion of South-South trade in agricultural products).

To explore this possibility further, we consider the regional allocation of gains from reform under the comprehensive agricultural reform scenario. Under comprehensive reform, all developing economies in the region experience positive welfare gains except Bangladesh and the Philippines, where the results remain negative (but small). The results for several countries stand out. Notably, Malaysia, the Republic of Korea, Sri Lanka and Thailand benefit substantially in proportional terms under this scenario. India also gains substantially in dollar terms, and is a classic case of large allocative efficiency gains being able to outweigh terms of trade losses, much like in the cases of the Republic of Korea and Japan. In Bangladesh and the Philippines, the efficiency gains are positive, but not enough to outweigh terms of trade loss. Finally, we consider Malaysia, a net loser under Doha, but a substantial gainer under comprehensive reform (indeed, the largest gainer in proportional terms). Interestingly, much of the gain is from terms of trade effects. This unanticipated result suggests that there is scope for market access gains with agricultural reform for Malaysia also, but that the current modalities are not addressing the areas that would benefit the country (suggesting that reform

does not go far enough in some niche products in which Malaysia has a strong comparative advantage, and that the opening of Southern as well as Northern markets is particularly crucial for that country).

Overall, the results lead us to two major conclusions. First, the current reform scenario in agriculture is unlikely to generate significant positive (or negative) impacts on most economies in the Asia-Pacific region; the current proposed modalities simply do not go very far in terms of cutting into binding overhang. To the extent that reform does occur, the concerns of developing economies and LDCs over adverse terms of trade movements (both preference erosion and increased food import prices fall into this category) do appear to be justified for many developing economies in the region, although the effects are not large. Moreover, expansion of preferential access for LDCs may not have the potential to ameliorate this effect, as even with zero tariffs on all agricultural goods offered by developed economies, preference erosion effects lead to terms of trade losses for an economy like Bangladesh. The second conclusion relates to the impact of expanded reform and special and differential treatment. Tariffs in many developing economies are quite high, suggesting that substantial gains from increased efficiency are possible—gains that could outweigh the small negative effects of reform in some countries. A more comprehensive reform agenda, embracing reform in both developed and developing economies, would result in much larger aggregate gains and a much larger pool of winners.

Poverty

We now turn to the possible effect of the Doha and comprehensive reform scenarios on poverty. Table 4 reviews the poverty statistics in the region. These have been drawn from the World Bank (2007), and we have selected the data year that is closest to our base year for each economy. The mean income figures are in United States dollars, adjusted for purchasing power, and are per month. Several measures are provided. The most basic measure of poverty is the headcount ratio: the proportion of the population that falls below a defined poverty line. Commonly used criteria are the international \$1/day standard and the \$2/day standard, with the higher standard more widely applied to countries with higher average incomes. The headcount is the actual number of people in that category (in millions).¹⁴ The total number in extreme poverty in the selected economies circa 2002 was approximately 620 million by the \$1/day criterion and 1.7 billion by the \$2/day criterion, with significant variation across economies and, in some cases,

¹⁴ See Chen and Ravallion (2004) for a more in-depth discussion of poverty measures and trends in global poverty.

Table 4. Indicators of poverty/income inequality for developing economies in the Asia-Pacific region circa 2002

Country/region	Data year	Mean income (\$/month) ^a	Gini (percent-age)	\$1/day poverty line				\$2/day poverty line			
				Headcount ratio (percent-age)	Headcount (millions)	Poverty gap (percent-age)	Squared poverty gap (percent-age)	Headcount ratio (percent-age)	Headcount (millions)	Poverty gap (percent-age)	Squared poverty gap
Bangladesh	2000	46.9	33.4	41.3	54.1	10.4	3.5	84.2	110.4	39.1	21.3
China (rural)	2002	68.7	38.0	22.4	175.0	5.0	1.5	65.1	507.5	25.3	12.5
China (urban)	2002	219.3	33.5	0.3	1.6	0.1	0.1	3.4	16.8	0.7	0.3
India (rural)	2000	42.3	28.1	41.8	302.7	10.2	3.4	88.4	640.5	40.8	21.9
India (urban)	2000	70.5	35.0	19.3	52.9	3.9	1.1	60.5	166.2	22.5	10.6
Indonesia	2002	81.3	34.3	7.8	16.5	1.0	0.2	52.9	112.0	15.9	6.2
Malaysia	1997	321.7	49.2	0.1	0.0	0.0	0.0	8.8	1.9	1.9	0.6
Mexico	2002	204.7	49.7	4.3	4.3	0.9	0.3	21.2	21.2	6.7	2.9
Philippines	2000	110.9	46.1	13.5	10.4	2.4	0.6	44.9	34.4	16.3	7.6
Russian Federation	2001	170.8	39.6	1.8	2.6	0.4	0.1	16.8	24.3	4.4	1.7
Sri Lanka	2002	105.4	40.2	5.8	1.1	0.7	0.1	41.5	7.9	12.1	4.6
Thailand	2002	145.2	42.0	0.9	0.6	0.0	0.0	25.8	16.2	6.2	2.0
Viet Nam	2002	114.8	37.6	1.8	1.4	0.1	0.0	33.2	26.7	8.3	2.7

Source: World Bank (2007). Povcal (Washington, D.C.)

^a Adjusted for purchasing power

across regions within economies (the headcount ratios are split by rural and urban for two major economies, China and India, with substantially higher levels of poverty in the rural regions in both cases).¹⁵ Poverty is most severe in Bangladesh, rural China and India, and Indonesia.

Two other measures, both of which attempt to address the issue of poverty depth, are provided in table 4. The poverty gap measure is the mean distance below the poverty line as a proportion of the poverty line. The squared poverty gap weights individual poverty gaps by the gaps themselves, and provides a measure of inequality among the poor. The areas with the greatest poverty depth are Bangladesh and rural India. Finally, the Gini coefficient is a common measure of overall income inequality, with the greatest levels of inequality in Malaysia, the Philippines, Sri Lanka and Thailand.

How might these patterns change with agricultural reform? A single representative household model like GTAP does not generate any direct measures of poverty (hence the use of sub-models in the country studies reviewed above). However, it is possible to gain some insights into the effects that trade reform may have on the poor through aggregate indices.

Anderson, Martin and van der Mensbrugghe (2006) argue that the incomes of the poor are dominated by returns to the factor of production that they own in the greatest abundance: their own (unskilled) labour. The most relevant consumption categories for poorer households are primary food products, and textiles. Hence, we can construct an index that measures the proportional change in the wages of unskilled workers, deflated by changes in the price index for those critical commodities. We might term this index the “real wage” of the poor. We can convert the index numbers into poverty measures using consumption to poverty elasticities.¹⁶ Measures of the latter were obtained from World Bank (2007) estimates, evaluated using both a \$1/day criterion and a \$2/day criterion.

The use of this approach implies several assumptions, including distribution neutrality of the proposed income change within the target group. Also, as Anderson, Martin and van der Mensbrugghe (2006) note, it is implicitly assumed

¹⁵ The 1.7 billion figure is of course likely to be a significant underestimate of poverty in the region because our data only tracks a subset of the economies. Also, the figure for Viet Nam should be regarded with some caution as real exchange rate data for that economy is not regarded as reliable.

¹⁶ It is also possible to base the calculations on average changes in real incomes, assuming complete distribution neutrality. Anderson, Martin and van der Mensbrugghe (2006) argue that linking key model variables to the possible change in the average per capita consumption of the poor, as this index attempts to do, better captures from model results some of the distributional aspects of the changes in real income and not simply the average gain.

that the change in unskilled wages is fully passed through to households and that tariff revenues are replaced only by skilled workers and high-income households. Anderson, Martin and van der Mensbrugge (2006) argue that this is a realistic assumption in many developing countries. While the calculations are clearly rough estimates, they do give us some quantitative indications on the likely patterns of poverty change.

The results are presented in table 5. Under the \$1/day criterion, we estimate a reduction in poverty in the region by 7 million under the Doha reform scenario, rising to 17 million by the \$2/day criterion. Overall then, we estimate that agricultural trade reform under Doha would have a beneficial if generally mild effect on poverty in the region. Once again, the distribution is not even, however. The majority of the positive impact is in rural China, while rural India experiences a rise in the number of people below the poverty line.¹⁷

Here we note two points of interest. First, an aggregate welfare gain does not necessarily correspond to a reduction in poverty (China is estimated to lose overall under Doha, although by a negligible magnitude, while India is estimated to gain). This is because the poverty index we are using here, following Anderson, Martin and van der Mensbrugge (2006), uses the real unskilled wage as the base, and this can move in the opposite direction to overall welfare. Second, in some countries (such as India) poverty rises while aggregate income rises. Since aggregate welfare levels are higher under the reform scenario (see table 3), it must be feasible to arrange a transfer under which poverty levels in fact decline, if the political will to do so exists. In other words, these calculations are based on an implicit assumption of business as usual in income distribution policy, but ultimately that is a domestic policy choice.

The results for the comprehensive reform scenario indicate a much greater impact on poverty. Under the \$1/day criterion, we estimate a reduction in poverty in the region by 51 million under the Doha reform scenario, rising to 65 million by the \$2/day criterion. Again, the distribution is uneven, with the majority of poverty reduction in rural China, but the results indicate that in the long run poverty would fall to some degree under comprehensive agricultural reform in all of the economies for which we are able to undertake the analysis except Sri Lanka. Again, we might note that since Sri Lanka gains overall in this scenario, it should be possible for poverty to be reduced there also, if the political will exists.

¹⁷ Our headcount estimates are somewhat larger than those in Anderson, Martin and van der Mensbrugge (2006). This probably reflects the fact that the earlier study was measured relative to a projected 2015 baseline, under which growth has already reduced poverty significantly below levels circa 2001 (i.e., the baseline is different).

Table 5. Estimated changes in indicators of poverty under agricultural trade reform

Country/region	<i>Doha scenario</i>		<i>Comprehensive scenario</i>	
	<i>Headcount ratio (percentage change)</i>	<i>Headcount (change in millions)</i>	<i>Headcount ratio (percentage change)</i>	<i>Headcount (change in millions)</i>
<i>\$1/day poverty line</i>				
Bangladesh	0.6	0.3	-4.5	-2.4
China (rural)	-6.6	-11.5	-15.6	-27.3
China (urban)	-7.1	-0.1	-16.9	-0.3
India (rural)	2.0	5.9	-3.3	-10.0
India (urban)	2.4	1.3	-4.0	-2.1
Indonesia	-7.3	-1.2	-22.8	-3.8
Malaysia	-1.8	0.0	-20.0	0.0
Mexico	-2.8	-0.1	-7.6	-0.3
Philippines	-8.1	-0.8	-23.4	-2.4
Russian Federation	0.3	0.0	-21.0	-0.5
Sri Lanka	1.2	0.0	7.7	0.1
Thailand	-95.0	-0.5	-100.0	-0.6
Viet Nam	-12.3	-0.2	-100.0	-1.4
<i>\$2/day poverty line</i>				
Bangladesh	0.1	0.1	-1.1	-1.2
China (Rural)	-2.6	-13.2	-6.2	-31.3
China (Urban)	-11.4	-1.9	-27.1	-4.5
India (Rural)	0.3	2.2	-0.6	-3.7
India (Urban)	1.0	1.6	-1.6	-2.7
Indonesia	-1.9	-2.1	-5.8	-6.5
Malaysia	-0.4	0.0	-4.6	-0.1
Mexico	-1.4	-0.3	-3.7	-0.8
Philippines	-3.3	-1.1	-9.5	-3.3
Russian Federation	0.1	0.0	-10.5	-2.6
Sri Lanka	0.3	0.0	2.0	0.2
Thailand	-12.0	-1.9	-27.9	-4.5
Viet Nam	-1.9	-0.5	-16.9	-4.5

Source: Global Trade Analysis Project simulations and calculations from World Bank (2007). Povcal (Washington, D.C.)

It is worth considering whether these aggregate results match with the results generated by the more detailed models, as an indicator of consistency and the extent to which these kinds of estimates are useful. Because the detailed results for India (Gilbert 2007) were generated using a consistent data set and experimental design, they provide the most direct comparison. The results of the detailed model indicated positive aggregate welfare gains in all scenarios, with the largest gains in the long run with comprehensive reform. This is consistent with the GTAP results. At the household level, the results suggested that under Doha there would be a decline in the incomes of the poorest groups, which were a subset of rural households. This is consistent with the marked increase in rural poverty that the aggregate method predicts. Moreover, in the long run with comprehensive reform, the detailed model predicted an increase in the incomes of the poorest groups, and the GTAP model indicated a decline in poverty levels under the same scenario. When calculating poverty changes from the household data, the Gilbert (2007) results were more moderate than those estimated here, both in terms of the rise under Doha and the fall under comprehensive.

All of the other available studies consider the broad Doha agenda, but nonetheless the results are generally consistent. The results of Annabi and others (2006) for Bangladesh match the somewhat bleak scenario that our analysis paints for that economy (that is, falls in aggregate welfare and rises in poverty under all Doha scenarios). The results for the Philippines by Cororaton, Cockburn and Corong (2006) also match, and in particular we find that the comprehensive scenario has a stronger impact on Philippine poverty levels, as suggested by Cororaton, Cockburn and Corong (2008). The results for Indonesia are consistent with Robilliard and Robinson (2006) in terms of sign but not magnitude, with our results indicating much larger poverty impacts. This is likely because of a difference in definition. Robilliard and Robinson (2006) use an official Indonesian poverty line, which is significantly lower than the \$2/day criterion, resulting in less scope for poverty reduction. Similarly, the results of Zhai and Hertel (2006) for China also indicate poverty reduction, with the majority occurring in the rural areas. This is consistent with our results, but the magnitude we estimate is larger, in part reflecting lower initial poverty estimates in the Zhai and Hertel (2006) base. Overall, there is a broad consistency between the results, suggesting that the aggregate approach adopted in Anderson, Martin and van der Mensbrugge (2006) and here at the least provides a useful guideline.¹⁸

¹⁸ Although our results suggest a decline in poverty in Viet Nam, a comparison with Linh, Burton and Vanzetti (2008) is not feasible given their specific focus on farm households.

Adjustment

A comparative-static-type model does not generate information on the adjustment path to the new equilibrium. Nonetheless, adjustment costs associated with trade reform may be an important, if temporary, poverty component, especially if they tend to be borne by groups known to be at or close to the poverty line. Understanding the likely magnitude of adjustments required may therefore be useful in designing policies to alleviate those costs.

Existing studies have not attempted to address the adjustment cost issue. One way to gain some indirect insights is by considering indices of the magnitude of economic changes within the system. Given our interest in how agricultural trade reforms impact the poor, we consider adjustment of unskilled labour in detail. It is important to note that the indices we consider do not measure the magnitude of the adjustment costs themselves, but rather tell us which economies are likely to face relatively high adjustment costs, and by whom those costs are likely to be borne.

We calculate two types of index. In the first, labelled “shift”, we take the employment share weighted average of the absolute values of the proportional changes in sectoral level employment of unskilled labour. This provides a measure of the extent to which unskilled labour is forced to change the sector in which it is employed as a consequence of the trade reform. The index is greater than zero, with numbers close to zero indicating less adjustment, and larger numbers indicating greater adjustment. We calculate the index both for the economies overall and for the agricultural subset.

The second index we have labelled “impact”. This is the production share weighted average of only the negative employment shifts. The rationale for this index is as follows. Suppose that an economy is rocked by some price shock. The consequence will ultimately be a reallocation of resources, including unskilled labour, as some industries contract and others expand. The worst case adjustment scenario is that industries adversely affected by the shock immediately reduce their employment (an instantaneous impact), while those positively affected increase their employment only slowly at some point in the future. Therefore, the impact measure can be interpreted as the upper bound estimate of the fall in the rate of employment of unskilled labour, prior to any uptake in new sectors. Again, we calculate this statistic for the economy overall, and for unskilled labour in agricultural sectors only.

The results of our analysis are presented in table 6. Under the Doha scenario, barring New Zealand, the results are quite moderate overall, as we might

expect given the small changes in the aggregate economic variables, with the largest adjustments and largest potential negative impacts on unskilled labour employment levels in the Philippines and Thailand. The worst-case changes are all less than 1 per cent.¹⁹

Table 6. Estimated employment adjustment indices under agricultural trade reform

Country/area	Doha scenario				Comprehensive scenario			
	Overall		Agriculture		Overall		Agriculture	
	Shift	Impact	Shift	Impact	Shift	Impact	Shift	Impact
Australia	1.2	-0.6	7.7	-1.5	3.4	-1.7	26.8	-8.9
New Zealand	3.0	-1.5	9.1	-1.6	4.4	-2.2	13.5	-2.3
China	0.6	-0.3	1.2	0.0	1.2	-0.6	2.5	0.0
Hong Kong, China	0.1	0.0	1.2	-0.3	0.1	0.0	1.9	-0.8
Japan	0.2	-0.1	2.5	-0.4	1.0	-0.5	16.5	-13.2
Republic of Korea	0.5	-0.3	4.8	-1.2	1.8	-0.9	16.8	-7.9
Indonesia	0.5	-0.2	0.8	0.0	2.1	-1.0	4.5	-0.7
Malaysia	0.1	-0.1	1.7	-0.9	4.1	-2.0	52.1	-13.9
Philippines	1.4	-0.7	1.5	0.0	3.1	-1.6	4.8	-1.4
Singapore	0.2	-0.1	6.9	-2.3	0.3	-0.2	8.7	-2.9
Thailand	1.0	-0.5	2.7	-0.6	4.5	-2.2	15.3	-5.5
Viet Nam	0.4	-0.2	1.2	-0.1	2.4	-1.2	10.0	-4.1
Bangladesh	0.1	-0.1	0.4	0.0	1.2	-0.6	3.6	-1.9
India	0.2	-0.1	0.4	-0.3	1.5	-0.7	2.6	-2.3
Sri Lanka	0.1	0.0	0.3	-0.1	1.9	-1.0	4.0	-0.3
Russian Federation	0.4	-0.2	1.7	-0.1	0.6	-0.3	3.9	-2.5
Canada	0.2	-0.1	2.3	-0.7	0.3	-0.2	4.6	-3.4
Mexico	0.3	-0.2	1.6	-0.7	0.8	-0.4	4.2	-2.2
United States of America	0.1	0.0	1.1	-0.9	0.1	-0.1	1.8	-1.8
European Union	0.2	-0.1	2.0	-1.7	0.4	-0.2	4.1	-2.7
South & Central America	0.4	-0.2	1.8	-0.3	0.6	-0.3	2.7	-0.5
Rest of world	0.3	-0.2	0.9	0.0	0.7	-0.4	2.4	-0.5

Source: Global Trade Analysis Project simulations by author.

Notes: Shift = Weighted average percentage change in employment by sector
Impact = Instantaneous fall in employment rate

¹⁹ Moderate changes are also observed in Australia and New Zealand, largely reflecting the pulling of resources into agriculture. On the other hand, in the Republic of Korea there are large adjustments reflecting the pushing of resources out of agriculture. The percentage change for Singapore is large also, but its economic significance must be interpreted in the light of the overall significance of agricultural production for Singapore, which is less than 1 per cent of GDP. Similarly, agricultural output as a proportion of GDP is low in Japan and the Republic of Korea. In any case, we would suspect that developed economies are better equipped to deal with transitional problems.

When we consider just agricultural labour, the results are more significant. This result suggests that the burden of adjustment falls unevenly, with unskilled labour employed in agriculture and the food processing industries generally having to shift activities at rates greater than the average shift, and having a greater probability of being temporarily unemployed in the adjustment phase. Hence, for example, unskilled agricultural labour in Malaysia must adjust at approximately 17 times the rate of unskilled labour overall, and is nine times more likely to face temporary unemployment (at the upper bound).

The comprehensive agricultural reform scenario would, not surprisingly, entail much greater adjustment. Our results indicate that the most adversely affected economies would be Malaysia, the Philippines, the Republic of Korea, Thailand and Viet Nam, where temporary falls in employment of unskilled labour in the region of 1 to 2 per cent are possible, with a disproportionate burden borne by agricultural workers (especially in Malaysia).

In summary, adjustment costs are temporary, and are part of the price of increased efficiency in the long term. CGE modelling does not address this issue directly. Nonetheless, our simulation results indirectly show that moderate sectoral adjustment is likely in agriculture throughout the region under Doha, and that the costs of adjustment are likely to be borne in large part by unskilled agricultural labour. This effect may contribute adversely to poverty during the adjustment phase if other policies are not put in place to address transition problems.

VI. CONCLUDING COMMENTS

In this paper we have considered the potential implications of agricultural trade reform under Doha on overall welfare and poverty for economies in the Asia-Pacific region. The approach has been to survey the results of the limited number of detailed country studies, and construct new results based on simulations using the GTAP model. The latter differ from existing work by concentrating on the agricultural reform in the Asia-Pacific region, drawing on the latest proposed modalities and tariff data, making use of the latest poverty elasticity estimates, and by addressing the issue of adjustment costs.

The results suggest that the level of agricultural reform currently being considered under Doha does not make sufficient cuts into the binding overhang to generate large welfare benefits. The very moderate cuts currently being proposed will likely have only a limited impact on developing economies. We do find some evidence to suggest that preference erosion may lower welfare in some economies, as may rising world prices, but again at very low levels given the limited degree of

actual liberalization proposed. In aggregate welfare terms, many developing economies would do better by engaging more fully in the liberalization process, since own-reform gains are under developing country control and likely to be more substantial than any conceivable benefit from tariff preferences. Most developing countries in the region would be winners, in aggregate welfare terms, under comprehensive agricultural trade reforms.

In terms of poverty, our aggregate results suggest that agricultural trade reform currently proposed under Doha may indeed hit the poor disproportionately in some countries in the region, by lowering unskilled wages and/or raising the prices of basic foodstuffs. However, the aggregate poverty levels decline by moderate amounts. This result is consistent with the results of the detailed studies available. The effect of comprehensive reform is a much more robust and broad-based decline in poverty levels in the region. The temporary burden of adjustment, however, does tend to be borne inequitably by the owners of unskilled labour, in particular those employed in agricultural activities, and Governments in the region will need to carefully consider complementary adjustment policies in conjunction with trade reform.

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ANNEX

LATEST PROPOSED DOHA MODALITIES*

Market access

- Members shall reduce their bound duties following a tiered formula requiring reductions of 48 to 73 per cent for developed countries depending on the initial bound levels. Commitments for developing economies have higher bands and lower required reductions (two thirds of developed economy levels). The least developed members and very recently acceded members (including Viet Nam) are not required to undertake any reductions beyond those already committed. “Small and vulnerable” economies, defined as those with an average share of world trade of 0.16 per cent or less, an average share of non-agricultural trade of 0.1 per cent or less and a share of world agricultural trade of no more than 0.4 per cent, are entitled to moderate the required cuts by a further 10 percentage points.
- Developing country members may lower their commitments proportionately across bands if their average reductions under the formula exceed 36 to 40 per cent. Small and vulnerable members may do the same if their average reductions under the formula exceed 24 per cent.
- Developed economies may designate 4 to 6 per cent of dutiable lines as sensitive, with developing economies entitled to 5 to 8 per cent. These require reductions at two thirds of the rate required under the tiered-formula.
- Developed country members commit to duty- and quota-free market access for all products originating in the least developed countries by 2008 or the start of the implementation period.

* See World Trade Organization (2007). “Draft possible modalities on agriculture”, paper presented at the special session of the Committee on Agriculture on 17 July.

Domestic support

- Reduction of total aggregate market support (AMS) in the range of 45 to 70 per cent, in accordance with a tiered formula.^a Developed countries with a level of total AMS of at least 40 per cent of the total value of agricultural production shall reduce by a further 10 per cent if their total AMS is in the second tier, and by 5 per cent if they are in the third tier.
- Reduction in the base level of overall trade-distorting domestic support in the range of 50 to 85 per cent in accordance with a tiered formula.^b Developed country members in the second tier with overall trade-distorting domestic support of at least 40 per cent of the total value of agricultural production shall reduce by a further 4 to 6 per cent.
- Developing economy member reductions are two thirds of those of developed economies, while small, low-income, recently acceded members are not required to undertake a reduction in total AMS.
- *De minimis* levels (the lower bound of support levels that must be reduced) are cut by 50 to 60 per cent from those set out under the Uruguay Round Agreement on Agriculture (that is, 5 per cent for developed economies and 10 per cent for developing economies).

Export competition

The commitment on export competition is elimination of export subsidies by 2013 for developed economies, and an as yet unspecified reduction by developing economies.

^a Aggregate market support (AMS) is a monetary measure of the total sectoral support, including both direct payments and the revenue transfers from consumers as a consequence of price distorting policies.

^b Overall trade-distorting domestic support is defined as total AMS plus 10 per cent of the value of production in the base period, 1995-2000, plus the higher of the existing average blue box payments (certain production limiting programs) or 5 per cent of the average total value of production in the base period.