The Poverty Impacts of Global Commodity Trade Liberalization

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Abstract

This paper examines the poverty impacts of global merchandise trade reform by looking at a wide range of developing countries in Africa, Asia and Latin America. Overall, we find that trade reform tends to reduce poverty primarily through the inclusion of agricultural components. The majority of our developing country sample experiences small poverty increases from non-agricultural reforms. We explore the relative poverty-friendliness of agricultural trade reforms in detail, examining the differential impacts on real after-tax factor returns of agricultural versus non-agricultural reforms. This analysis is extended to the distribution of households by looking at stratum-specific poverty changes. Our findings indicate that the more favorable impacts of agricultural reforms are driven by increased returns to peasant farm households' labor as well as higher returns for unskilled wage labor. Finally, we examine the commodity-specific poverty impacts of trade reform for this sample of countries. We find that liberalization of food grains and other processed foods represent the largest contributions to poverty reduction. More specifically, it is tariff reform in these commodity markets that dominates the poverty increasing impacts of wealthy country subsidy removal.

JEL codes: D30, D58, D63, F13, O53, Q18

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Thomas W. Hertel and Roman Keeney

Despite a lack of recent progress towards a multilateral trade reform agreement, the Doha Development Agenda negotiations of the WTO continue to generate interest for their poverty reduction potential. A distinguishing feature of the Doha Agenda was the lack of commitment to trade policy reform by developing countries – particularly the poorest countries which were offered "the round for free" (Anderson and Martin 2006). Recent research suggests that developing country tariff cuts – particularly in agriculture – are among the most poverty-friendly elements of a broader multilateral trade policy agenda (Hertel *et al*. 2009).

Such analyses hinge critically on the measured protection for agriculture in developing countries. Unlike the OECD countries, where the measurement of agricultural protection has received considerable attention over the past two decades through the regular publication of "Producer Support Estimates" (PSE), there remained considerable uncertainty about current support and recent trends in agricultural protection in developing countries – particularly the smaller, low-income economies – until the new World Bank agricultural distortions database was compiled (Anderson and Valenzuela 2008).

In this chapter, we incorporate this new information on price distortions to assess the impact of agricultural and other trade reforms on poverty. These data on developing country protection in agriculture afford us the opportunity to consider the relative importance of agricultural versus non-agricultural protection at home and abroad more accurately than has been previously possible.[1]

[1] Note that throughout this chapter, as with the rest of the book, non-agriculture includes highly processed foods and

Tracing the impacts of developments in multilateral trade policy from international markets to the household level is a long and complex process (Winters *et al*. 2004). A natural method for accomplishing this is to divide the task up into parts. This approach is taken in Hertel and Winters (2006), where a global model is used to generate world price changes following various multilateral trade reform scenarios with national models rich in household level detail used to assess the ensuing national poverty impacts. This method allows separate modeling tools, with each working to its own comparative advantage. It has become widely accepted as the standard for definitively answering *ex ante* questions regarding the poverty impacts of trade reforms for a specific country.

An inherent limitation of the country specific studies underlying the final poverty change estimates from this approach is the development of general conclusions regarding the broad pattern of poverty impacts. Are rich country reforms pro-poor on average? How do they compare to poor country reforms? For this purpose, it is important to assemble a household-survey based framework that is comparable across countries, and which permits us to say something about poverty impacts across a wide range of diverse economies that are representative of the developing world.

This approach has been adopted by Ivanic (2006) and by Hertel *et al*. (2007) in their analyses of the Doha Development Agenda (DDA). These authors conclude that the set of measures envisioned under the DDA[2] are less poverty friendly than the set of policy measures not being considered. Hertel *et al*. (2009) explore this question in detail and determine that an over-emphasis on export and domestic production subsidies relative to market access in the rich countries, together with the absence of commitments to deep agricultural tariff cuts in developing countries, are the primary culprits in diminishing the prospects for poverty reduction from the DDA. This international cross-section approach has proven especially fruitful for providing complementary insight to detailed country-specific studies, despite its relatively undifferentiated treatment of developing country household behavior. In addition to making use of the new

beverages while farm goods that require light processing before they can be traded easily (such as rice, sugar, dairy products and meat) are included in agriculture.

[2] Specifically, they focus on an implementation of the July 2004 framework agreement of the WTO's DDA.

developing country protection estimates, we also examine the poverty impacts of trade reform through a different lens – namely that of commodity-specific support. Given that many political economy and distributional causes of agricultural protection are inherently commodity specific, viewing the trade/poverty link through the commodity lens in a comparative fashion represents an area of relative inattention and one that a global model with a diverse developing country sample is well-suited to address. For present purposes we focus on 15 developing countries: four African (Malawi, Mozambique, Uganda, and Zambia), five Asian (Bangladesh, Indonesia, Philippines, Thailand, and Vietnam), and six Latin American (Brazil, Chile, Colombia, Mexico, Peru, and Venezuela).

Analytical approach to poverty modeling

Our poverty analysis begins with the specification of a utility function and an associated consumer demand system for determining household consumption and the maximum utility attainable at a given level of prices and income. The utility of the household at the poverty line is defined as the poverty level of utility. Households with utility at or below this level are deemed to be in poverty. In this study, we follow Hertel *et al*. (2004) and Hertel *et al*. (2007) in using Rimmer and Powell's (1992) AIDADS demand system to represent consumer preferences. The AIDADS demand system is particularly useful for poverty analysis because it lends itself to international cross-section estimation and devotes two-thirds of its parameters to consumption behavior in the neighborhood of the poverty line (Cranfield *et al.* 2003).

Estimation of this demand system is undertaken using the 80 country, per capita consumption data set offered by GTAP version 6.1 and the resulting parameters are reported in Hertel *et al*. (2009). The demand system estimates are then calibrated reproduce base year per capita demands in each country following the approach of Golub and Hertel (2008).

A key finding in the work of Hertel *et al*. (2004) is the importance of stratifying households by their primary source of income. Farm households in developing countries often rely on the farm enterprise for virtually all of their income, and the share of national poverty concentrated in agriculture-specialized households is large in the poorest countries in our sample – between one-quarter and one-half of the $1/day poverty line headcount in Chile, Colombia, Indonesia, Malawi, Mozambique, and Zambia.

Not only are farm households in the poorest countries more likely to be specialized in farm earnings, these specialized farm households also tend to be poorer than the rest of the population (Hertel *et al*., 2004). The implication is that the poorest households in the poorest countries are more concentrated in agriculture and therefore more likely to benefit from producer price increases engendered by multilateral trade reforms. We follow Hertel *et al*. (2004) in identifying five household groups that rely almost exclusively (greater than 95 percent) on one source of income: agricultural self employment, non-agricultural self-employment, rural wage labor, urban wage labor, or transfer payments. The remaining households are grouped into rural or urban diversified strata, leading to seven total strata.[3]

Hertel *et al*. (2004) simulated the impact of trade reform on the full distribution of households within each of the seven strata using a global CGE model and a household micro-simulation framework. Given our emphasis on poverty in this chapter, we follow Hertel *et al*. (2009) by focusing on the households in the neighborhood of the poverty line making use of a highly disaggregated poverty elasticity approach. Specifically, we compute the stratum-specific elasticity of the poverty headcount with respect to a change in average income in the stratum. We denote this elasticity ε_{rs}, and report the computed values for the fifteen countries in our sample in table 1. They range from a low of 0.0006 in the self-employed agriculture stratum in Zambia, where nearly all of the population is well below the poverty line, to a high of 3.63 in the urban diversified stratum of Brazil, where the population density at the poverty line is quite high.

The proportional change in real income of households at the poverty line in stratum s of region r can be written as the income–share weighted sum of these households' real after-tax factor earnings:

[3] A clear limitation of this approach stems from the rigidity of a given households' classification by earnings specialization. Obviously households may be induced to change their specialization or diversify in response to changing relative factor returns. We believe that the relatively broad definition of strata circumvents this problem for the majority of households in the face of modest earnings changes. However, this important qualification is considered further in the results section below.

$$\hat{y}_{rs}^{p} = \sum_{j} \alpha_{rsj}^{p} (\hat{W}_{rj} - \hat{C}_{r}^{p}) \tag{1}$$

where α_{rsj}^{p} is the share of income obtained from factor j by households at the poverty line in stratum *s* of region r, $\hat{W}_{rj}$ is the proportional change in after-tax earnings of factor *j* in region *r*, and $\hat{C}_{r}^{p}$ is the proportional change in the cost of living at the poverty line in region *r*, i.e. expenditure required to remain at the poverty level of utility. This is obtained by solving the AIDADS demand system for the expenditure required to remain at the poverty level of utility, given the new prices (that is, post-trade reform prices).

We can now express the proportional change in the poverty headcount in stratum *s* of region *r* as follows:

$$\hat{H}_{rs} = \varepsilon_{rs} \cdot \hat{y}_{rs}^{p} = \varepsilon_{rs} \cdot \sum_{j} \cdot \alpha_{rsj}^{p} (\hat{W}_{rj} - \hat{C}_{r}^{p}) \tag{2}$$

The earnings shares at the poverty line, α_{rsj}^{p}, will play a critical role in our analysis. Regardless of the household type (with the exception of transfer-dependent households), unskilled labor income tends to dominate these stratum-specific earnings shares (Hertel *et al.* 2009). For example, in the case of the agriculture-dependent households, most of the earnings show up in unskilled agricultural labor. In the case of rural diversified households, it is usually a mix of agricultural self-employed unskilled labor, unskilled wage labor and unskilled nonfarm (self-employed) labor. The fact that these households are so poor means that they have little income from land or capital.

Having established the determinants of the stratum poverty headcount, we can now progress to the national poverty headcount, H_r, which can be expressed as a function of the stratum headcounts and stratum populations (POP_{rs}):

$$H_r = \left[\sum_{s} POP_{rs} * H_{rs} \right] / POP_r \tag{3}$$

where $POP_r = \sum_{s} POP_{rs}$. So the proportional change in national poverty headcount is:

$$\hat{H}_r = \sum_s \beta_{rs} * H_{rs}.$$

Here:

$$\beta_{rs} = \left[\left(POP_{rs} * H_{rs}\right)/POP_r\right]/H_r = \left(POP_{rs} * H_{rs}\right)/\sum_s \left(POP_{rs} * H_{rs}\right) \quad (4)$$

is the share of stratum *s* poverty in nationwide poverty in region *r*. These shares are reported in table 2 for our 15 focus countries. Agricultural specialized households and rural diversified households tend to dominate the poverty headcount, although exceptions are evident in Colombia, Venezuela and Peru where self-employed, non-agricultural households contain a large share of the poor.

Combining equations (2) and (4) we get a useful expression for evaluating the change in the national poverty headcount in response to a small change in factor and commodity prices:

$$\hat{H}_r = \sum_s \beta_{rs} \cdot \varepsilon_{rs} \cdot \sum_j \alpha_{rsj}^p \left(\hat{W}_{rj} - C_r^p\right) \quad (5)$$

Since the expression in parentheses in equation (5) denotes the proportional change in real, after-tax income associated with each of the factors of production ($\hat{W}_{rj}^R$) we can rewrite this as:

$$\hat{H}_r = \sum_s \sum_j \beta_{rs} \cdot \varepsilon_{rs} \cdot \alpha_{rsj}^p \cdot \hat{W}_{rj}^R \quad (6)$$

From equation (6) it is clear that, in order to obtain the change in national poverty, each real after tax factor return must be pre-multiplied by a region-, stratum-, and factor-specific poverty elasticity.

As an example, table 3 reports the product: $\beta_{rs} \cdot \varepsilon_{rs} \cdot \alpha_{rsj}^p$ for Bangladesh. The rows in this table correspond to strata and the columns to earnings types. Since $\sum_j \alpha_{rsj} = 1$, the row sums in this table simply give the elasticity of national poverty with respect to a one percent rise in stratum income, that is, $\beta_{rs} \cdot \varepsilon_{rs}$. These are obviously heavily influenced by the national poverty shares reported in the Bangladesh row of table 2. Since the rural diversified stratum comprises nearly 37 percent of the poor, it is not surprising that this row total is the largest in table 3. This is followed in importance by the self-employed agriculture and non-agriculture strata, which have relatively high stratum-specific poverty elasticities (recall the first row of table 1), then the rural labor stratum and the urban diversified stratum.

The column sums in table 3 allow us to identify which factors are most important in poverty reduction in Bangladesh. In this case it is clear that unskilled labor is the primary endowment of the poor in Bangladesh. What matters is where these workers are employed, and how their relative wages will be affected by trade reform. Based on the bottom row in table 3, we see that unskilled wage labor is most important from a national poverty reduction point of view, followed closely by self-employed non-agricultural and agricultural unskilled labor. Transfer payments, skilled wage labor, capital and land, play a much smaller role in poverty reduction at the margin, according to the final row in table 3. The grand total in table 3 gives the national $1/day poverty elasticity (bottom right corner, 1.24) with respect to a uniform one percent rise in real, after-tax income from all sources.

The first row of table 4 takes the final row of table 3 for Bangladesh and divides all the entries by 1.24 so that we have the share of each earnings source in national poverty reduction, given an across-the-board rise in real after-tax incomes. Thus, unskilled wage labor (the fifth column entry in row one) is shown to contribute 33 percent of the total, and so on. The remaining rows in table 4 provide the same calculation for the other fourteen developing countries in our sample.

Treating each country as an observation, unskilled wage labor shows the highest average share (bottom row of table 4), followed by agricultural unskilled labor and then non-agricultural unskilled labor and transfers. Transfer payments are very important in some of the richer developing countries (Mexico, Thailand, Chile, Colombia, Brazil), as well as lower income countries with a large share of migrant labor (for example, Mozambique). The entries in table 4 give a clear idea of which factor price increases are most likely to lower the national poverty headcount in each country.

The global computable general equilibrium (CGE) model

With the household level poverty impacts hinging critically on factor rewards that depend not only on the type of endowment but also where it is employed, we need a global modeling framework with enough detail to separate these differential returns. We adopt the GTAP model (Hertel 1997) and its version 6.1 database calibrated to 2001 (Dimaranan 2007) and modify both to be consistent with our needs for differentiated factor returns as well as changes in price distortions identified in Anderson and Valenzuela (2008) and prepared for CGE modeling by Valenzuela and Anderson (2008). The date of the version 6.1 database also requires us to make some updates due to market conditions and policy reforms that have changed since 2001. The model is implemented in GEMPACK (Harrison and Pearson 1996). We now turn to a discussion of the modeling assumptions and data changes incorporated into our CGE modeling framework.

Database adjustments

Our starting point for the global CGE analysis of the impacts of trade policy is the GTAP version 6.1 database (Dimaranan 2007). For present purposed we aggregate that to 31 productive sectors and 6 groups of household consumption items, following Ivanic (2006). We update this database by solving an experiment that accounts for key policy reforms to border protection that took place between 2001 and 2005 (most notably accession of China to the WTO, enlargement of the European Union, and completion of Uruguay Round commitments by some WTO members). We then alter the data base (now with a base year of 2005) to reflect the recent estimates of agricultural price distortions in developing countries from Anderson and Valenzuela (2008). At the same time, we alter our database to reflect most recent OECD commodity support figures for agricultural output subsidies as of 2004. The aggregate changes in commodity support as measured by the PSE are relatively small over this time frame (OECD 2007). However, in some instances support to particular commodities changed dramatically. With an emphasis on viewing poverty impacts through a commodity lens, using the most recent available information on initial protection is warranted. In total this leads us to adjust twenty-five different OECD member output subsidy levels in our initial database.[4]

Modifications to the GTAP model

Our modifications to the standard GTAP model focus on features that enhance analysis of agricultural reforms and simulation of poverty impacts. We retain the simplistic yet empirically robust assumptions of constant returns to scale and perfect competition typically featured in agricultural trade studies.[5] The remaining modifications are aimed at permitting us to shed new light on the distributional consequences of trade reforms – focusing particularly on unraveling the puzzle of why such reform is not more poverty friendly.

On the demand-side of the model, we ensure consistency with the poverty analysis by modifying the GTAP model to incorporate the AIDADS demand system as discussed in Hertel *et al.* (2007). Thus, aggregate preferences are consistent with the preferences used to evaluate the impact of price changes on households at the poverty line – although expenditure patterns differ across income levels due to the non-homotheticity of demands.

The other modifications relate to the factor markets and follow from model changes made in Keeney and Hertel (2005). Frictions in agricultural factor markets have been prominently featured in the development economics literature, particularly as an explanation for low agricultural supply response (de Janvry, Fafchamps and Sadoulet 1991). Modeling the complex processes leading to limited farm/non-farm, rural/urban mobility for the full range of countries in our model is beyond the scope of this chapter, and as stated previously is better suited to the single country case study approach.

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[4] We make adjustments to the output subsidy *ad valorem* rate in instances where the difference between OECD's reported output subsidy rate in 2001 and 2004 differ by at least one percent. Most of the changes occur in the United States where the *ad valorem* output subsidy to rice falls by seventy-seven points and that for oilseeds falls by twenty-four. The year 2001 featured very low world prices for oilseeds and rice relative to 2004 and these commodities factor heavily in our updates of protection in the OECD countries.

[5] Francois, van Meijl and van Tongeren (2005) introduce monopolistic competition in the manufacturing sector into their analysis of WTO reforms. The resulting variety and scale effects generally boost the gains to rich countries and dampen the gains to poor countries from rich-country reforms. However, this makes their model less stable, and, given our focus on agricultural reforms, this feature seems less critical.

To maintain a general framework that reflects imperfect factor mobility between rural and urban employment, we specify a constant elasticity of transformation function which "transforms" farm-employed factors into non-farm employment and vice-versa.[6] This permits factor rewards to diverge between the farm and non-farm sectors and supplies us with the factor market segmentation we require for our distributional analysis. We use the factor supply parameters adopted in Keeney and Hertel (2005) and drawn from the OECD (2001).

We assume that aggregate endowment levels are fixed in our static analysis, reflecting the belief that the aggregate supply of factors is unaffected by trade policy. This is not the 'full employment' assumption sometimes ridiculed by advocates of structural models of development. Rather, it holds that aggregate employment is primarily determined by factors such as labor market norms and regulation that are largely independent of trade policy in the long run.

Recalling equation (6), we must tie our results to the factor earnings shares for all household types in each region. We map the factor returns from the general equilibrium model to those different earnings types in the following way. Agricultural labor and capital receive the corresponding farm factor returns from the general equilibrium model, as do non-agricultural labor and capital. Wage labor in the household surveys is not distinguished as to place of employment so we use the economy-wide average change. Transfer payments represent an important source of earnings for many households and have no obvious corollary from the CGE model. We choose to index these to the growth rate in net national income, which allows us to maintain consistency with the representative household approach of the global model (see Hertel *et al*. 2007).

Finally, a few words about our macro-closure are in order. In this chapter, we fix the ratio of key macro-economic aggregates relative to net national income. These include: government spending, total tax revenues (net of subsidies), net national savings and the trade balance. In this way, we also ensure that public transfer payments (not explicitly modeled in this study) are implicitly fixed relative to net national income. This provides a convenient method for indexing the transfer payments accruing to households. Since tariff liberalization typically results in a

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[6] Land in the GTAP database is specific to agriculture. There we model imperfect mobility across agricultural uses so as to represent the cost of converting land from one use to another.

reduction in tax revenues, a replacement tax is needed. In this chapter, we assume that income taxes on all earnings rise by an equal proportion in order to ensure that tax revenues remain fixed relative to net national income. Of course in those rich countries where tariffs are low and agricultural subsidies are high, this tax rate may fall in the wake of trade liberalization. While we do not believe that the income tax will be the replacement tax of choice in many economies – particularly the poorest economies – it is a convenient tool to use and we do not have enough detail on the tax structure in many of these economies to greatly improve on this simple assumption. As we will see below, omission of the tax replacement effect has a dramatic effect on our poverty results, highlighting this as a key issue for consideration in the country specific case studies in this volume and elsewhere.

Model results and discussion

In this chapter we report the results of just one core simulation: the removal globally of all agricultural production and export subsidies and all merchandise trade taxes, both agricultural and non-agricultural.[7] Table 5 reports our estimates of the percentage change in national poverty headcount for each of our focus countries as it arises from this global liberalization simulation. We use the decomposition method of Harrison, Horridge and Pearson (2000) to identify the impacts of agricultural and non-agricultural policy reform separately from the total in percentage terms. We also provide level changes (in thousands) in the national poverty headcount (column four of table 5).

Impacts of the new price distortions data

[7] More specifically, our global liberalization includes removal of all border measures (export subsidies as well as trade taxes) in all regions of the model and removal of all input and output subsidies in agriculture in the OECD and for those developing countries where Anderson and Valenzuela (2008) provide new information.

Table 5 offers a comparison of the total poverty reduction based on previous work (Hertel *et al.* 2009), which did not feature the distortion estimates compiled by Anderson and Valenzuela (2008), nor the updated OECD estimates for member country protection. By comparing columns 3 and 5 in table 5, we see mostly small differences in the percentage change in the poverty headcount from the current study (column 3) compared to those produced previously (column 5). However, some differences are worth noting. For Colombia, previous results indicated that global liberalization would lead to a slight increase in poverty (a 0.1 percent increase in the national headcount) whereas the current results now anticipate that global trade reform will lead to a slight poverty reduction. Colombia is one of the countries where the information on agricultural protection changed significantly due to incorporation of the Anderson and Valenzuela (2008) estimates. More significantly, predicted poverty reduction in Indonesia is somewhat lower, and in Brazil somewhat higher, than the poverty reduction previously reported.

The crucial role of tax replacement

The last two columns of table 5 present differing estimates of the predicted poverty changes that follow when we alter the assumption about tax adjustments. One variant is to assume that the poor are not subjected to the income tax replacement mechanism. Another is to use an alternative tax replacement instrument, namely a value added tax. This permits our results to be compared with studies in which different assumptions are made in this matter, and it highlights the importance of the tax replacement assumption on predicted changes in poverty.

Column 6 of table 5 reports the percentage change in the national poverty headcount when the poor are not subject to the replacement income tax. This is the assumption made by Anderson, Martin and van der Mensbrugghe (2006) in their analysis of the poverty impacts of the Doha Development Agenda. As can be seen, this presents a marked difference in the predicted poverty alleviation. Trade reforms go from being marginally poverty reducing in most cases to being universally poverty reducing by a considerable magnitude. It reduces the poverty rate by roughly one-quarter in Thailand and Vietnam, for example. In this scenario, the poor are being given access to commodities or are able to sell them at undistorted prices without having to directly bear any of the tax burden of replacing the lost tariff revenue. In effect, this represents a very significant implicit income transfer from non-poor to poor households. We do not argue that such a fiscal transfer is a bad thing of course, as it would have tremendous poverty reduction benefits. However, we do not believe it is the measure most likely to be used, as most developing countries seeking to make up for lost tariff revenue resort to a value added tax (VAT).

The final column in table 5 reports the poverty results when we replace the lost tariff revenue through adjusting the VAT. However, care is needed when adjusting that tax, because some sectors are VAT-exempt (public consumption, for example, and often basic foods). In this alternative scenario we adjust it through an equi-proportional adjustment in the power of the consumption tax (i.e., one plus the consumption tax rate) on taxable items in each focus country. This might be viewed as equivalent in effect to a value-added tax replacement experiment when the VAT applies to all imports and exempts all exports. However, when the existing consumption tax structure is already distorted (as is the case in our model, for example due to exempting some sectors), this replacement consumption tax exacerbates these distortions. In particular, since it does not apply to public consumption, it distorts the allocation of resources between public and private consumption. Therefore, in our framework this VAT scenario is expected to give less beneficial outcomes in terms of poverty reduction than the core scenario. And indeed that is confirmed by the comparison of column3 and 7 of table 5: when lost tariff revenue is replaced with a consumption tax instead of an income tax, the poverty gains are more modest, and the mix of countries reducing poverty changes slightly.

Summary of poverty impacts

Returning to the main set of results from this study (columns 1, 2 and 3 of table 5) we report in the final three rows the summary measures introduced by Ivanic (2006).Specifically, we compute first the Average Value across countries (treating each country as an "observation" with equal weight), then the Average Absolute Value – which shows how important a given change is regardless of sign, and finally the ratio of these two (AV/AAV = SC = Sign Consistency). Note that the latter – which may be viewed as the tendency for trade reforms to reduce (or increase) poverty – is constructed such that $-1 \leq SC \leq +1$. When SC = -1, a given trade reform (or set of reforms) is poverty reducing for all countries in the sample since the average change and absolute value of the changes will be of the same magnitude and opposite sign.

From the average across countries, we see that our current results, using updated protection data, predict larger poverty alleviating impacts in developing countries than the previous analysis (AV of -1.71 versus -1.59), and a slightly increased prevalence of poverty reducing impacts across countries in our sample (AAV of -0.84 versus -0.81). In summary, the results predict that full global trade liberalization would reduce poverty in ten of the 15 focus countries. Even ignoring the growth-enhancing effects of trade reform (which are not included in our comparative static framework), this would lift no less than 816,000 people out of poverty.

The decomposition of total impacts between agricultural and non-agricultural reforms (first two columns of table 5) show that the global agricultural reforms have more than twice the impact on the poor as do non-agricultural reforms (AAVag of 1.78 versus AAVnonag of 0.71). Furthermore, the agricultural reforms are nearly always poverty reducing (SC = -0.93), whereas the non-agricultural reforms tend to be only marginally poverty reducing in this sample of countries (SC = -0.07). Of the five countries experiencing poverty increases in the wake of ag and nonag trade reforms combined, Mexico and Bangladesh are the most important in terms of absolute numbers (more than 100,000 in each case). These are countries that currently enjoy preferential market access in their most important markets (the United States for Mexico and the European Union for Bangladesh). Global trade liberalization results in substantial preference erosion for both countries in these preferred markets.

Why are agricultural reforms more poverty friendly than non-farm trade reform?

As we seek to understand the differential impact of trade reforms across products, we begin by focusing on the difference between the poverty impacts of agricultural and non-agricultural reforms, then turn to the individual commodity decomposition of agricultural reforms.

A natural way to investigate the difference between farm and non-farm reforms is via the decomposition proposed in equation (6). Since the elasticities in this expression are the same (initially) for both experiments, the entire difference in the poverty headcount change is accounted for by real after-tax wage changes. Specifically, we have the following decomposition of the difference in poverty headcount, by region:

$$\hat{H}_{r,diff} = \sum_{s}\sum_{j} \beta_{rs} \cdot \varepsilon_{rs} \cdot \alpha^{p}_{rsj}(\hat{W}^{R}_{rj,agr} - \hat{W}^{R}_{rj,nagr}) \tag{7}$$

where $\hat{W}^{R}_{rj,agr}$ is the real after-tax change in earnings, for endowment *j* in region *r,* owing to agricultural reforms and $\hat{W}^{R}_{rj,nagr}$ is the non-agricultural counterpart. Our first task is to explain why the earnings are differentially affected, then consider how these changes interact with the region/stratum/factor elasticities to determine the differential impact on national poverty.

Table 6 reports the values of $(\hat{W}^{R}_{rj,agr} - \hat{W}^{R}_{rj,nagr})$ for all earnings sources and all focus regions in our analysis. It happens that, relative to non-agricultural trade reforms, agricultural trade reforms raise returns to farming in all of our focus developing countries. They also raise returns to unskilled wage labor, relative to non-agricultural reforms, in most countries, as the unskilled labor-intensive agricultural sector expands and boosts unskilled wages. (Indonesia, Mexico and Vietnam are the exceptions, in which non-agricultural reforms exert a stronger influence on unskilled wages.) Agricultural reforms are less favorable for skilled labor, but this factor's reward is relatively unimportant for the poor (recall table 4).

Continuing across the columns in table 6, we see that agricultural reforms often (but not always) lead to relatively lower real after-tax earnings than non-agricultural reforms for self-employed non-agricultural endowments, as we see many negative entries in columns 7 to 9. The fact that transfers (by assumption) are indexed to net national income and not the cost of living at the poverty line means that food price-increasing agricultural reforms tend to hurt the transfer-dependent households, relative to non-agricultural reforms(column 10). This is due to the relatively large share of food expenditures in the consumption baskets of the poorest households.

Taking into account the aggregate poverty elasticities with respect to factor earnings, reported in table 4, it is not immediately clear why the pattern of earnings differences from table 6 results in agricultural trade reforms dominating non-agricultural reforms as a poverty reduction tool. This depends on the responsiveness of the national poverty headcount to each of these earnings sources. We can gain more insight into this by moving to table 7, which reports the poverty elasticity weighted counterparts to the earnings differences reported in table 6, that is, $\sum_s \beta_{rs} \cdot \varepsilon_{rs} \cdot \alpha_{rsj}^p (\hat{W}_{rj,farm}^R - \hat{W}_{rj,nfarm}^R)$.

When we sum across a row in table 7 (i.e., sum over all endowments in a given region), we get the percentage difference in poverty headcount stemming from agricultural and non-agricultural reforms (subject to rounding error due to the differencing of percentages, which is why these entries differ from the simple difference between the first two columns of table 5). From the final column in table 7, we can see that, in all countries except Mexico and Vietnam, agricultural reforms are more poverty friendly than non-agricultural reforms.

What is special about Mexico and Vietnam? We note that these are two of the three countries where real after-tax unskilled wages rise more under non-agricultural trade reforms (the other is Indonesia, see table 6). Unlike Indonesia, where the share of the poor in agriculture-specialized households is about 40 percent (recall table 2), Mexico and Vietnam show relatively low shares of agricultural households in total poverty. Both of these countries have relatively high shares of rural diversified households in poverty that rely heavily on unskilled wage labor, which is more favorably affected by non-agricultural trade reforms.

While higher returns to unskilled family labor in agriculture represent the dominant driver of agricultural relative to non-agricultural poverty reduction in most countries, there are some important exceptions. In Bangladesh and Zambia, where agricultural reforms have a more favorable impact on poverty than do non-agricultural reforms, this is largely due to the wage labor channel. And in the Philippines, peasant households benefit relatively more from higher returns to agricultural land.

We also examine the relative impact of agriculture and non-agriculture trade reforms on poverty by stratum. This is shown in table 8 which reports the elements of $\sum_j \beta_{rs} \cdot \varepsilon_{rs} \cdot \alpha^p_{rsj}(\hat{W}^R_{rj,farm} - \hat{W}^R_{rj,nfarm})$ for all 15 countries and all 7 strata. The columns now refer to strata and each element represents the combined impact of all earnings changes (adjusted for taxes and cost of living changes) on national poverty – through changes in poverty in the individual household strata. Once again, the final column records the difference between agricultural and non-agricultural reforms on the percentage change in national poverty headcount. Here we see that agricultural trade reforms reduce poverty among agriculture-specialized households in nearly all countries (note that SC, the ratio of the average and absolute average headcount, is -1.00 under this stratum).

The contribution of the agricultural stratum to national poverty reduction is negligible only in Vietnam and Mexico, and these are the only two countries where poverty falls more for diversified rural households following non-agricultural trade reforms than under agricultural reforms (leading to positive entries in the rural diversified column of table 8). In both Vietnam and Mexico, all of the non-agricultural household strata contribute to greater poverty reductions under multilateral non-agricultural reforms than under agricultural reforms.

Understanding the poverty impacts by farm commodity

Given the importance of agricultural reform, we now turn to the task of decomposing the poverty impacts by agricultural commodity. Table 9 decomposes the agricultural poverty reduction in table 5 into its component parts – in this case breaking it out by the global commodity market in which reform is taking place. Thus, the first set of columns reports the percentage change in national poverty headcount due to global reforms in the food grains sector. From this, we see that, with the exception of Vietnam (and Mexico and Venezuela, where there is no effect), liberalization in food grain markets is generally poverty reducing. The disaggregation of the foodgrains reforms by instrument reveals that tariff cuts in foodgrains – as well as feedgrains which are also shown in table 10 – are universally poverty-reducing (sign consistency index of -

1). Where poverty rises due to reforms in food or feed grains for a country, it is due to the adverse price impacts that arise from elimination of export subsidies and domestic support (see the Export Subsidies and Domestic Subsidies columns in table 10). Outside of foodgrains, the most poverty-friendly reforms are those in other crops. These include many of the tropical products for which developing countries are net exporters. Due to space only foodgrains and feedgrains are reported here, but an all-commodity ranking on “poverty-friendliness” as we have defined it here would order as follows: food grains, other food and beverages, other crops, meats, sugar, feed grains, cotton and dairy. In terms of absolute size of poverty impacts, liberalization of other crops is the most significant, followed by food grains and then meats.

Summary and conclusions

This chapter offers a complementary perspective to the detailed country case studies of trade reform and poverty provided by others in this volume. By looking at a wide range of developing countries in Africa, Asia and Latin America, we offer some more general conclusions about the poverty impacts of commodity trade reform. We find that, overall, trade reform tends to reduce poverty, and it does so due to the agricultural trade reform components of the total package of reforms. Indeed, non-agricultural trade reforms tend to increase poverty in most of our focus developing countries.

We explore the relative poverty-friendliness of agricultural trade reforms in more detail, by examining their differential impacts (relative to nonagricultural reforms) on real after-tax factor returns, and on poverty by stratum. Overall, the more favorable impacts of agricultural reforms are driven by the increased factor rewards for peasant farms as well as higher returns for unskilled wage labor, evaluated relative to the real cost of living at the poverty line. Finally, we examine the poverty impacts of trade reform by agricultural commodity groups across this sample of countries. Not surprisingly, food grain reforms are the most poverty-friendly group.

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Table 1: Elasticity of Poverty Headcount ($1/day) with Respect to Total Income

	Strata							National elasticity
Country:	Agric.	Non-Agric.	Urban Labor	Rural Labor	Transfer	Urban Diverse	Rural Diverse	
Bangladesh	1.64	2.02	1.58	0.63	0.56	1.74	1.09	1.24
Brazil	0.75	1.28	1.94	2.19	0.34	3.63	2.69	1.35
Chile	1.90	2.24	2.06	1.55	2.45	2.29	2.60	2.18
Colombia	0.79	0.60	1.73	1.72	0.93	1.14	1.00	0.82
Indonesia	2.35	2.14	2.38	2.89	1.17	2.58	2.87	2.47
Malawi	0.49	0.30	2.26	1.97	0.43	1.04	0.76	0.58
Mexico	1.73	1.90	3.33	2.08	2.28	1.63	1.80	2.02
Mozambique	0.28	0.94	0.97	0.76	0.48	1.58	0.99	0.64
Peru	1.50	1.32	2.37	1.73	0.44	1.09	1.05	1.07
Philippines	2.25	1.96	2.98	2.44	1.69	2.42	1.98	2.15
Thailand	2.30	2.42	2.98	2.45	2.78	2.42	2.59	2.57
Uganda	0.28	0.40	1.71	0.34	0.01	0.36	0.21	0.24
Venezuela	0.69	1.16	2.57	2.17	0.01	1.72	1.53	1.20
Vietnam	0.48	1.12	2.81	8.98	0.84	0.86	1.01	0.98
Zambia	0.00	0.64	2.28	0.91	0.45	1.29	0.37	0.61

Notes: Values in strata columns are elasticities of the poverty headcount with respect to changes in earnings. National elasticity in the final column is the poverty share weighted (see table 2) aggregate elasticity for each country. Elasticities estimated by authors using country specific household survey data. For the first 5strata, more than 95 percent of household income comes from just one source.

Source: Authors' compilation.

Table 2. Stratum Contributions to the $1/day Poverty Population in each Country (percentage shares)

	Strata							
Country:	Agric.	Non-Agric.	Urban Labor	Rural Labor	Transfer	Urban Diverse	Rural Diverse	Total
Bangladesh	0.15	0.13	0.04	0.22	0.03	0.07	0.37	1.00
Brazil	0.14	0.09	0.24	0.15	0.32	0.04	0.03	1.00
Chile	0.26	0.01	0.09	0.09	0.28	0.15	0.12	1.00
Colombia	0.28	0.43	0.03	0.04	0.12	0.05	0.04	1.00
Indonesia	0.42	0.12	0.02	0.07	0.04	0.06	0.28	1.00
Malawi	0.54	0.11	0.00	0.03	0.07	0.01	0.25	1.00
Mexico	0.05	0.06	0.05	0.12	0.28	0.14	0.29	1.00
Mozambique	0.41	0.13	0.01	0.05	0.14	0.06	0.19	1.00
Peru	0.07	0.35	0.01	0.02	0.22	0.11	0.23	1.00
Philippines	0.12	0.06	0.03	0.05	0.03	0.23	0.49	1.00
Thailand	0.06	0.02	0.00	0.06	0.11	0.07	0.68	1.00
Uganda	0.10	0.04	0.00	0.03	0.02	0.07	0.75	1.00
Venezuela	0.08	0.24	0.17	0.10	0.28	0.08	0.05	1.00
Vietnam	0.04	0.11	0.00	0.00	0.05	0.10	0.70	1.00
Zambia	0.34	0.23	0.10	0.07	0.07	0.09	0.11	1.00

Notes: Values are shares of the impoverished population that are specialized in a particular stratum of earnings. Shares are derived from country-specific household surveys. Total column reflects that entire poverty population is allocated among the seven strata.

Source: Authors' compilation.

Table 3. Stratum and Earnings Specific Poverty Elasticities for Bangladesh ($1/day)

Country	Land	Agric. Unskilled Labor	Agric. Skilled Labor	Agric. Capital	Unskilled Wage Labor	Skilled Wage Labor	Non-agric. Unskilled Labor	Non-agric. Skilled Labor	Non-agric. Capital	Transfers	Total
Agric.	0.01	0.23	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.24
Non-Agric.	0.00	0.00	0.00	0.00	0.00	0.00	0.25	0.00	0.01	0.00	0.26
Urban Labor	0.00	0.00	0.00	0.00	0.06	0.00	0.00	0.00	0.00	0.00	0.06
Rural Labor	0.00	0.00	0.00	0.00	0.12	0.01	0.00	0.00	0.00	0.00	0.14
Transfer	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.02
Urban Diverse	0.00	0.02	0.00	0.00	0.05	0.01	0.02	0.00	0.00	0.01	0.12
Rural Diverse	0.00	0.07	0.00	0.00	0.17	0.02	0.08	0.00	0.01	0.04	0.40
Total	0.01	0.33	0.00	0.01	0.41	0.03	0.36	0.00	0.02	0.07	1.24

Notes: Elasticities are calculated by multiplying earnings shares by stratum specific elasticities for Bangladesh. Total column gives the change in stratum poverty for a one percent increase in income by that household type. Total row gives the national change in poverty from a one percent increase in factor income of the column type.
Source: Authors' compilation.

Table 4. Earnings Contributions to Total Poverty Response across Countries (1$/day)

(percentage share of total)

Country	Land	Agric. Unskilled Labor	Agric. Skilled Labor	Agric. Capital	Unskilled Wage Labor	Skilled Wage Labor	Non-agric. Unskilled Labor	Non-agric. Skilled Labor	Non-agric. Capital	Transfers	Total
Bangladesh	0.01	0.27	0.00	0.01	0.33	0.02	0.29	0.00	0.02	0.06	1.00 (1.24)
Brazil	0.00	0.07	0.03	0.01	0.60	0.04	0.10	0.01	0.00	0.15	1.00 (1.35)
Chile	0.07	0.15	0.00	0.10	0.26	0.00	0.02	0.00	0.00	0.40	1.00 (2.18)
Colombia	0.00	0.29	0.00	0.00	0.18	0.00	0.34	0.00	0.01	0.16	1.00 (0.82)
Indonesia	0.03	0.50	0.00	0.02	0.19	0.01	0.17	0.00	0.04	0.03	1.00 (2.47)
Malawi	0.03	0.52	0.00	0.07	0.12	0.02	0.07	0.00	0.05	0.14	1.00 (0.58)
Mexico	0.00	0.09	0.00	0.00	0.38	0.00	0.08	0.00	0.00	0.43	1.00 (2.02)
Mozambique	0.00	0.35	0.00	0.02	0.11	0.00	0.14	0.00	0.15	0.20	1.00 (0.64)
Peru	0.01	0.16	0.00	0.01	0.09	0.00	0.45	0.07	0.06	0.14	1.00 (1.07)
Philippines	0.23	0.00	0.01	0.12	0.31	0.01	0.14	0.00	0.07	0.10	1.00 (2.15)
Thailand	0.03	0.20	0.02	0.02	0.24	0.05	0.04	0.01	0.01	0.38	1.00 (2.57)
Uganda	0.13	0.13	0.00	0.25	0.08	0.08	0.08	0.00	0.13	0.08	1.00 (0.24)

Venezuela	0.00	0.06	0.00	0.00	0.58	0.03	0.28	0.01	0.00	0.05	1.00 (1.20)
Vietnam	0.01	0.12	0.00	0.00	0.00	0.00	0.18	0.00	0.47	0.20	1.00 (0.98)
Zambia	0.00	0.02	0.00	0.02	0.43	0.16	0.20	0.00	0.13	0.08	1.00 (0.61)
Average	0.04	0.19	0.00	0.04	0.26	0.03	0.17	0.01	0.08	0.17	--

Notes: Values are earnings specific elasticities divided by national elasticity (in parentheses in Total column). Average row is the simple average across countries of the contribution of a specific earnings source to total poverty responsiveness. Total column reflects the fact that contributions to total responsiveness add up to 1. National poverty elasticities are given in parentheses in the total column.
Source: Authors' compilation.

Table 5. Summary Poverty Impacts of Global Reforms

(percentage change in Headcount)

	Core results of this study				Different data: GTAP Version6	Different tax replacement (poor are exempt)	Different tax replacement (VAT)
Country	Agric. Reforms	Non-agric. Reforms	Total	*Level change ('000)*			
Bangladesh	-0.25	0.51	0.26	*116*	0.28	-5.30	-0.01
Brazil	-2.53	0.38	-2.15	*-50*	-1.41	-10.00	-1.42
Chile	-4.76	0.12	-4.64	*-14*	-4.99	-12.25	-4.79
Colombia	-0.72	0.63	-0.09	*-3*	0.10	-4.05	0.03
Indonesia	-1.05	0.49	-0.56	*-84*	-1.45	-5.23	-0.53
Malawi	-1.64	-0.26	-1.91	*-81*	-1.84	-5.62	-1.31
Mexico	0.78	0.35	1.13	*105*	1.35	-0.48	1.15
Mozambique	-1.15	0.15	-1.00	*-61*	-0.69	-4.34	0.29
Peru	-0.64	-0.16	-0.80	*-35*	-0.79	-5.24	-0.67
Philippines	-1.37	0.42	-0.95	*-108*	-0.75	-6.39	-1.92
Thailand	-11.19	0.93	-10.26	*-121*	-8.87	-28.05	-5.83
Uganda	-0.01	0.09	0.09	*15*	0.06	-5.96	0.09
Venezuela	0.15	0.71	0.86	*28*	0.86	-2.12	1.14
Vietnam	-0.48	-5.26	-5.74	*-88*	-5.85	-23.58	-6.96
Zambia	-0.02	0.13	0.11	*7*	0.09	-2.00	1.25
Average (AV)	-1.66	-0.05	-1.71	na	-1.59	-8.04	-1.30
Abs. Av. (AAV)	1.78	0.71	2.04	na	1.96	8.04	1.83
Sign Con. (SC)	-0.93	-0.07	-0.84	na	-0.81	-1.00	-0.71

Notes: Results from authors' simulations using GEMPACK software (Harrison and Pearson 1996) and the GTAP database (Dimaranan 2007). Agricultural and non-agricultural reform impacts add to total percentage change in poverty. We use the subtotal routine in GEMPACK developed by Harrison, Horridge, and Pearson (2000) to isolate these portions of the total impact. Level change is the calculated number of persons moving out of poverty given the initial headcount and predicted percentage change. The 'Different data' simulation uses the GTAP version 6 (base year 2001) protection data with the modifications made in Hertel *et al.* (2007, 2009). The 'Different tax replacement (poor are exempt)' scenario assumes that the poor are not subject to the higher income tax needed to replace lost tariff revenue. The 'Different tax replacement (VAT)' scenario replaces lost tariff revenue with a consumption tax which can be viewed as equivalent to a VAT under which imports are taxed and exports exempted. Average (AV) is the simple average of percentage changes while Abs. Av. (AAV) is the simple average of the absolute value of individual percentage changes. Sign Con. (SC)measures the consistency between the direction of effects and the level of impact and is calculated as the ratio of the average to the absolute average, AA/AAV (Ivanic 2006).

Source: Authors' model simulations.

Table 6. Earnings Differences from Agricultural and Non-agricultural Reforms

(percentage change)

Country	Land	Agric. Unskilled Labor	Agric. Skilled Labor	Agric. Capital	Unskilled Wage Labor	Skilled Wage Labor	Non-agric. Unskilled Labor	Non-agric. Skilled Labor	Non-agric. Capital	Transfers
Bangladesh	0.33	0.38	0.95	0.86	0.56	1.68	0.62	1.69	1.52	1.17
Brazil	40.01	16.35	15.10	14.81	1.34	-0.75	-0.72	-0.91	-1.58	-0.13
Chile	15.35	7.57	6.93	6.74	0.29	-0.86	-1.03	-0.88	-1.33	-0.85
Colombia	8.22	4.40	3.97	3.49	1.10	0.30	0.36	0.30	-0.81	0.35
Indonesia	3.87	1.76	1.59	1.49	-0.50	-0.83	-1.53	-0.86	-1.09	-0.59
Malawi	4.76	3.20	2.68	2.82	1.75	0.77	0.75	0.77	0.68	1.21
Mexico	-0.18	-0.10	-0.06	-0.06	-0.19	-0.10	-0.21	-0.10	-0.20	-0.26
Mozambique	8.58	4.93	3.52	4.16	1.42	-1.41	-0.18	-1.43	-0.50	0.60
Peru	12.95	6.94	5.69	5.92	1.07	-1.25	-1.44	-1.49	-0.92	-0.11
Philippines	3.07	1.68	1.53	1.21	0.35	0.07	-0.56	0.03	-0.67	-0.36
Thailand	34.07	17.46	14.29	12.92	4.19	-1.59	-2.01	-1.99	-4.38	-2.11
Uganda	0.62	0.50	0.47	0.44	0.40	0.34	0.25	0.34	0.20	0.37
Venezuela	0.87	0.68	0.70	0.44	0.49	0.55	0.46	0.55	0.01	-0.11
Vietnam	15.75	3.87	3.89	5.83	-9.07	-8.93	-12.81	-8.93	-4.87	-6.40
Zambia	4.00	1.87	1.60	1.47	0.56	0.03	0.17	0.02	-0.49	-0.15
Average (AV)	10.15	4.76	4.19	4.17	0.25	-0.80	-1.19	-0.86	-0.96	-0.49
Abs.Av.(AAV)	10.17	4.78	4.20	4.18	1.55	1.30	1.54	1.35	1.28	0.98
Sign Con. (SC)	1.00	1.00	1.00	1.00	0.16	-0.62	-0.77	-0.64	-0.75	-0.50

Notes: See Notes to table 5 for simulation information. Results are the difference in impacts on real, after-tax earnings by endowment from agricultural and non-agricultural reforms. Source: Authors' model simulations.

Table 7. Earnings-Specific Poverty Change Differences Between Agricultural and Non-agricultural Reforms
(percentage change in Headcount)

Country	Land	Agric. Unskilled Labor	Agric. Skilled Labor	Agric. Capital	Unskilled Wage Labor	Skilled Wage Labor	Non-agric. Unskilled Labor	Non-agric. Skilled Labor	Non-agric. Capital	Transfers	Total
Bangladesh	0.00	-0.12	0.00	-0.01	-0.23	-0.05	-0.22	0.00	-0.04	-0.08	-0.76
Brazil	-0.10	-1.43	-0.60	-0.15	-1.09	0.04	0.10	0.00	0.00	0.03	-3.21
Chile	-2.30	-2.45	0.00	-1.48	-0.16	0.00	0.04	0.00	0.00	0.75	-5.60
Colombia	0.00	-1.07	0.00	0.00	-0.17	0.00	-0.10	0.00	0.01	-0.04	-1.38
Indonesia	-0.30	-2.16	-0.02	-0.08	0.23	0.02	0.66	0.01	0.10	0.05	-1.49
Malawi	-0.10	-0.95	0.00	-0.11	-0.12	0.00	-0.03	0.00	-0.02	-0.10	-1.43
Mexico	0.00	0.02	0.00	0.00	0.15	0.00	0.03	0.00	0.00	0.23	0.43
Mozambique	-0.04	-1.12	0.00	-0.04	-0.11	0.00	0.02	0.00	0.05	-0.08	-1.31
Peru	-0.12	-1.17	0.00	-0.07	-0.11	0.01	0.70	0.11	0.06	0.02	-0.59
Philippines	-1.54	-0.01	-0.04	-0.32	-0.23	0.00	0.17	0.00	0.09	0.08	-1.79
Thailand	-2.95	-9.08	-0.89	-0.54	-2.55	0.21	0.21	0.03	0.13	2.06	-13.38
Uganda	-0.02	-0.02	0.00	-0.03	-0.01	-0.01	0.00	0.00	-0.01	-0.01	-0.10
Venezuela	0.00	-0.05	0.00	0.00	-0.34	-0.02	-0.16	0.00	0.00	0.01	-0.56
Vietnam	-0.17	-0.45	0.00	-0.03	0.01	0.00	2.27	0.01	2.24	1.31	5.20
Zambia	-0.01	-0.01	0.00	-0.01	-0.14	0.00	-0.02	0.00	0.04	0.01	-0.15
Average (AV)	-0.51	-1.34	-0.10	-0.19	-0.32	0.01	0.24	0.01	0.18	0.28	-1.74
Abs.Av.(AAV)	0.51	1.34	0.10	0.19	0.38	0.02	0.32	0.01	0.19	0.32	2.49
Sign Con. (SC)	-1.00	-1.00	-1.00	-1.00	-0.86	0.53	0.77	0.93	0.95	0.87	-0.70

Notes: See Notes to table 5 for simulation information. Results correspond with equation (7) and are the difference in impacts on poverty by endowment from agricultural and non-agricultural reforms. Source: Authors' model simulations.

Table 8. Stratum Specific Poverty Change Differences between Agricultural and Non-agricultural Reforms

(contribution to percentage change in national headcount)

Country	Agric.	Non-Agric.	Urban Labor	Rural Labor	Transfer	Urban Diverse	Rural Diverse	Total
Bangladesh	-0.10	-0.17	-0.03	-0.09	-0.02	-0.08	-0.27	-0.76
Brazil	-1.67	0.08	-0.55	-0.40	0.01	-0.46	-0.23	-3.21
Chile	-4.47	0.02	-0.05	-0.04	0.58	-0.97	-0.67	-5.60
Colombia	-0.98	-0.09	-0.06	-0.07	-0.04	-0.08	-0.06	-1.38
Indonesia	-1.76	0.39	0.02	0.10	0.03	-0.03	-0.23	-1.49
Malawi	-0.86	-0.02	0.00	-0.09	-0.03	-0.02	-0.40	-1.43
Mexico	0.01	0.02	0.03	0.05	0.17	0.05	0.10	0.43
Mozambique	-0.58	0.04	-0.02	-0.05	-0.04	-0.21	-0.45	-1.31
Peru	-0.68	0.64	-0.01	-0.03	0.01	-0.18	-0.33	-0.59
Philippines	-0.62	0.06	-0.03	-0.04	0.02	-0.41	-0.77	-1.79
Thailand	-2.62	0.09	-0.05	-0.57	0.63	-0.94	-9.94	-13.38
Uganda	-0.01	0.00	0.00	0.00	0.00	-0.01	-0.06	-0.10
Venezuela	-0.04	-0.13	-0.21	-0.11	0.00	-0.04	-0.03	-0.56
Vietnam	-0.08	1.16	0.00	0.00	0.27	0.11	3.74	5.20
Zambia	0.00	0.01	-0.08	-0.03	0.00	-0.04	-0.01	-0.15
Average (AV)	-0.96	0.14	-0.07	-0.09	0.11	-0.22	-0.64	-1.74
Abs.Av.(AAV)	0.97	0.20	0.08	0.11	0.12	0.24	1.15	2.49
Sign Con. (SC)	-1.00	0.72	-0.91	-0.82	0.86	-0.91	-0.56	-0.70

Notes: See Notes to table 5 for simulation information. Results correspond with equation (7) and are the difference in impacts on poverty by household type from agricultural and non-agricultural reforms.

Source: Authors' model simulations.

Table 9. Percentage Change in Poverty by Commodity Specific Reform
(percentage change in national headcount)

Country	Food Grains	Feed Grains	Sugar	Cotton	Other Crops	Dairy	Meat
Bangladesh	-0.07	-0.16	-0.02	-0.18	0.11	0.04	0.02
Brazil	-0.29	-0.20	-0.20	-0.01	-0.27	0.01	-1.56
Chile	-0.18	-0.04	-0.03	0.03	-3.11	-0.40	-1.03
Colombia	-0.11	0.06	-0.08	0.01	-0.55	-0.09	0.04
Indonesia	-0.09	0.00	0.29	0.00	-0.36	-0.03	-0.86
Malawi	-0.14	0.02	0.05	-0.04	-1.51	-0.02	0.00
Mexico	0.00	0.48	0.03	0.06	0.23	-0.03	0.02
Mozambique	-0.10	-0.17	-0.53	-0.08	-0.36	-0.01	0.09
Peru	-0.07	0.01	-0.01	0.02	-0.01	0.02	-0.60
Philippines	-0.20	-0.23	-0.01	-0.07	-0.79	0.11	-0.19
Thailand	-5.63	-0.91	-0.88	0.06	-2.89	0.01	-0.93
Uganda	-0.01	-0.02	0.00	-0.02	0.03	0.01	0.00
Venezuela	0.00	0.02	0.00	0.00	0.04	0.03	0.04
Vietnam	0.03	-0.40	-0.07	0.00	-0.18	0.13	0.01
Zambia	-0.01	-0.04	0.01	0.01	-0.04	0.01	0.03
Average (AV)	-0.46	-0.11	-0.10	-0.01	-0.64	-0.01	-0.33
Abs.Av.(AAV)	0.46	0.18	0.15	0.04	0.70	0.06	0.36
Sign Con. (SC)	-0.99	-0.57	-0.65	-0.31	-0.92	-0.23	-0.90

Notes: See Notes to table 5 for simulation information. Results correspond with equation (7) and are the impacts on national poverty reforms in different agricultural sectors.

Source: Authors' model simulations.

Table 10. Poverty Impacts by Instrument for Food Grains and Feed Grains

(percentage change in national headcount)

Country	Food Grains				Feed Grains			
	Tariffs	Export Subsidies	Domestic Subsidies	Total	Tariffs	Export Subsidies	Domestic Subsidies	Total
Bangladesh	-0.02	-0.02	-0.03	-0.07	-0.17	0.00	0.01	-0.16
Brazil	-0.31	0.01	0.01	-0.29	-0.07	-0.01	-0.13	-0.20
Chile	-0.22	-0.01	0.05	-0.18	0.00	-0.02	-0.02	-0.04
Colombia	-0.14	0.00	0.02	-0.11	-0.12	0.03	0.14	0.06
Indonesia	-0.18	0.01	0.08	-0.09	-0.05	0.01	0.04	0.00
Malawi	-0.18	0.00	0.03	-0.14	-0.02	0.00	0.04	0.02
Mexico	-0.16	0.00	0.15	0.00	-0.44	0.01	0.92	0.48
Mozambique	-0.13	0.01	0.02	-0.10	-0.17	0.00	-0.01	-0.17
Peru	-0.11	0.01	0.04	-0.07	-0.05	0.02	0.04	0.01
Philippines	-0.34	0.02	0.12	-0.20	-0.31	0.01	0.08	-0.23
Thailand	-5.45	-0.03	-0.15	-5.63	-1.09	0.00	0.18	-0.91
Uganda	-0.02	0.00	0.01	-0.01	-0.02	0.00	0.00	-0.02
Venezuela	-0.02	0.00	0.02	0.00	-0.03	0.00	0.05	0.02
Vietnam	-0.02	0.01	0.04	0.03	-0.44	0.02	0.01	-0.40
Zambia	-0.01	0.00	0.00	-0.01	-0.05	0.00	0.01	-0.04
Average (AV)	-0.49	0.00	0.03	-0.46	-0.20	0.01	0.09	-0.11
Abs.Av.(AAV)	0.49	0.01	0.05	0.46	0.20	0.01	0.11	0.18
Sign Con. (SC)	-1.00	0.17	0.54	-0.99	-1.00	0.60	0.82	-0.57

Notes: See Notes to table 5 for simulation information. Results correspond with equation (7) and are the impacts on national poverty reforms from the listed type of reform within the sector identified. Totals are the sum across instruments and reflect the total contribution for sector specific reforms to the national percentage change in poverty headcount.

Source: Authors' model simulations.