The Effects of a Prospective Multilateral Trade Reform on Poverty in Developing Countries

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Summary

The goal of this chapter is to evaluate the impact of three prospective trade reforms on poverty in fifteen developing regions and to identify the most significant components of these reforms from a poverty perspective. To that end, the chapter uses the latest GTAP data, household survey data and a modified version of the GTAP model that includes AIDADS consumer preferences. Poverty impacts are assessed using post-simulation techniques based on the household survey data.

Results suggest that the near term effects of the core Doha scenario on poverty in the 15 countries in our sample would be mixed, with substantial reductions in some cases, while some countries are unaffected, and others show small poverty increases. Introducing reciprocal (i.e. deeper) cuts in bound tariffs in the developing countries improves the poverty outcome overall. Indeed the core Doha scenario is less poverty friendly than the reforms that are not undertaken in this scenario. The reason for this is the heavy emphasis of Doha on cuts to export subsidies and domestic support, both of which tend to raise poverty in this sample of countries. On the other hand, the most poverty friendly reform measure, namely cuts in developing country tariffs, is nearly absent from the core Doha scenario. These limited cuts in developing country applied tariffs are caused by extensive binding overhang and non-reciprocal tariff cuts in the developing countries.
1. Introduction

Measuring poverty impacts is an important issue in the current debate of trade liberalization that has been labeled “a development round”. In order to assess the poverty effects of multi-regional trade liberalization, this chapter performs a simulation exercise in which a trade reform is implemented in a global computable general equilibrium model and, subsequently, in a household model that includes income information for a large number of household groups in fifteen developing countries. In this way, the two models permit an assessment of the change in the households’ real income and the resulting poverty effects following the trade reform.

To make its predictions, the chapter uses the latest version of the GTAP database as well as the recent household survey data from fifteen developing countries (Section 2) to run a global CGE model (Section 3) and to simulate the medium-run impacts of three considered trade reforms (Section 4) on the consumer prices and household income and to estimate the impact of these reforms on poverty in the fifteen developing countries (Section 5). The results are summarized with additional concluding remarks (Section 6).

2. Data

GTAP version 6 data (pre-release 6.5) documented by Dimaranan and McDougall were used in the form of a regional aggregation that captures fifteen developing (focus) countries for which household survey data were available. In addition we disaggregate the most important world trading blocks (Table 14.1). The commodity aggregation on the production side distinguishes the most important traded commodities. On the consumer side, the aggregation is
far more limited because the estimated consumer demand system is available only for six broad commodity goods. Table 14.2 shows the two commodity aggregations and the relationship between them, i.e. which producer goods map to each of the six consumer good categories.

The available survey data were reconciled with the GTAP data to ensure consistency in their information following the method of Ivanic (2004). The reconciliation followed a few simple principles: the value of GDP and its two main components (agricultural and non-agricultural production) was compared with the survey data. In each case the survey showed less value-added in either sector than the national accounts data and therefore each survey total was increased and brought into accord with the GTAP data. Because the most underreported category of household income appeared to be capital, the survey was changed by scaling the reported household capital income to match the level suggested by the GTAP data. In the second stage of the reconciliation process, survey information on the amounts of skilled and unskilled labor was imposed on the GTAP data. Because the survey data permitted an explicit estimation of imputed labor, this information was also used to create a specific version of the GTAP database where capital explicitly excluded self-employed labor, a definition more suitable under the medium-run closure of the model.

2.1 Stratification of households according to main source of income

In addition to being reconciled with the household survey data, the GTAP data were also split to represent the endowments of 140 household groups—twenty vingtiles (equal groups from poorest to richest) within each of seven strata. The strata were defined to contain those households that obtain more than 95% of their total income from the following sources: agricultural profits, non-agricultural profits, labor and transfers. Based on their location, the labor stratum was split into rural and urban. The remaining households that were not specialized in any
specific income source were allocated to the two last strata: urban and rural diversified households.

The importance of income specialization among households in developing countries has been highlighted in the work of Hertel, Ivanic, Preckel, and Cranfield (2004); Hertel, Ivanic, Preckel, Cranfield, and Martin (2003); and Ivanic (2002). According to these findings, a significant portion of households specialize in a single income source and the extent of specialization is greatest amongst the poor. The phenomenon of income specialization of households is particularly important in light of the differential changes in factor returns that frequently result from trade liberalization. Moreover, specialization is also non-randomly associated with poverty. In many countries, specialization in an agricultural stratum is associated with higher poverty incidence. Thus separating households by their income source improves our understanding of the structure of poverty in a given country as well as the potential for significant changes in the wake of trade reform.

3. Model and Method

The model used in this work is a modified version of the standard GTAP model (Hertel, 1997). The key change is that the CDE demand system has been replaced with the AIDADS demand system (Rimmer and Powell, 1992) following the approach of Yu, Hertel, Preckel, and Eales (2003). The demand parameters have been obtained from the work of Cranfield, Preckel, Eales, and Hertel (2004); Cranfield, Eales, Hertel, and Preckel (2003); Cranfield, Preckel, Eales, and Hertel (2002). The parameters of the AIDADS demand structure were available for six aggregate goods only. They were estimated globally utilizing consumption data from the
International Comparison Project (1996) as well as survey-based data on the distribution of income within countries. Following estimation, the parameters were calibrated to fit the aggregate, per capita consumption in each region. Because the commodity aggregation in the GTAP database was far more extensive than the six commodities included in the AIDADS demand structure, the thirty-one production commodities were mapped to the six consumption goods. Table 14.2 shows the mapping between the thirty-one, GTAP producer goods and the six estimated consumer goods.

Estimation of the poverty level of income in the benchmark equilibrium is based on the poverty rate in each country as reported by the World Bank in conjunction with the income distribution from the available surveys. The poverty level of income is that level of income that yields the reported poverty rate. This in turn determines a level of utility for the observed set of prices in each country. This poverty level of utility is kept constant between the simulations. After the simulation, the new poverty level of income is calculated as the level of income that achieves the original poverty level of utility under the new consumer prices.

Because the household surveys suggest that transfers comprise an important part of household earnings in many countries, especially the poorest households, it was necessary to model transfers in the household model. These transfers are indexed by the cost of the household consumption basket (CPI).

The final special feature of the model is the tax replacement closure. It assures that the lost or gained tax revenue is replaced by a uniform ad valorem tax on primary factor endowments making each scenario fiscally neutral.
The method of this chapter is outlined in Figure 14.1 that shows not only all the data used in the analysis, but also the relationship among, and sequence of, all the steps taken in order to establish the link between trade reform and poverty.

4. Scenarios and Experimental Design

4.1 Trade reform scenarios

In this section, two specific scenarios of trade reform are considered and compared to full trade liberalization. The first is the core Doha scenario explained in detail in Chapter 2, while the second is the Doha-All scenario discussed briefly in that chapter. In the latter case, developing and least developed countries engage in reciprocal tariff cuts so that their bound tariff rates fall by the same percentage as in the developed countries. Because this analysis is conducted with a revised version of the global GTAP model – designed to work in concert with the micro-simulation analyses for each of the 15 focus countries – we do not draw on the global results outlined in Chapter 3. Rather, we simulate the global impacts of these scenarios within the analytical framework laid out above.

In addition to these two Doha scenarios, this chapter follows the lead of earlier the country case studies and also considers a full trade liberalization scenario. Representing the maximum extent of the trade reform, full trade liberalization involves the full reduction of all import tariffs, export subsidies and domestic support. Its inclusion, along with the prospective trade reforms—Doha and Doha-All—provides a meaningful reference point. Understanding the effects of a full reform can tell us if the chosen step is in the right direction and whether its size is significant.
All scenarios were simulated under a single run using the decomposition feature—described in detail below—of the GEMPACK software. Under this procedure, only the full trade liberalization reform was actually computed, while the Doha-SDT and Doha-All scenarios were extracted from the results based on a decomposition of the individual elements of reform. To assure that this method of decomposition and extraction provides accurate results, we performed separate runs of the Doha scenarios and compared them to the results extracted from the full liberalization run by the decomposition method. We found that the two sets of results were almost indistinguishable, thereby ensuring the accuracy of the method.

4.2 Decomposing Differences between Doha and Full Liberalization

The Doha and full trade liberalization scenarios are significantly different in three aspects: the level of tariff reduction among the developed countries, the size of their domestic support cuts and the level of participation in tariff reduction by the developing countries. Both scenarios involve the abolition of export subsidies. Because each of these differences can by itself in either way significantly contribute to poverty change, it is important to understand the individual impact of each of the components. To that end, we have evaluated the poverty effects of a series of twelve partial reforms wherein the first five combine to replicate the Doha scenario, three more incremental reforms represent the difference between the Doha and Doha-All scenarios, and the last four complement Doha-All to obtain full trade liberalization.

The first set of the components—comprising the Doha scenario—include removal of export subsidies on food products, the reduction in the tariffs and domestic support of developed countries as well as reductions in the tariffs of the developing countries. The second set of components—Doha-All—include further reductions in tariffs by the developing countries as dictated under the fully reciprocal tariff cutting formula. The last step—completing full trade
liberalization—includes the complete removal of remaining developed countries’ tariffs and domestic support, as well as the removal of tariffs remaining in the developing countries following the Doha-All scenario.

Decomposition of the endogenous outcomes in the model (e.g., prices and poverty), with respect to these exogenous policy shocks, was performed using standard decomposition feature of the GEMPACK software (Harrison, Horridge and Pearson).

4.3 Factor mobility assumptions

Assumptions on factor mobility play a vital role in the general equilibrium analysis of poverty model as they determine both the employment of the factors and their returns. While a short-run closure, with most factors only imperfectly substitutable across sectors, is well suited for capturing the initial impact of economic shocks, it abstracts from the impact of trade reform on economy-wide, unskilled wage rates, which is often considered an important avenue for poverty reduction in the medium run (recall the findings for Brazil in Chapter 7 and 9, for example). Because of this, it appears sensible to incorporate a different closure that reflects the ability of some factors—especially labor and capital—to move among sectors in search of the highest return. This medium-run closure corresponds to the assumption that capital of most small businesses, as well as the labor employed by them are flexible in changing the nature of their business over the model’s time horizon. The only sluggish factor is agricultural land which we assume may be reallocated among sectors in a limited way only due to geographic and agronomic considerations.
5. Results

5.1 Price results

The price results of the three simulations are presented in Tables 14.3–14.5. Each table lists the consumer price changes, factor return changes as well as the change in national income (in percent), all deflated by the change in the price index of consumption at the poverty level of utility.

The results suggest that the effects of the two Doha trade reforms are rather small (Tables 14.3–14.4): all national real income changes fall in the range of (-1.1, 0.7%) which reflects a rather modest impact on the focus countries. The effects of these reforms on primary factors are also relatively small, with the exception of the factor that is sector-specific (agricultural land) and is therefore expected to exhibit the greatest variation in the changes to its return due to its inelastic supply.

In contrast to the Doha trade reforms, the effect of full liberalization is more significant (Table 14.5). The most strongly affected country is Vietnam, where reform induces a positive 5.8% change in national income deflated by the CPI at the poverty level.

5.2 Poverty results

We have used the general equilibrium model to simulate the impacts of the described trade reform on countries’ consumer and factor prices, and households’ incomes and utility levels. Using the initial poverty level of utility benchmarked for each region, we then determined the number of households that fell into or were removed from poverty. The poverty percentage changes for each scenario on each stratum within each country are shown in Table 14.6. The final row of each section in this table also shows the share of the strata in the total poverty in each
country, which determines the weight of each stratum’s poverty change towards the nation-wide poverty change (shown in the total column). Table 14.7 reports the estimated poverty headcount change (in thousands) for all strata in each of the fifteen countries following all three simulations.

The poverty changes in both tables show a close relationship with the factor price changes (deflated by the CPI at the poverty level of consumption). For example, looking at the deflated factor return changes under full trade liberalization in the Philippines (Table 14.5), we can see that the most important primary factors (labor and capital) experience an increase in their returns while the return to land falls. Because these returns are deflated by the cost of consumption at the poverty level of income, it must be that poverty will increase among those households whose income derives mainly from land (agricultural households) and will fall for the others; this is indeed true, as Table 14.6 confirms. In the case of Brazil, the results are reversed—the real returns to all factors except land fall. This results in an increase of poverty for all strata except those relying on earnings from agricultural land (agricultural and diversified households). The same relationship between poverty-deflated factor prices and poverty is present for all other countries under all simulations.

The poverty effects of the reforms across all fifteen countries are summarized in Table 14.8 which lists the expected poverty effects, by stratum and type of reform. These effects are summarized in a single number that reports the difference in probability for poverty reduction and poverty growth. A value of negative one means that a particular reform is found to increase poverty in each case (probability for poverty reduction is zero), while a value of one means that in each country the reform resulted in lower poverty (probability of poverty rise equal to zero). A value of zero means that the probability of experiencing poverty reduction and poverty growth were equal, based on the particular set of countries considered. The table is constructed using the
new decomposition technique referred to above, so that each row shows the incremental effect of a particular instrument/reform, while the summary rows for Doha, Doha-All and Full-Lib capture the combined effect of those complete reform packages – i.e., the sum of all preceding rows.

Focusing initially on the complete reform impacts, we see that Doha and Doha-All yield numbers in the neighborhood of zero for most stratum impacts and for the national impacts. That is, poverty increases for about as many countries as it falls. Doha-All is shown to be a bit more poverty friendly, particularly with regard to the diversified households and also for the nation as a whole. The Full-Lib scenario yields a stronger result, with the probability of poverty reduction at 0.20, indicating that poverty falls in more cases than it rises. In order to understand these differences, we need to exploit the decomposition with respect to individual instruments.

5.3 Decomposition of the differences in poverty effects of Doha and Full trade liberalization scenarios

To perform this decomposition, we broke the full liberalization shock into eight components of the Doha-SDT and Doha-All scenarios to which we added four additional reforms that complement the full trade liberalization for the total of twelve scenarios in the following sequence: (1) complete removal of export subsidies by the developed countries, (2) cut (Doha-SDT level) in the tariffs of the developed countries, (3) cut (Doha level) of the domestic support of the developed countries, (4) cut (Doha-SDT level) in the developing countries’ own tariffs, (5) cut (Doha-SDT level) in the tariffs of other developing countries, (6) further cut (Doha-All level) in the tariffs of the developed countries (7) further cut (Doha-All level) in the developing countries’ own tariffs, (8) further cut (Doha-All level) in the tariffs of the rest of the developing countries, (9) complete removal of tariffs by the developed countries, (10) full reduction of
domestic support in the developed countries, (11) full tariff removal by the focus countries’ own tariff and, finally, (12) the full removal of tariffs by the rest of the countries.

The separate poverty effects of each of these reforms are reported in Table 14.8, which shows the expected effect of each partial reform on overall poverty among the strata and on the national level. Note that the poverty estimates in this table were obtained by using income distributions that were homogenous across households in the same stratum—this treatment was necessary in order to remove that part of the data heterogeneity on the level of the individual households that is responsible for a random change in poverty sign in the face of small shocks.

Table 14.8 provides important insights into the poverty impact of various components of the reforms and in this way helps us understand why the overall effect of the Doha reform is poverty increasing, while the effect of Doha-All and full trade liberalization is opposite. The table lists individual components of both reforms: the first five represent Doha, next four represent Doha-All, while the remaining four complete the full trade liberalization. The following seven columns—one for each stratum—show the expected poverty reduction (in the total of fifteen countries) for each component of the reform. Finally, the last two columns show the same effects on the national level as well as the weight of each reform in the total result.

The last two columns of the table show that the Doha reforms are dominated by the first two components—export subsidy removal and reductions in developed countries’ tariffs—both of which have a negative effect on national poverty. Also negative, though less significantly, are the effects of preference-eroding reductions in developed countries’ tariffs and the reduction in domestic support. The effect of these two components completely dominates the consistent poverty-reducing effect of the reduction of developing countries’ tariffs that produces only small changes in poverty. The overall effect of the Doha reform is therefore marginally poverty
increasing in this sample of countries. The effect of Doha-All is very similar to Doha on the national level, except that Doha-All creates more benefits for the poor through greater tariff reductions by the developing countries. The full trade liberalization scenario adds more benefits of the reductions in the tariffs by both developing and developed countries and these tend to offset the negative effects of further cuts in domestic support and developing countries’ own tariff reductions, thereby leading to a slight poverty reduction, on average.

Figure 14.1 shows the decomposition of the poverty effects of the reforms in a visually intuitive way: each poverty effect is represented by a vertical bar whose height represents the expected poverty reduction effect of the reform\(^1\) while its width represents the weight associated with the reform (this weight is taken from Table 14.8). Thus a tall narrow bar means a very poverty-friendly reform with little total impact, while a wide, short bar means a significant impact on national poverty with an undecided effect on poverty across the entire sample. The definition of the construction of this chart provides for a very useful interpretation of the area of each bar which represents the weight of each reform in the total results—a sum of all the areas belonging to a given reform determines the total impact.

Considering the poverty effects of each Doha reform component on each stratum yields other interesting observations: while the effect of the removal of export subsidies has an overall negative effect on poverty, it has a far less negative effect on poverty among the agricultural households (see Table 14.8). This is hardly surprising, as the removal of export subsidies—primarily in agriculture—raises agricultural prices, hence helping agricultural households: we can observe that return to land increases in most cases under Doha scenarios in Tables 14.3 and 14.4.

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\(^1\)This shows the difference between the probability of poverty reduction and poverty growth so that a value of one means that the probability of poverty reduction is one, and the value of negative one means that the probability of poverty growth is one.
On the other hand, these high agricultural prices translate into higher food prices thus hurting the poor in general. A similar pattern of favoring agricultural households can be seen for other components of the reforms that make food prices rise such as the cut in domestic support under both Doha scenarios as well as its complete elimination under full trade liberalization.

Turning to the bottom section of Table 14.8, we can see that—unlike Doha and Doha-All—the full trade liberalization scenario contains a significant stratum-wide positive effect of the removal of developing countries’ tariffs on poverty. The same positive effect was present under the Doha reforms. However, due to the minimal tariff changes under the core Doha scenario, the poverty effects of that reform were rather small. The effects of other reform components are also magnified under the full trade reform: for example the effect of the domestic support cut, negligible under Doha, has a more significant poverty-increasing effect under full trade liberalization. With respect to each respective stratum, the full trade liberalization exhibits a much more uniform effect on poverty, despite somewhat poverty-increasing effects of developing countries’ own tariff liberalization. The latter derives from the fact that each country in the global model has an optimal tariff, as a consequence of the Armington assumption (product differentiation by origin). Therefore, unilateral liberalization beyond the optimal tariff level results in a terms of trade loss which outweighs the efficiency gain. However, when other countries also cut their tariffs, the adverse terms of trade effect is dampened, or even reversed, and the efficiency gains dominate.

6. Conclusion

The goal of this chapter is to describe the poverty effects of two possible trade reforms and contrast them to the limiting case of the full trade liberalization. It has been shown that
differences in the patterns of the trade reform result in different poverty results. In particular, by increasing the depth of cuts in bound tariffs under a Doha scenario, Doha-All improves the overall poverty outcome in this sample of 15 countries.

More complete trade liberalization—inclusive of trade and domestic reform—appears to be generally poverty reducing. The reason for this is explained by the overall poverty-reducing effect of the removal of tariffs by the developed countries beyond the Doha level, and the reduction of developing countries’ tariffs, a component that is missing in the Doha scenarios.

Based on the proposed trade reforms and the results shown in this chapter, a suggestion for a trade policy aimed at poverty reduction should probably include advice to developing countries to focus more attention on tariff reductions and less on the removal of domestic and export subsidies by industrialized countries.
References


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