POVERTY IMPACTS OF MULTILATERAL TRADE LIBERALIZATION

by
Thomas W. Hertel
Paul V. Preckel
John A.L. Cranfield
and
Maros Ivanic[1]

GTAP Working Paper # 16

[1] Hertel and Preckel are Professors and Ivanic is Graduate Research Assistant in the Department of Agricultural Economics at Purdue University. Cranfield is Assistant Professor of Agricultural Economics at the University of Guelph. The authors acknowledge support from the Development Research Group at the World Bank. Specifically we would like to thank Will Martin for championing this work and making available the household surveys. Address Correspondence to: T. Hertel, Director, Center for Global Trade Analysis, 1145 Krannert Building, Purdue University, West Lafayette, IN 47907-1145; hertel@purdue.edu.

Table of Contents

List of Figures

List of Tables

Multilateral Trade Liberalization and Poverty Reduction

By: Thomas W. Hertel, Paul V. Preckel, John A.L. Cranfield, and Maros Ivanic[2]

Abstract

Poverty reduction is an increasingly important consideration in the deliberations over multilateral trade liberalization. However, the analytical procedures used to assess the impacts of multilateral trade liberalization on poverty are rudimentary, at best. Most poverty studies have focused on a single country using detailed household survey data. When it comes to multi-country, global trade liberalization analyses, researchers are forced to resort to a discussion of average, or *per capita* effects. This severely limits their capacity to address the poverty question. This paper combines results from a newly available international, cross-section consumption analysis, with earnings data from household surveys from seven countries, to analyze the implications of multilateral trade liberalization for poverty in several developing countries in Asia, Africa and Latin America.

Our analysis begins by focusing on the impact of trade liberalization on households at the edge of poverty – the marginal households in our terminology. Since previous multi-region analyses have focused on the *per capita* effects, we decompose the departures of marginal household welfare from these *per capita* effects. These differences are explained in terms of deviations in consumption and earnings shares. We find that the differences in earnings shares are relatively more important in explaining the changes in marginal households' welfare than the differences in their consumption profiles.

The multilateral trade liberalization scenario that we examine involves complete elimination of merchandise tariff barriers as well as textile and apparel quotas in place in 1997. This ignores the potential impact of other non-tariff barriers as well as the significant barriers to trade and investment in services and trade distorting domestic farm policies. While this liberalization scenario is accordingly stylized, it does offer a useful benchmark for assessing the potential poverty impacts of multilateral measures. Of particular interest is our partitioning of the effects on poverty of countries' own policies versus those of other countries. We measure poverty using the Foster-Greer-Thorbecke transfer measure that reports the total transfer required to lift all households out of poverty, as a proportion of the poverty level of income.

We find that the aggregate measure of poverty is reduced in Indonesia, Philippines, Uganda, and Zambia, while it is increased in Brazil, Chile, and Thailand, following multilateral trade liberalization. The largest percentage reduction in poverty occurs among agriculture-specialized households in Brazil. Indonesia experiences the largest national reduction. The largest increases in poverty occur in the non-agriculture, self-employed and wage-labor households in Brazil, Chile, and Thailand.

---

[2] Hertel and Preckel are Professors and Ivanic is Graduate Research Assistant in the Department of Agricultural Economics at Purdue University. Cranfield is Assistant Professor of Agricultural Economics at the University of Guelph. The authors acknowledge support from the Development Research Group at the World Bank. Specifically we would like to thank Will Martin for championing this work and making available the household surveys. Address Correspondence to: T. Hertel, Director, Center for Global Trade Analysis, 1145 Krannert Building, Purdue University, West Lafayette, IN 47907-1145; hertel@purdue.edu.

Multilateral Trade Liberalization and Poverty Reduction

Poverty reduction is an increasingly important consideration in the deliberations over multilateral trade liberalization. At the 1999 Geneva conference on the WTO and the developing countries, Joseph Stiglitz, then Vice President of the World Bank, proposed that the next round of WTO negotiations be labeled the development round and incorporate an explicit emphasis on poverty reduction. Mike Moore, Director General of the WTO has also emphasized the importance of development and poverty reduction in multilateral trade negotiations.[3] Given this intense interest in the topic of trade policy and poverty, Globkom and the World Bank sponsored conference in Stockholm in October of 2000 aimed at assessing the state of the art in quantitative policy research on this topic.[4] It was at this conference that a very early version of the present paper was presented (Hertel, Preckel and Cranfield, 2000).

The Globkom conference drew together economists working with household surveys (Levinsohn, Barry and Friedman, 1999; Case, 1998; Friedman, 2001; Ianchovichina, Nicita and Solaga, 2000), as well as researchers using computable general equilibrium (CGE) models with a poverty focus (Devarajan and van der Mensbrugghe, 2000; Harrison, Rutherford and Tarr, 2000).[5] One of the key outcomes of this conference was the realization that, while factor markets are critical to determining the trade-poverty linkage, they are relatively neglected in much of the poverty research. (See also the recent paper by Decaluwé, Patry, Savard and Thorbecke (1999), as well as the pathbreaking work of Adelman and Robinson (1978)). Part of the problem stems from the tendency of poverty researchers to focus their attention on the expenditure side of household surveys due to its greater reliability for purposes of measuring poverty. This may be fine for poverty measurement, however, when it comes to counterfactual analysis of policies and poverty, it is impossible to proceed without proper treatment of the factor markets.[6] CGE modelers are fundamentally constrained by data obtained from the household surveys, since this is the only way to identify the mapping from factor earnings to specific household groups (e.g., how heavily reliant are the poor on unskilled wages?). In light of this state of affairs, we have chosen to focus the present paper squarely on the factor markets and their role in determining the poverty impacts of trade liberalization.

Based on the work presented at the Globkom conference it is also clear that there is a great deficit in the area of multi-region trade policy analysis and poverty. However, such studies are very difficult to accomplish, due to the country-specificity of the household surveys. With the exception of our paper – which was strictly exploratory in nature -- all of the trade and poverty studies focused on an individual country. When it

[3] See also the survey paper by Alan Winters (2000).

[4] This paper was originally presented at that conference. Since then it has been dramatically revised, taking into account comments at that conference, as well as extensive research over the past year.

[5] Other good examples are offered by Löfgren (1999) and Evans (2001).

[6] By way of example, Coxhead and Warr (1995) report that substantially more of the poverty reduction from technological change in agriculture is transmitted through the factor markets than through the consumer goods markets.

comes to multi-country, or global trade liberalization analyses, researchers are forced to focus only on average, or *per capita* effects. This severely limits their capacity to address the poverty question.

In this paper, we extend the typical multi-country trade analysis in a direction that permits us to assess the likely impacts of trade liberalization on the incidence of poverty. The approach builds on a combination of national household surveys available through the World Bank, and multi-country data sources, including: the International Comparisons Project (ICP) database on *per capita* consumption (Kravis, Heston, and Summers 1982), the Deninger and Squire income distribution data set (Deninger and Squire 1996), and the Global Trade Analysis Project (GTAP) database (McDougall *et al.*). The proposed approach is flexible enough to incorporate improved national databases as they become available.

The ideal approach to analyzing the implications of multilateral trade liberalization for poverty would incorporate a highly disaggregate set of households directly into a multi-region general equilibrium model, which could then be used for policy simulations. We are, however, a long way from this ideal analytical environment. Therefore, the present analysis is conducted in two parts. First, we simulate a global model to determine regional price changes owing to the policy experiment. Then we utilize a second model to conduct the detailed analysis of household incidence and poverty, thereafter drawing out the implications for poverty.

Overview of the Approach

Perhaps the most straightforward means of assessing the impact of trade policy on a given individual, a household, or a group of households, is to compute the change in their real income – that is factor earnings and transfers deflated by an index of consumer prices faced by these individuals. There is an extensive literature on the computation of cost of living indices (Deaton and Muellbauer, 1980). For our purposes we find that the following first-order approximation to the percentage change in the *i*-th consumer group's compensating variation relative to initial expenditure (cv^i) works quite well:

$$cv^i = -\left[y^i - \sum_n \theta_n^i p_n \right] \tag{1}$$

where θ_n^i is the *i*-th group's budget share for good *n*, p_n is the percentage change in the price of that good and y^i is the percentage change in income received by group *i*. If the share-weighted average for consumer prices rises, relative to income, then compensation will be required ($cv^i > 0$) in order to hold this household at its initial level of utility.[7]

In this paper we focus much of detailed analysis on one specific type of household – namely the *marginal household* – defined as those individuals that find

[7] While this CV measure is distinct from the EV measure commonly used in the welfare analysis, and it is only an approximation, we will see below that the CV approximation and the exactly computed EV yield very similar findings. Since (2) greatly facilitates economic analysis of the consequences of trade liberalization for poverty, we will work with that expression here.

themselves just below the poverty line prior to the policy change. [We will denote this household by setting $i=m$ in (1)]. The marginal household is of obvious interest since an improvement in their well-being will raise them out of poverty, whereas a deterioration will mean an increase in the poverty headcount. Since most analyses of multilateral liberalization focus only on the *per capita* household, it is of particular interest to see how much the marginal and *per capita* households differ. This may be seen by introducing *per capita* changes in income (y) and consumer prices (cpi) into (1) as follows:

$$-cv^m = (y - cpi) + (y^m - y) - \left(\sum_n \theta_n^m p_n - cpi \right). \quad (2)$$

In equation (2) the first term captures the average *per capita* percentage change in compensating variation, relative to initial expenditure. The second term describes the percentage change in the marginal household's income, relative to the *per capita* average. The third term measures the change in the marginal household's consumption price index, relative to the *per capita consumer price index (cpi)*. If the first right-hand-side (RHS) term in (2) dominates the results, then the current approach to multilateral trade liberalization analyses can be thought of as providing a good approximation to the impact on marginal households. The larger the second and third RHS terms, the greater the need for disaggregated analyses in order to isolate the impact of trade policy on poverty.

While equations (1) and (2) emphasize the role of consumers' differential expenditure patterns in determining the welfare impact of a policy change, it is often the pattern of factor ownership that proves most important in determining incidence. Abstracting from inter-household transfers, we can introduce differences in the sources of factor earnings as follows:

$$-cv^m = (y - cpi) \quad + \sum_f \left(\Omega_f^m - \Pi_f\right) w_f \quad - \sum_n \left(\theta_n^m - \lambda_n\right) p_n \quad (3)$$

where Ω_f^m is the share of primary factor f in marginal household m's income, Π_f is primary factor f's share in the *per capita* household's income, and w_f is the percentage change in the market return to primary factor f. λ_n is the share of consumer good n in the average *per capita* household's budget, so that:

$$cpi = \sum_n \lambda_n p_n \quad (4)$$

$$y^m = \sum_f \Omega_f^m w_f \quad (5)$$

$$y = \sum_f \Pi_f w_f \quad . \quad (6)$$

Equation (3) permits us to account for changes in the marginal household's welfare, relative to the *per capita* change by interactions between price changes and differences in expenditure and income shares.

In our analysis of poverty, we find it useful to stratify the population into groups, depending on their primary source of income. Otherwise one is left with the impression that all households are diversified in their income sources, with the composition of their earnings reflecting the average for their income level. Yet we believe that in the short to medium run, household incomes will be differentially affected depending on their

reliance on sector-specific factors of production, as one finds in agriculture and small non-farm enterprises. For example, a household which earns all of its income from a family run farm will be heavily dependent on the prices of agricultural products. If prices fall, they may eventually be able to find other employment, but this is likely to be difficult in the short run – particularly if they are not currently employed off-farm. To capture this specialization effect, we introduce earnings stratum *s* into the decomposition as follows:

$$-cv^{m,s} = (y - cpi) \quad - \sum_n (\theta_n^m - \lambda_n) p_n + \sum_f (\Omega_f^s - \Pi_f) w_f \; + \sum_f (\Omega_f^{m,s} - \Omega_f^s) w_f \qquad (7)$$

where Ω_f^s is the average share of primary factor *f* in stratum *s*'s income.

Equation (7) decomposes the change in welfare of marginal household *m* in stratum *s* into portions explained by (a) the change in *per capita* welfare, (b) the change due to departures of the marginal household's consumption pattern from the *per capita* household, (c) the change in strata *s* income, relative to *per capita* income, and finally, (d) departures of the marginal household's earnings pattern from the average for stratum *s*. This is the decomposition which will be employed below.

The remainder of the paper is organized as follows. We next turn to the problem of establishing the pattern of factor returns across strata and across the income spectrum. We then discuss our approach to estimating the profile of consumer expenditure across countries and across households within a given country. The subsequent section discusses the modeling approach and policy simulation used to assess the price impacts of multilateral trade liberalization. We then turn to the results and our estimates of the impact of trade liberalization on poverty.

Factor Earnings by Income Level and Stratum

We believe that factor markets represent a primary channel for trade policy transmission to poverty. Furthermore, as noted in the introduction, this is a relatively neglected area in the poverty literature, with authors tending to prefer to emphasize consumption impacts, which are easier to measure and assess. Therefore, we begin by focusing on determination of the income shares in equation (7): $\Omega_f^{m,s}$. The only sources of data for these shares are household surveys. In this paper, we focus on seven countries where such surveys are readily available, and which are also representative of diverse income, and geographic and trade policy circumstances. These seven countries are: Brazil, Chile, Indonesia, Philippines, Thailand, Uganda, and Zambia.[8]

[8] The sources of these surveys are as follows: Pesquisa Nacional por Amostra de Domicilios (1998), Brazilian Institute of Geography and Statistics (IBGE).SUSENAS: Indonesia's Socio-Economic Survey (1993) Biro Pusat Statistik, Jakarta, Indonesia. Annual Poverty Indicator Survey (1999) National Statistics Office, Manila, Philippines, World Bank Mission and the United Nations Development Programmme. Thailand Socio-Economic Survey (1996) National Statistics Division, Bangkok, Thailand. Living Conditions Monitoring Survey II (1998) Central Statistical Office, Lusaka, Zambia.

Before conducting an analysis of trade policy, household earnings and poverty, we must first reconcile the household income data with the macroeconomic data on earnings. A detailed discussion of this reconciliation process is provided in the appendix. The main point to note here is that, in several countries there is strong evidence of underreporting of income from profits. In these cases we have adjusted the survey data by scaling up reported profits in order to reconcile them with earnings shares based on national accounts.

Based on preliminary analysis of the earnings data, we group households into five strata, designed to preserve, as far as possible, the differences reflected in: $(\Omega_f^s - \Omega_f)$, the difference between stratum and *per capita* income shares, and the difference between marginal and stratum income shares, $(\Omega_f^{m,s} - \Omega_f^s)$. Aggregation strategies that cut across strata will tend to blur these key distinctions, thereby hiding the differential impact of factor price changes on diverse household groups. The five strata that we have selected are: (1) households relying almost exclusively (95% or more) on transfers (both public and private) for their income, (2) self-employed households specializing in agricultural production (95% or more of income), (3) households specializing in non-agricultural enterprises, (i.e., income from profits for non-agricultural enterprises), (4) households specializing in wages/salaries (95% or more), and (5) diversified (all other) households. Note that this final category comprises all those households that get less than 95% of their income from each of the four sources: transfers, agricultural profits, non-agricultural profits and labor – hence the label "diversified".

Figures 1 – 7 report the population density in each stratum, as a function of income level. These figures focus on the lower tail of the income distribution – the upper tail is extremely long, especially for Brazil and the Philippines. They have been constructed as follows. First, we compute *per capita* income in each household in the survey. The households are then ordered from poorest to richest, based on *per capita* income. They are then broken into 20 equal groups – called vingtiles. For any given stratum in Figure 1, each vingtile contains the same total population "area". Therefore, if the income range for the vingtile is short, the density must be high. This is true at the lowest income levels. On the other hand, at the highest income levels the income range in each vingtile is quite large and so the density is low.

In figures 1-7, these densities are additive across strata so that by taking a vertical slice at any income level, we can observe the portion of the population at that income level that belongs to each stratum. For example, in the case of poorest households in Brazil (Figure 1), the population is dominated by households relying on labor income (area under blue line and above black line). This is followed by households that are specialized in transfer payments (area under green line). The population distribution by earnings category in Chile is quite similar to that in Brazil, only diversified households are somewhat more important. Like Brazil and Chile, many of the poorest households in Thailand (Figure 5) are reliant on transfers, but unlike those countries, a substantial portion of the poorest households in Thailand are self-employed in agriculture. The same is true of Zambia (Figure 7), where small-holder farming households dominate at the lowest income levels. Clearly any policy that boosts agricultural prices will lift incomes

for the majority of the poorest households in Zambia. In Indonesia, the Philippines, and Uganda (Figures 3, 4, and 6), poor households tend to be more diversified in their income sources. To understand what is likely to drive incomes of the diversified households, we need to investigate the composition of their income sources.

Figures 8 – 14 report the composition of incomes (share of earnings from each source) for the diversified households in the seven focus countries. Unskilled wages are important for low income, diversified households in all countries. They are especially dominant in Chile, where they comprise nearly two-thirds of diversified household income in the poorest vingtile. In Brazil and Thailand, this figure is about 40%, while the share of unskilled wages in Uganda is only about 12%. In Uganda, agricultural profits are dominant throughout the diversified household group – but especially so at the lowest income level where they comprise more than half of all income. Agricultural profits are also important for low income, diversified households in Indonesia, but do not play a large role elsewhere. Non-agricultural profits dominate diversified household income at the upper income levels in all countries, but they also play an important role for poor, diversified households in Southeast Asia and in Zambia. Finally, transfers comprise between 10 and 25% of diversified incomes for the poorest household groups in the seven countries. In the Philippines, the diversified households rely heavily on self-employment in non-agricultural activities. This is even true at the lowest income levels. A similar situation applies in Zambia. In contrast, agricultural income is the dominant source of earnings for the poorest diversified households in Indonesia and Thailand. This means that many of the poorest farmers have off-farm jobs in these countries. Wages are important for the poorest diversified households in all countries. They are most dominant in Brazil, where they account for more than half of the poorest diversified households' incomes.

It is also interesting to explore the composition of earnings in the households that rely almost exclusively on wages or salaries for their incomes. For purposes of this study, we defined skilled labor based on the available occupational information in the household surveys. In particular, individuals working as managers and professionals were deemed skilled, with all others classified as unskilled. In some cases income and occupational data were not available for each household member so we assigned the household's total labor income based on the occupational status of the head of the household. The earnings splits for the labor-specialized households are displayed in Figures 15 – 21. Not surprisingly, unskilled labor dominates at the lowest income levels and subsequently diminishes in importance as income increases. However, it also persists at the higher income levels (top 5% of the stratum's households, by income) – reflecting the limitations of our occupational-based splits, as well as the presence of multiple earners in households where individual earnings were not available.

Returning to equation (7), we can now see how the income decomposition will work in practice. Take Chile, for example. If multilateral trade liberalization boosts agricultural prices, relative to those of manufactures in Chile, then the agriculture-specialized stratum will benefit due to the third term in (7), while the non-agriculture-specialized stratum will lose. What happens to the labor-specialized stratum will depend

on what happens to wages, relative to other factor returns. And for the poorer households, the key variable will be the unskilled wage rate. The departure of the diversified stratum income from the *per capita* income change will be dampened, since all factor returns play a role in this household groups income. Finally, households dependent on transfer income will depend entirely on what happens to government spending. Even if *per capita* welfare were unaffected by the policy, there could be substantial changes in poverty due to changes in the distribution of real income. In this case, with unskilled labor-specialized households dominant at the lowest income levels, the key variable will be the change in wages, relative to commodity prices.

Estimating Household Consumption Patterns Across Income Levels

Having dealt with the earnings shares in the welfare decomposition (7), it remains to determine the consumption shares (θ_n^m). The most obvious means of obtaining these is to observe them directly from the survey. This is the most common approach to counterfactual analysis of poverty from the consumption side (e.g., Levinsohn, 2000; Case, 2000). However, as those authors point out, these shares are typically not constants and so, in the face of large price changes it would be preferable to estimate a household expenditure function from which these expenditure shares could be derived for different price configurations. Another advantage of having an explicit expenditure function is that out-dated consumer surveys can be updated to reflect subsequent changes in spending due to higher (or lower) income levels. Finally, the expenditure function offers a natural means of conducting welfare analysis. Unfortunately, efforts to estimate expenditure functions using household surveys often meet with limited success (e.g., Levinsohn, 2000), so it is common to revert to simply using observed expenditure shares in the welfare analysis.

In this paper we take a new approach to estimating consumer expenditure shares. It involves the combination of cross-country and within-country information to estimate a consumer expenditure function. Specifically, we draw on recent work by Cranfield (1999) who estimates the parameters of a complete demand system while simultaneously utilizing data on the distribution of expenditure by quintile in order to permit recovery of the unobservable distribution of expenditure for each quintile. This approach requires data typically used in demand system estimation (*i.e.*, prices, *per capita* quantities and *per capita* expenditure), in addition to summary measures of the distribution of expenditure (or income), such as variance, skewness, kurtosis, or quintiles and the relevant range of expenditure in each observation. Rather than estimating a model that predicts a budget share for each good on a *per capita* basis in each observation, the framework approximates the distribution of expenditure, estimates demand system parameters consistent with the demand and expenditure data (including the distribution information), and predicted budget shares for each good *across expenditure levels within each national observation*. An added benefit is that, with a complete demand system in hand, expenditure shares for more recent years can be predicted, based on information about changes in per-capita income and possibly prices.

We use consumption, price and expenditure data from a sub-set of the 1985 International Comparisons Project (ICP) data set for the demand system portion of the model. Quintile data are used as summary measures of the expenditure distribution, and are obtained from the Deninger and Squire (1996) database and the World Bank's *World Development Reports*. Given these quintile data, we approximate a finer distribution of expenditure across fifteen expenditure levels for each observation in the ICP data set. These fifteen expenditure levels are equally allocated across the five quintiles (i.e., there are three expenditure levels within each quintile). It is important to note that the recovered expenditure distribution aggregates back to the *per capita* expenditure levels in the ICP data, as well as reproducing the observed quintile data. Our sample contains 53 countries from the ICP data set for which corresponding quintile data were available (see table in Appendix). The ICP consumption and price data are aggregated up to six goods: staple grains, livestock products, other food products, other non-durable goods, durable goods, and services. The emphasis on food products (three of the six categories) is appropriate for this study, since we are focusing on poverty and poor households spend a large share of their income on food products.

Since we are using the demand system to estimate consumer expenditure at different income levels, both within and across countries, it is vital that this demand system is sufficiently flexible to capture the wide range of consumer behavior that might arise over the global income spectrum. In this study, we adopt Rimmer and Powell's (1992a, 1992b, 1996), AIDADS system[9], due to its capability for capturing expenditure patterns across the development spectrum. This may be viewed as a generalization of the popular, but restrictive, Linear Expenditure System (LES). Unlike the LES, AIDADS allows for non-linear Engel responses, while maintaining a parsimonious parameterization of consumer preferences.

The following equation gives the budget share form of AIDADS:

$$w_n = \frac{p_n \gamma_n}{y} + \frac{a_n + \beta_n \exp(u)}{1 + \exp(u)} \left(1 - \frac{p'\gamma}{y} \right) \quad \forall\, n \tag{7}$$

where w_n is the budget share of good n, a_n, $\square_n$, and $\square_n$ are unknown parameters, u represents utility and other parameters have the definitions given earlier. The following parametric restrictions are used to ensure well-behaved demands: $0 \le \alpha_n, \beta_n \le 1$ for all n, and $\sum_{n=1}^{N} \alpha_n = \sum_{n=1}^{N} \beta_n = 1$. If $\alpha_n = \beta_n$ for all goods, then AIDADS simplifies to the LES. By replacing the values of β_n in the LES with more general terms that are functions of a value that varies with real expenditure level (in this case utility), Rimmer and Powell allow for marginal budget shares that vary across expenditure levels in a very general manner. Moreover, the budget shares from AIDADS also vary non-linearly across expenditure. This last point is rather important in the context of predicting the pattern of demand for food products and services across expenditure levels.

[9] AIDADS stands for *A*n *I*mplicitly, *D*irectly-*A*dditive *D*emand *S*ystem.

Table 1 reports estimates of the AIDADS parameters for this study. For livestock, grains, and other food, the estimate of α_i is greater than the estimate of β_i. Given the AIDADS structure, the estimates of α_i and β_i represent upper and lower limits for the budget shares, respectively. For modest expenditure levels, livestock's budget share is about 0.14. However, as expenditure grows, livestock's budget share approaches 0.05. Upper and lower asymptotes for grain's budget share are 0.11, and 0, respectively. The upper and lower bounds for other food's budget share are 0.31 and 0, respectively. The lower bound of zero for grain and other food may seem troubling as it implies that as expenditure grows without bound, expenditure on other food goes to zero. Recall, however, that this is an asymptotic result and so does not imply that the budget share for grain or other food ever actually reaches zero – just that it approaches zero. More importantly, the estimate of γ_n is zero for livestock and other food, but positive for grain. Thus, an individual with expenditure equal to subsistence consumption (*i.e.*, where $y = \sum_{n=1}^{6} p_n \gamma_n$) is predicted to consume grain, but not livestock or other food. As expenditure grows, the subsistence household will begin to consume livestock and other food products. Consequently, consumption shares for these goods peak and then decline towards their minimum values. Figure 22 illustrates the predicted pattern of each good's budget share over a range of expenditure levels, and at a common price level (which is assumed to be that of Thailand in this figure). The grains budget share follows a monotonically declining pattern, while the budget shares for both livestock and other food increase, reach a peak and then decline. Other (non-food) non-durable goods follows an increasing pattern. Since budget shares must sum to one, and those for livestock and other food products rise and then fall, it must be true that the budget shares for some other good(s) must fall and then rise. In fact, the budget shares for services and durable goods follow such a pattern. (See Appendix for more figures relating to fitted budget shares, by country.)

Modeling the Price Effects of Multilateral Trade Liberalization

In the interests of tractability, we have taken a fairly simple approach to modeling trade liberalization. We draw on the GTAP modeling framework (Hertel, 1997), using the latest version (6.1) of that model in conjunction with the most recent, version 5.0, GTAP data base (Dimaranan and McDougall, 2001). This data base incorporates the latest tariff information for merchandise trade and agricultural protection. Agricultural tariffs are derived from the AMAD data base and are for 1998. The non-agricultural tariff data are for 1997, or the most recent year, and come from the WITS system maintained by UNCTAD and the World Bank. The only non-tariff trade barriers in the data base relate to export measures. In the case of agriculture, export subsidies for 1998, reported to the WTO, are incorporated. Also, the quota rents associated with restrictions on textile and apparel exports to North America and Europe are reflected in the database. In our trade liberalization experiment, we remove the tariffs and quotas. We do not attempt to capture the impact of prospective liberalization of direct trade in services or barriers to international investment or the movement of people in the services sectors. Also, we leave domestic agricultural subsidies in place. Appropriate modeling of these subsidies

requires considerable care – given the decoupled nature of many of these programs. We will tackle this in future work.

A summary of the average import tariffs used in this study of multilateral trade liberalization is provided in Table 2. For purposes of this table, these have been aggregated from the 31 commodities used in the modeling exercise (see Table 3) to four broad categories, and services protection is omitted. (The GTAP database does not incorporate protection on services trade.) The highest protection on agricultural products is found in East Asia and Uganda. EU protection is understated, since these averages include intra-EU trade which is free of tariffs. For food products, the highest average tariffs are for Japan, Other Africa, Other Asia, and Thailand. Tariffs on textiles and apparel are uniformly quite high, while average tariffs on other manufactures are highest for the developing countries.

For purposes of this study, we have modified the model closure in a number of important respects. First of all, we have introduced an explicit revenue replacement assumption in all regions. Specifically, we maintain a constant ratio of tax receipts, relative to net national income.[10] This is achieved by endogenizing the rate of consumption taxation. Secondly, we fix the foreign savings, relative to net national income. When combined with the usual GTAP assumption that consumption, domestic saving (private and government combined) and government spending are also fixed relative to net national income[11], we can deduce that transfers will also be fixed relative to net national income. A careful treatment of transfers is important, since, as we have seen above, they represent a significant component of income for the poorest households in many countries.

The other major modification with respect to earlier studies of multilateral trade liberalization involves the use of a short run closure with respect to the factor markets. This is designed to permit us to match up more closely to information available in the household surveys. In fact, for each of the five focus countries, we have modified the GTAP data base to incorporate the earnings information for unskilled and skilled labor, as well as agricultural and non-agricultural profits from the household surveys (see Appendix for more details). Specifically, we assume that wage and salaried labor are mobile across sectors, but capital, land and self-employed labor are immobile. As a consequence, supply response is considerably smaller, and price changes larger, than in most such studies – as would be expected in the short run.[12]

[10] GTAP users will recognize that the MFA quota rents are treated as export taxes in the model. However these rents rarely accrue in full to the government price, so we have omitted them from the tax replacement equations.

[11] This fixed share assumption is not strictly true in version 6.1 of the GTAP model – due to non-homotheticity of private consumption. However, for all practical purposes consumption, government spending and savings move very closely with national income.

[12] Of course a WTO agreement would typically be phased in over a number of years, so this short run closure is somewhat stylized. However, it highlights the most extreme outcome and this therefore a useful benchmark. Also, as noted in the text, this short run closure permits us to match price changes with the income sources from the household survey. In future work, we plan to explore the implications of

Disaggregated commodity price changes for these seven focus economies are reported in Table 3, while aggregated factor and commodity price changes are reported in Table 4. The aggregated commodity price changes are reported both on producer prices (excluding wholesale/retail/transport margins) and consumer prices (margin inclusive).[13] The latter are blunted in many cases by a more modest change in the price of margins services. Since the AIDADS demand system employed in the post-simulation analysis is estimated at consumer prices, it is the vector of consumer price changes that is pertinent for our evaluation of household welfare.

All of the reported price changes are relative to the numeraire in this model, which is the average price of primary factors, worldwide. A rise in the primary factor prices, as is observed in all of the seven countries except for Brazil, means that they experience a real appreciation as a result of this liberalization experiment. That is, increased demand for their exports bids up their prices, relative to the world average. In the case of Brazil, the situation is mixed, with agricultural profits rising, while wages and non-agricultural profits fall, relative to the numeraire. On the commodity side (at producer prices) food prices rise in most regions, as OECD countries reduce their production and curb their exports of subsidized products. Non-durable and durable prices fall in most regions, while services prices rise. Once the wholesale/retail/trade margin is taken into account, these price changes are blunted somewhat (lower part of Table 4).

Welfare Results and Implications for Poverty

By making use of the factor earnings densities in combination with a model that accounts for changes in income and expenditures, it is possible to assess the implications of trade liberalization for households at the edge of poverty -- the so-called *marginal* households, as well as for a comprehensive measure of poverty incidence. But in order to do so, we must first adopt a definition of poverty. There are many such definitions available in the literature (World Bank, 2000). However, since the demand system that we use to evaluate household well-being is based upon the 1985 ICP database, it is logical to consider the World Bank's notion of absolute poverty as applying to households living on one or two dollars per day. These measures of absolute poverty were also originally defined in terms of 1985 ICP dollars. One dollar per day corresponds roughly

---

alternative factor mobility assumptions.

[13] The consumer price changes are computed assuming a simple, Cobb-Douglas wholesale/retail/trade sector which is introduced in the post-simulation analysis. This sector combines GTAP producer goods with GTAP trade and transport services to produce aggregated consumer price changes consistent with the general equilibrium results. Since we do not have data on the share of margins services embodied in consumer goods for the five focus countries, we deduce these margins based on the difference in consumption shares at consumer prices (ICP) and producer prices (GTAP). More discussion of our reconciliation of margins demand in the two data bases is provided in the appendix. For manufactures and processed products, the margin is assumed to equal 50% of the producer price. For farm products that are consumed without further processing, the margin is assumed to be 20% of the producer price. For purposes of comparison, we have computed comparable margins for the United States, based on data provided by Gohin (2000). As anticipated, we find much higher average margins there. While U.S. margins on grains and livestock products average about 45% of producer prices, margins on other non-durables average 80% of producer prices. Durables margins average about 74%.

to the poverty level in many of the poorest countries of the world (World Bank, 2000, p. 17). Since our sample of countries also includes some higher income countries (e.g., Brazil, Chile) we have increased the absolute poverty line to $1.50 per day for purposes of the study. While the expenditure functions we use are based on units defined in terms of 1985 ICP prices, real expenditure levels have been updated to reflect 1997 *per capita* incomes, since this is the base year for the version 5 GTAP data which will provide the basis for the trade liberalization analysis.

Having established the poverty level, the next step is to measure the extent of poverty in each of the focus economies. The simplest approach is the so-called "head-count measure of poverty. However, there are two problems with simply counting the number of people in poverty. The first of these is that it offers no indication of the severity of the poverty problem. Real income could have fallen for the poorest households and risen for the marginal households and this index would show a decline in poverty. The second problem with using the simple head-count measure is specific to our work here. We use a discrete distribution of households by income and in many cases the poverty line falls between vingtiles (five percent groupings of the population) so that even if the marginal household's welfare improves, the headcount may not change. On the other hand, when such a change does occur, it occurs in a discrete jump. For these reasons, we deem the headcount results to be uninformative.

In this paper, we focus one of the alternative measures of poverty proposed by Foster, Greer and Thorbecke (1984). This measure focuses on incomes below poverty level. This critical level for the post liberalization scenario is obtained by calculating the income level required to obtain the same utility level as was achieved before liberalization, but at post liberalization consumer prices and incomes. Denoting this level by *z*, the general form of the Foster-Greer-Thorbecke measure is:

$$\Phi_\alpha = \frac{1}{n}\sum_{i=1`}^{n}\left[\max\left(\frac{z-y_i}{z},0\right)\right]^\alpha .$$

The most common values of α considered are $\alpha = 0$, 1 or 2. Taking the convention that zero to the zero power equals zero, the case of $\alpha = 0$ results in the traditional "head count" measure – the fraction of the population below the critical level. In the case where $\alpha = 1$, the measure yields the average amount by which income of the poor must be increased to bring them up to the critical income level, expressed as a fraction relative to *z*. This is the measure we will focus on in the subsequent discussion. When $\alpha = 2$, the interpretation is less clear. However, just as a variance measure puts greater than proportional emphasis on observations farther from the mean, so does this measure put greater emphasis on individuals with income farther below the critical level of one dollar per day at pre-liberalization prices. Since the results from this measure are very similar to those from the transfer measure, we only report the latter here.

Using this metric for measuring poverty, we report in Table 5 the estimated profile of estimated poverty in 1997, across the five strata in each of the three focus economies. In Brazil, we estimate that it would require an average transfer of 6.46% of the poverty level of income per person to boost all of the poor (total row) out of poverty.

The distribution of this poverty across strata is shown in the five rows of this table. More than half of the poverty appears in the labor stratum, followed by diversified households , transfers, and then the agriculture-specialized households. Households specialized in non-agriculture profits play a very small role in Brazil's poverty picture, according to this measure. The ordering of household groups relative importance in the poverty picture is the same in Chile, with wage labor once again dominant. However, the situation is quite different in Indonesia, where poor households are typically diversified. This is followed in importance by the agriculture-specialized households. Diversified households also dominate the poverty picture in the other Southeast Asian economies, with self-employed agricultural households following in relative importance. The same pattern applies in Uganda, while in Zambia – where the poverty problem is most severe – each of the stratum (except for transfer specialized households) contributes about one-quarter of the total incidence.

Impacts on the Marginal Households: In the spirit of the framework offered in the overview section above, we begin our analysis with a focus on the marginal household in each stratum, in each focus country (7 strata x 3 countries = 21 in total). Welfare gains for the marginal household (that is, the household on the threshold of poverty) can be measured in terms of Equivalent Variation (EV), or compensatory variation, computed using the AIDADS demand system, and expressed as a percentage of pre-liberalization expenditure. These are reported in the appendix and compared with the first-order approximation obtained from equation (7). This comparison shows only minor differences in most cases, so we simply use the approximate measure in Table 6, where the emphasis is on decomposition.

Note from the top entries in Table 6 that the agriculture-specialized, marginal households gain in all but one region as a result of higher world food prices and enhanced returns to farming. In Thailand, the decline in *per capita* real income dominates the increase in agricultural profits. The picture with respect to non-agriculture specialized households is mixed, with lower rates of protection reducing profitability and hence welfare in Brazil, Chile, Philippines, and Thailand. The labor-specialized marginal households in Indonesia, Philippines, Uganda, and Zambia experience gains as a result of the liberalization of trade in labor-intensive manufactures and agriculture, whereas welfare declines for the labor-specialized, marginal households in Brazil, Chile, and Thailand. The transfer-specialized, marginal households gain in all regions except for Chile and Thailand. Diversified, marginal households' welfare follows the *per capita* result, which is not surprising, since their earnings patterns tend to mirror those of the economy as a whole.

The remaining rows in Table 6 provide a summary of the welfare decomposition for the marginal household in each of the five strata, in each of the seven focus countries. By way of example, consider the change in welfare of the marginal diversified household in Brazil (top set of rows, last column). According to our first-order approximation to the compensating variation, this household is better off as a result of the trade liberalization scenario (+0.76% increase in welfare). This is the numerical value for the left hand side

of equation (7). The subsequent entries in the table decompose this outcome, explaining it via the terms reported on the right hand side of equation (7).

The first of the decomposition terms is the *per capita* effect, which is common across all strata. It is positive. This is offset by a negative consumption effect, reflecting the high share of food in total expenditures of the marginal, relative to the average household. (The differences in the marginal and *per capita* shares for consumption are shown at the top of Table 7.) With food prices rising (see final column of Table 7), this heavy dependence on food generates a negative contribution to welfare for the marginal household. Furthermore, since we have abstracted from stratum-specific consumption differences in our study, the consumption difference term in Table 6 (-0.17) is common across all strata.

The next term in the Brazil/diversified column of Table 6 refers to the third term on the right hand side of (7). It reports the difference in the *per capita* and stratum income changes. These diversified households are not as reliant on unskilled wage income as is the average household in Brazil. (See the second panel of Table 7 for these share differences.) Since returns to the latter factor fall, the diversified stratum income rises, relative to the *per capita* income.

The final term on the right-hand side of (7) reports the impact of deviations of the marginal household from the average stratum household due to differing factor endowments, within strata, by income level. Since the marginal household is poorer than the average household in the diversified stratum, it is more heavily reliant on transfers and agricultural profits – both of which rise. (See the final panel of Table 7.) On the other hand, it is less dependent on non-agricultural profits and wages – both of which fall. So the marginal household's income also rises, relative to the average stratum income, making another positive contribution to welfare of the marginal, diversified household.

Looking across the marginal households in other strata for Brazil in Table 6 reveals that the other groups to benefit are the transfer- and agriculture-specialized households. These gains are both augmented by increases in stratum income, relative to average income. In the case of the agriculture households, this welfare gain is about 11%. Conversely, in the case of the non-agricultural household, most of the loss is driven by the decline in non-agricultural profits. The marginal labor household also loses due to declining wages which combine with the negative effect of higher food prices to dominate the *per capita* gain.

In Chile, the pattern of stratum vs *per capita* earnings differences for the self-employed and labor-specialized households is quite similar to Brazil, so agricultural households are the big winners and non-agriculture and labor households lose. However, whereas the *per capita* effect in Brazil is positive, it is negative for Chile. In addition, staple grains prices rise more in Chile, so the marginal *per capita* consumption difference is larger. Consequently, the marginal transfer and diversified households in China lose from trade liberalization.

Indonesia offers an interesting contrast to Brazil and Chile. Here, the labor household gains three times as much as does the agriculture-household from trade liberalization. (Recall from Table 4 that wages rise more than agricultural profits – fueled by the increased production of labor-intensive light manufactures.) In addition, the *per capita* effect in Indonesia is strongly positive, and this also lifts the welfare of the non-agricultural households. The gain for diversified and transfer households is similar to the *per capita* gain. In the Philippines, the *per capita* gain is slightly less and the marginal non-agriculture household loses, while all other marginal households gain.

All marginal households in Uganda and Zambia gain from multilateral trade liberalization, (although the agriculture gains in Uganda are quite small). However, in Thailand all marginal households experience a decline in welfare as a result of multilateral trade liberalization. This is driven by the strongly negative *per capita* effect in Thailand.

Changes in Poverty: Having examined, in considerable detail, the impact of multilateral trade liberalization on the marginal households in each stratum/country, we now turn to the more comprehensive measure of poverty, designed to take account of the entire population under the poverty line. In Table 8 we report the percentage change in the FGT transfer measure of poverty for each stratum/country combination due to trade liberalization. In creating this table, we have taken advantage of a new approach for decomposing model results, developed by Harrison, Horridge, and Pearson (1999). It employs numerical integration techniques to attribute changes in the endogenous variables (in this case prices) to changes in sub-sets of the exogenous shocks (tariff and export subsidy/tax cuts). We have grouped the policy shocks according to the countries doing the liberalization: own (i.e. Brazil, Chile, etc., as the case may be), other LDC, and Developed Country (DC). For each country group, we have distinguished between farm and food liberalization (ag.) and other merchandise trade liberalization (non-ag.). The total row refers to the impact of all of the shocks, combined, on a given stratum's poverty measure.

Let us begin by looking at the combined impact of all liberalization measures (total row) on poverty across strata. The percentage reduction in poverty is particularly striking in the case of agriculture-specialized households in Brazil (poverty is nearly eliminated among this group) and Chile (-16%). Poverty also falls substantially for the transfer and diversified strata in Brazil, and for the wage-labor stratum in Indonesia. On the other hand, there are very substantial increases in poverty among the self employed, non-agricultural households in Brazil (+9%), Chile (+4.7%), Philippines (+0.4%) and Thailand (+11.2%). Of course these households (i.e. the households specialized in non-agriculture profits specialized households) are the least significant among the impoverished households in most countries.

Combining the changes in poverty in individual strata, together with the relative importance of these strata in the overall poverty picture, we are able to obtain an assessment of the impact on national poverty. This is reported, again as a percentage change, in the lower right hand corner of each section of Table 8. Here we see that

national poverty falls in Indonesia, Philippines, Uganda, and Zambia, while poverty increases in Brazil, Chile and Thailand.

Table 8 also permits us to decompose these total poverty changes, as well as the stratum changes, by source, i.e., by liberalizing policy. Consider first the case of Brazil. Let us focus first on the first two columns of the table – namely the impact on the two poor household groups that are self-employed, and therefore earning virtually all of their income from profits. In the case of the agriculture-specialized households, poverty rises by 24% following own-ag liberalization, as agricultural profits fall with the reduction in protection for that sector. On the other hand, poverty among non-agriculture households falls as a result of own-ag liberalization (-3.7%), as food prices fall and the non-agricultural sector becomes relatively more competitive.

In the case of non-agricultural liberalization in Brazil (Own Non-ag), precisely the opposite pattern emerges. Poverty falls among agricultural households (-30.7%) since manufacturing tariffs act as an indirect tax on agriculture. Reducing these tariffs serves to lower input costs for agriculture and leads to a real depreciation, making it easier to export agricultural products. Cheaper non-agricultural commodities also benefit the poor from the consumption side. Similarly, the reduction in non-agricultural protection increases poverty by 7.6% amongst the households reliant on profits in this sector for their income.

When we turn to the impact on Brazilian self-employed households of liberalizing policies in other countries of the world, we see that the sign pattern is reversed – now agricultural liberalization elsewhere boosts agricultural prices, production and profits and lowers poverty among ag-specialized households. In this case, poverty among non-agricultural households increases in the face of higher food prices and a more competitive agricultural sector that squeezes non-agricultural profits.

Looking down the Ag stratum column for Brazil, we see that the greatest impact on poverty is due to liberalization of developed country agricultural policies, which serves to reduce poverty by nearly 64%. LDC agricultural liberalization lowers poverty among Brazilian agriculture-specialized households by about 13%, and this is followed in magnitude by the own-non-agriculture liberalization impacts. These poverty reductions, dominate case the associated non-agriculture liberalization impacts and so the total poverty reduction from multilateral trade liberalization is quite dramatic – nearly 100% among agriculture-specialized households.

In the case of non-agriculture specialized households, the increases in poverty as a result of own-liberalization of manufactures protection dominate the beneficial effects of agriculture liberalization. Similarly, the poverty increases from agriculture liberalization elsewhere dominate the beneficial effects of non-agriculture liberalization outside of Brazil. So poverty rises (by about 3%) among this household group in Brazil, following multilateral trade liberalization.

As we continue down Table 8 and consider the sign patterns for these two household strata in the other countries, we see some similar patterns as well as some differences. Fore example, in Indonesia, with the exception of the impact of own-liberalization on the Non-ag household stratum, and LDC liberalization on the Ag stratum, the signs are the same as for Brazil. However, now the impact of worldwide liberalization on the Ag stratum is now much smaller – only a -0.77% reduction in poverty. This is due to the fact that Indonesia is not an exporter of agricultural products protected by OECD countries. In addition, since the base level of poverty is much higher in Indonesia, the percentage change resulting from trade liberalization is bound to be smaller.

There is much more to discuss in this rich table of results. However, we will focus here on just two other strata. The first of these is the labor-specialized group in Brazil. Here, the poverty increasing features of own, Non-ag liberalization and developed country Ag liberalization dominate, so that poverty rises for this household group under multilateral trade liberalization. On the other hand, the labor household in Indonesia experiences a very significant overall reduction in poverty, which is fueled by all of the trade liberalization measures, excepting for the food-price increasing liberalization of DC agricultural trade.

Conclusions, Limitations and Directions for Future Research

Assessing the impact of multilateral trade liberalization on poverty is a challenging assignment. As Alan Winters (p. 43) notes: "Tracing the links between trade and poverty is going to be a detailed and frustrating task, for much of what one wishes to know is just unknown. It will also become obvious that most of the links are very case specific." Winters proceeds to lay out a general framework for thinking about the impact of trade policy on poverty. Our paper is similar in spirit to the Winters effort. We recognize that the definitive assessment of the impact of trade liberalization on poverty must be done on a case-by-case basis. However, there is also a need for a set of internationally comparable estimates of the global impact on poverty, and our approach provides a tractable methodology for providing this. The keys to our approach are: (1) detailed earnings data from household surveys, (2) a demand system that credibly reflects the changes in consumption patterns across the income spectrum, and (3) a globally consistent framework for projecting the price impacts of trade liberalization.

The approach is applied to the assessment of the consequences of abolishing merchandise tariffs, agricultural export subsidies and quotas on textiles and clothing. We find that the aggregate measure of poverty is reduced in Indonesia, the Philippines, Uganda, and Zambia, while it is increased in Brazil, Chile, and Thailand following multilateral trade liberalization. However these national figures mask substantial variation in poverty by individual household groups.

As with any ambitious research undertaking, there are many limitations associated with this study. Given the importance of the factor earnings profile for poor households in determining the impact of trade liberalization on poverty, further efforts should be made to evaluate the discrepancies between the household survey data and the GTAP

data. We have devoted considerable attention tot this issue --- specifically bringing the household survey data on earnings to bear in adjusting the GTAP data. But we also found it necessary to adjust the survey data for underreporting of profits in a number of countries (see appendix).

A second limitation derives from the database available to us for estimation of the international demand system. We have used the 1985 International Comparisons Project database that has limited country coverage (Appendix Table A1). There is a more recent (1996) ICP database with over 100 countries, currently available at the World Bank. While it has a few problems, it is clear that use of these data would give us much better developing country coverage, in addition to a more up-to-date snapshot of international consumption patterns. We also plan to extend the estimation methodology to better take account of the information available from the household surveys.

The third limitation – and a potential avenue for future research – relates to our methodology for assessing the incidence of trade liberalization. Our current approach involves simple, *post-simulation* incidence analysis using the factor income mappings and our household demand model. Thus, we abstract from the potential impact that resulting changes in income distribution might have on relative prices. Given the relatively modest shifts in income, coupled with modest differences in consumption shares, we do not believe the resulting approximation error to be very severe. Perhaps more important is the enforcement of consistency between the aggregate behavior of the demand systems used in the trade policy model and the post-simulation analysis. These issues could be resolved if the disaggregated households were directly incorporated into the trade policy model (e.g., Cogneau and Robilliard, 2000). This, however, is a major undertaking.

These limitations notwithstanding, we believe that there is considerable value in this kind of rigorous, post-simulation assessment of the poverty impacts of trade liberalization. We plan to continue to push forward in systematically addressing these limitations as time, data, and resources permit.

References

Adelman, Irma, and Sherman Robinson. 1978. *Income Distribution Policy: A Computable General Equilibrium Model of South Korea.* Stanford: Stanford University Press.

Annual Poverty Indicator Survey (1999) National Statistics Office, Manila, Philippines, World Bank Mission and the United Nations Development Programmme

Case, Anne. 1998. "Income Distribution and Expenditure Patterns in South Africa." Paper prepared for the Conference on Poverty and the International Economy, organized by World Bank and Swedish Parliamentary Commission on Global Development, Stockholm, October 20-21, 2000.

Cogneau, Denis and Anne Sophie Robillard. 2000. "Growth, Distribution and Poverty in Madagascar: Learning from a Microsimulation Model in a General Equilibrium Framework." IFPRI TDM Discussion Paper 61.

Coxhead, Ian and Peter Warr (1995). "Does technical progress in agriculture alleviate poverty? a Philippine case study." *Australian J. Agr. Econ.*, 39(1), April, pp.25-54.

Cranfield, J.A.L. (1999) "Aggregating Non-Linear Consumer Demands – A Maximum Entropy Approach." Unpublished Ph.D. Dissertation, Department of Agricultural Economics, Purdue University.

Cranfield, John A.L., Thomas W. Hertel, and Paul V. Preckel. 2000. "Multi-lateral Trade Liberalization and Poverty." Paper prepared for the Conference on Poverty and the International Economy, organized by World Bank and Swedish Parliamentary Commission on Global Development, Stockholm, October 20-21, 2000.

Deaton, A. and J. Muellbauer (1980) *Economics and Consumer Behavior*. New York: Cambridge University Press.

Decaluwé B., A. Patry, L. Savard and E. Thorbecke. 1999. "Poverty Analysis within a General Equilibrium Framework." CREFA Working Paper 9909. Université Laval. Available at: http://www.crefa.ecn.ulaval.ca/cahier/liste99.html.

Deninger, K. and L. Squire (1996) "A New Data Set Measuring Income Inequality," *The World Bank Economic Review*, 10:565-591.

Devarajan, Shantayanan, and Dominque van der Mensbrugghe. 2000. "Trade Reform in South Africa: Impacts on Households." Paper prepared for the Conference on Poverty and the International Economy, organized by World Bank and Swedish Parliamentary Commission on Global Development, Stockholm, October 20-21, 2000.

Dimaranan, Betina V. and Robert A. McDougall. 2001. "Global Trade, *Assistance, and Protection: The GTAP 5 Data Base*," Center for Global Trade Analysis, Purdue University, West Lafayette, IN. Forthcoming.

Evans, David. 2001. "Identifying Winners and Losers in Southern Africa from Global Trade Policy Reform: Integrating Findings from GTAP and Poverty Case Studies for a Zambian Example." Paper prepared for the ESRC Development

Economics/International Economics Conference, Nottingham University, April 5-7, 2001.

Foster, J.E., J. Greer, and E. Thorbecke (1984) "A Class of Decomposable Poverty Measures", *Econometrica* 52:761-766.

Friedman, Jed. 2001. "Differential Impacts of Trade Liberalization on Indonesia's Poor and Non-Poor." Paper prepared for the Conference on Poverty and the International Economy, organized by World Bank and Swedish Parliamentary Commission on Global

Gohin, A. (2000). "Incorporating Domestic Margins into GTAP: Data and Modeling", *Mimeo, Center for Global Trade Analysis*, Purdue University.

Harrison, W. Jill, J. Mark Horridge, and K.R. Pearson. 1999. "Decomposing Simulation Results with Respect to Exogenous Shocks." Paper presented at the Second Annual Conference on Global Economic Analysis, Copenhagen, Denmark, June 20-22.

Harrison, Glenn W., Thomas F. Rutherford, and David G. Tarr. 2000. 'Trade Liberalization, Poverty and Efficient Equity.' Paper prepared for World Bank Conference on Poverty and the International Economy, organized by World Bank and Swedish Parliamentary Commission on Global Development, Stockholm, October 20-21, 2000.

Hertel, Thomas W. (editor) (1997) *Global Trade Analysis: Modeling and Applications*. New York: Cambridge University Press.

Ianchovichina, Elena, Alessandro Nicita, and Isidro Soloaga. 2000. "Implications of Trade Reform on the Distribution of Income in Mexico." Paper prepared for the Conference on Poverty and the International Economy, organized by World Bank and Swedish Parliamentary Commission on Global Development, Stockholm, October 20-21, 2000.

Kravis, I.B., A.W. Heston, and R. Summers (1982) *World Product and Income: International Comparisons of Real Gross Product*. Baltimore: Johns Hopkins University Press.

Levinsohn, James, Steven Berry, and Jed Friedman. 1999. "Impacts of the Indonesian Economic Crisis: Price Changes and the Poor." Paper prepared for the Conference on Poverty and the International Economy, organized by World Bank and Swedish Parliamentary Commission on Global Development, Stockholm, October 20-21, 2000.

Living Conditions Monitoring Survey II (1998) Central Statistical Office, Lusaka, Zambia

Löfgren, Hans. 1999. "Trade Reform and the Poor in Morocco: A Rural-Urban General Equilibrium Analysis of Reduced Protection." IFPRI TMD Discussion Paper 38.

McDougall, R.A., A. Elbehri, and T.P. Truong (1998) *Global Trade Assistance and Protection: The GTAP 4 Data Base*, Center for Global Trade Analysis, Purdue University.

Ministerio de Planificación y Cooperación, *Caracterización Socioeconómica Nacional 1998*, , Santiago, Chile

Uganda Bureau of Statistics, *National Household Survey 1999*, Entebbe, Uganda

Pesquisa Nacional por Amostra de Domicilios (1998), Brazilian Institute of Geography and Statistics (IBGE).

Rimmer, M.T and A.A. Powell (1992a) *Demand Patterns Across the Development Spectrum: Estimates of AIDADS.* IMPACT Project Working Paper No. OP-75, Monash University.

Rimmer, M.T and A.A. Powell (1992b) *An Implicitly Directly Additive Demand System: Estimates for Australia*. IMPACT Project Working Paper No. OP-73, Monash University.

Rimmer, M.T., and A.A. Powell (1996) "An Implicitly Additive Demand System." *Applied Economics* 28:1613-1622.

Robillard, Anne-Sophie, Francois Bourguignon, and Sherman Robinson. 2001. "Crisis and Income Distribution: A Micro-Macro Model for Indonesia." Paper prepared for ESRC Development Economics/International Economics Conference. Nottingham University, April 5-7,2001.

SUSENAS: Indonesia's Socio-Economic Survey (1993) Biro Pusat Statistik, Jakarta, Indonesia.

Taylor, Lance, ed. 1990. *Socially Relevant Policy Analysis: Structuralist Computable General Equilibrium Models for the Developing World.* Cambridge: The MIT Press.

Thailand Socio-Economic Survey (1996) National Statistics Division, Bangkok, Thailand.

Winters, L. Alan. 2001. "Trade, Trade Policy, and Poverty: What are the Links?" Centre for Economic Policy Research Paper No. 2382.

World Bank (1992) *World Development Report*. New York: Oxford University Press.

World Bank (1993) *World Development Report*. New York: Oxford University Press.

World Bank (2000/2001) *World Development Report*. "Attacking Poverty," Oxford: Oxford University Press.

Figure 1. Population densities by income and strata for Brazil

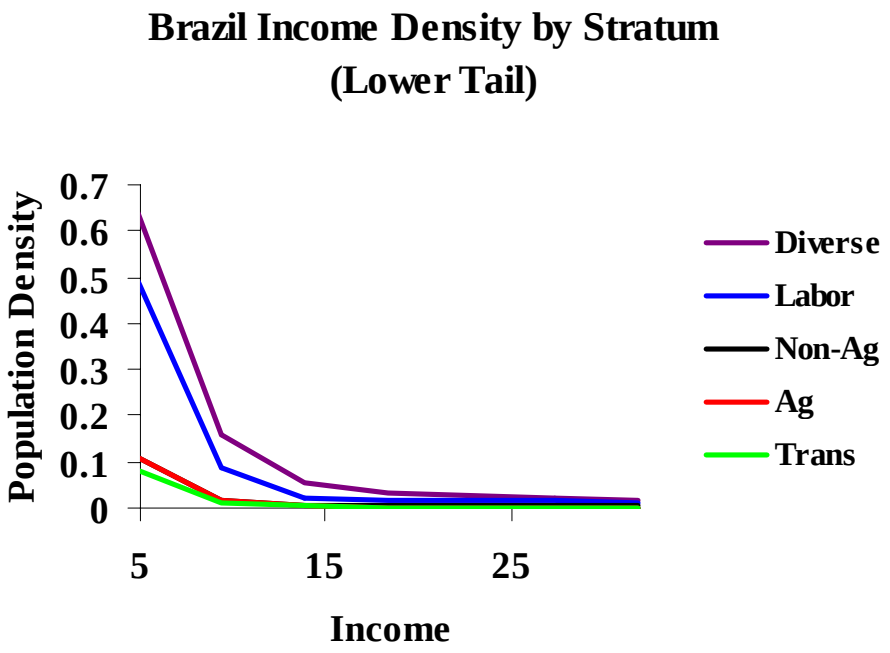

Figure 2. Population densities by income and strata for Chile

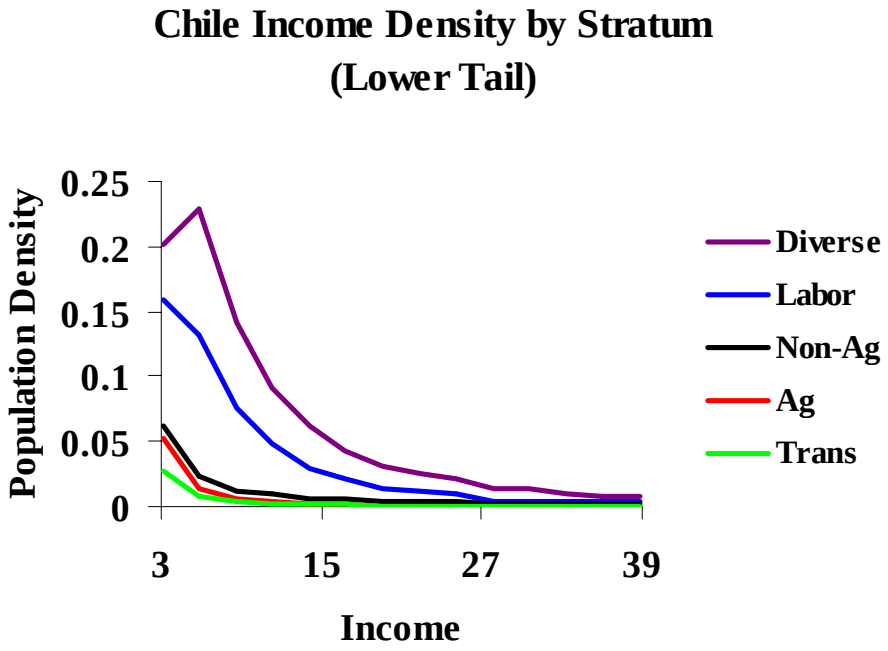

Figure 3. Population densities by income and strata for Indonesia

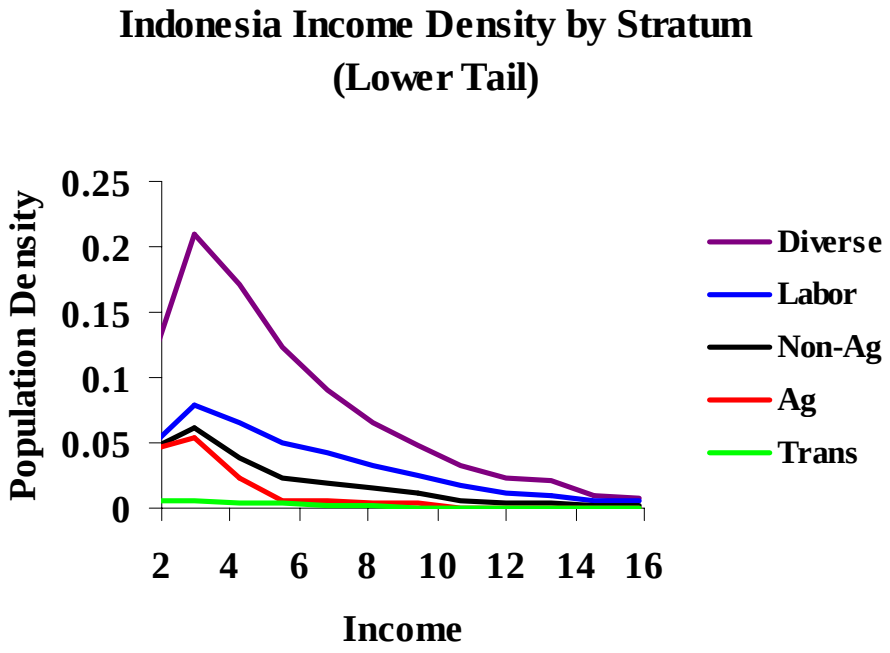

Figure 4. Population densities by income and strata for Philippines

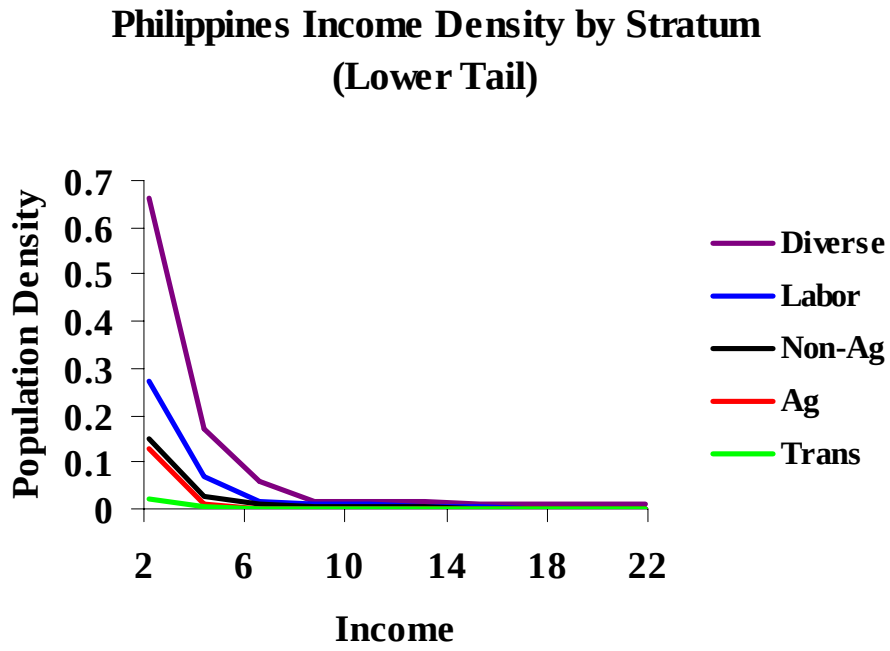

Figure 5. Population densities by income and strata for Thailand

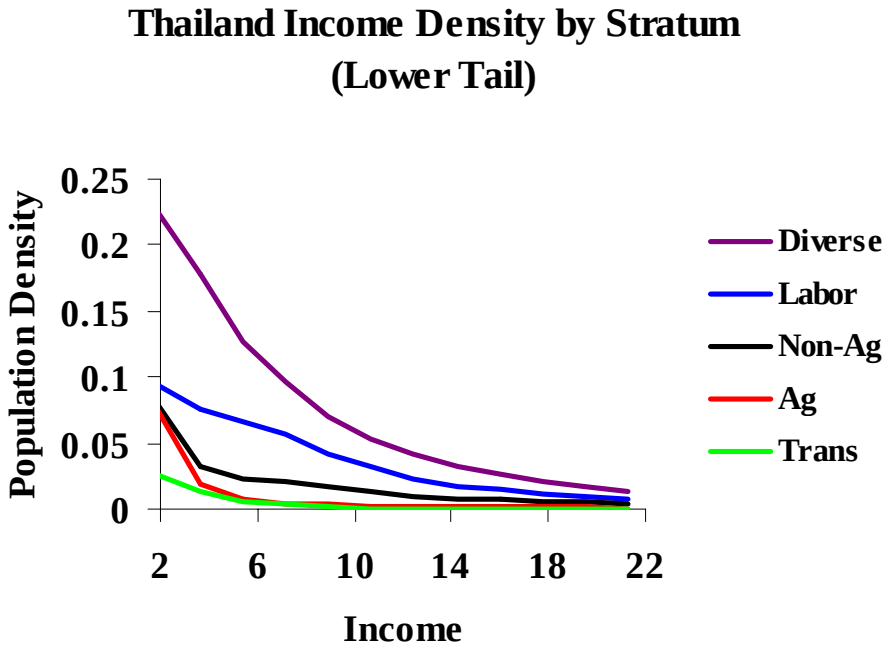

Figure 6. Population densities by income and strata for Uganda

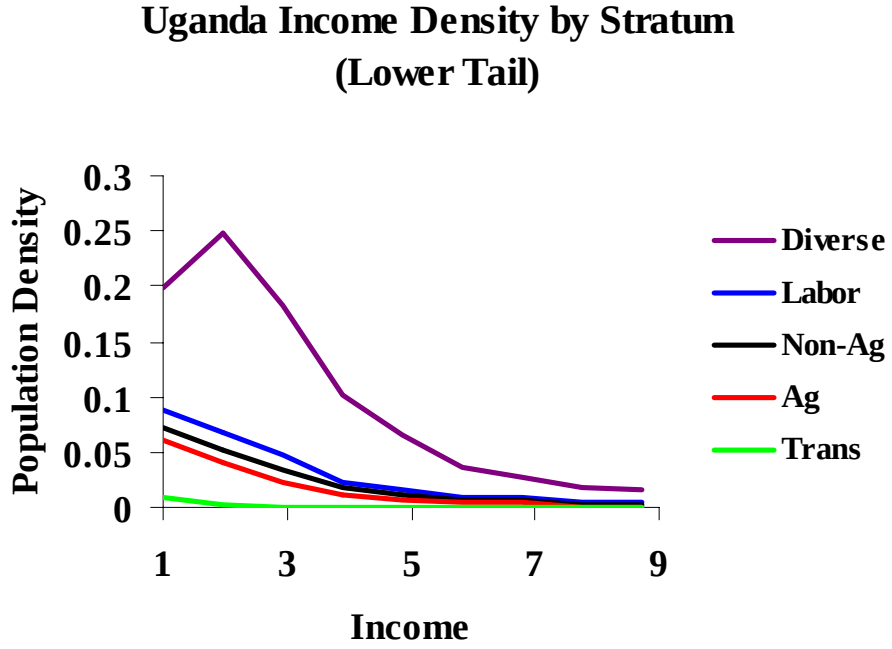

Figure 7. Population densities by income and strata for Zambia

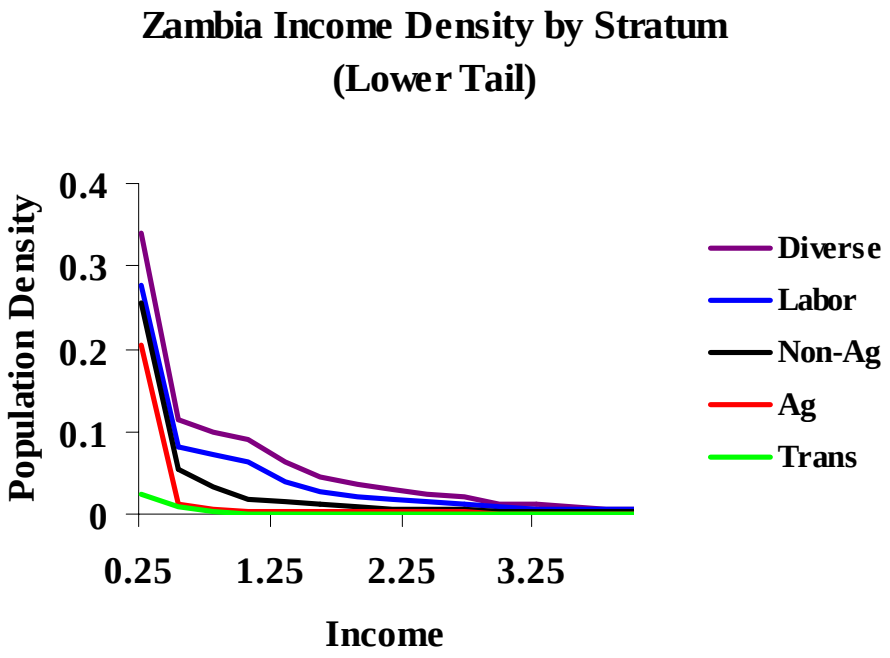

Figure 8. Composition of income in the diversified households for Brazil

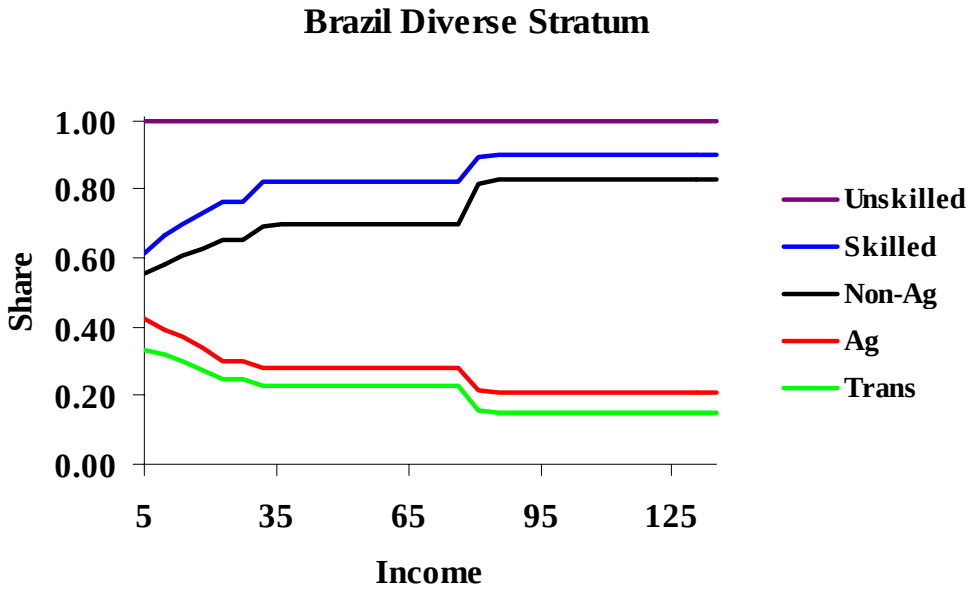

Figure 9. Composition of income in the diversified households for Chile

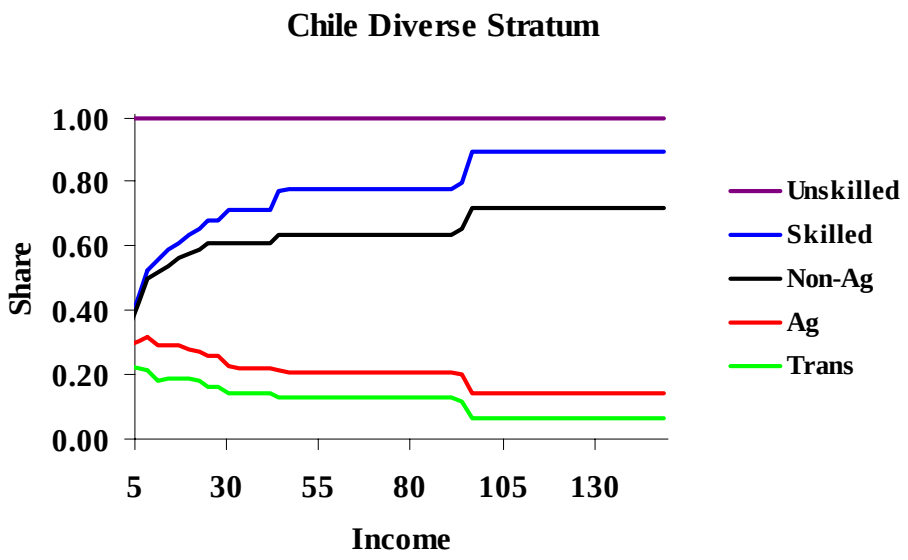

Figure 10. Composition of income in the diversified households for Indonesia

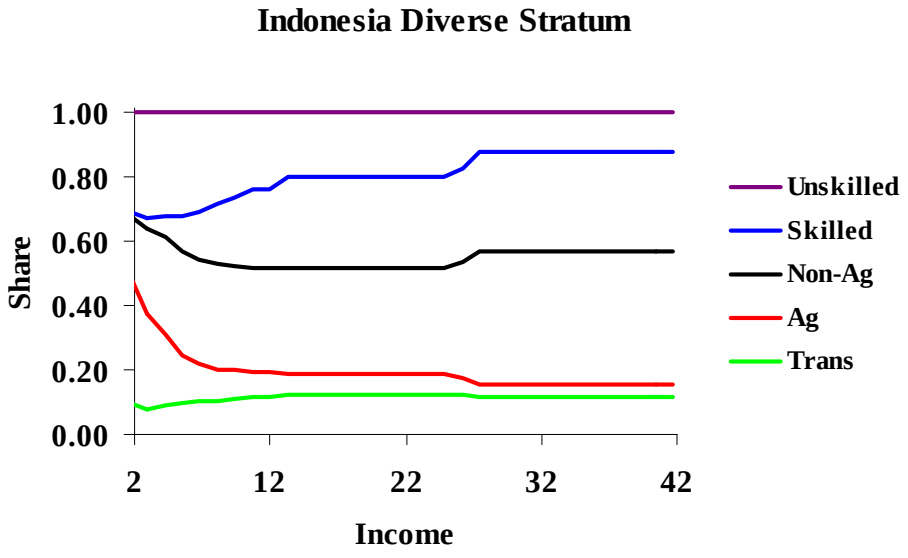

Figure 11. Composition of income in the diversified households for Philippines

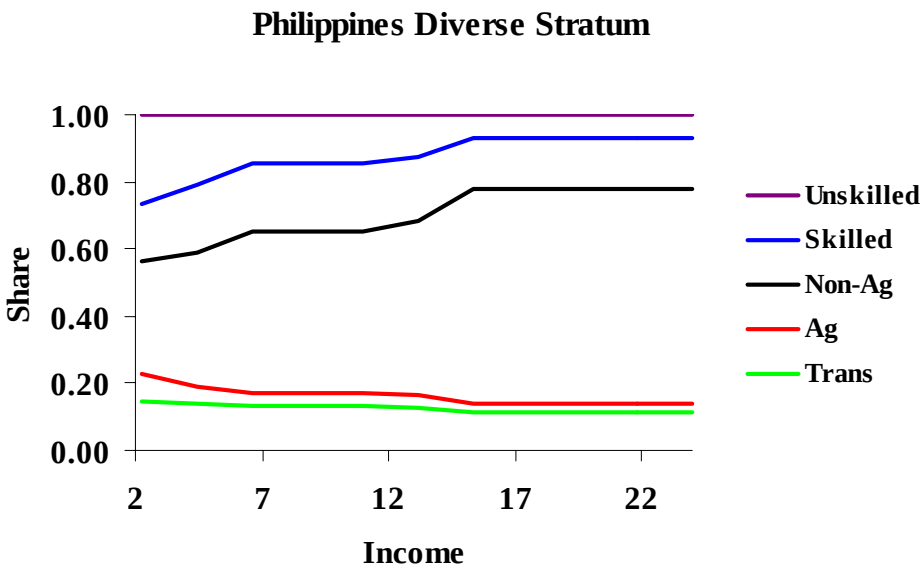

Figure 12. Composition of income in the diversified households for Thailand

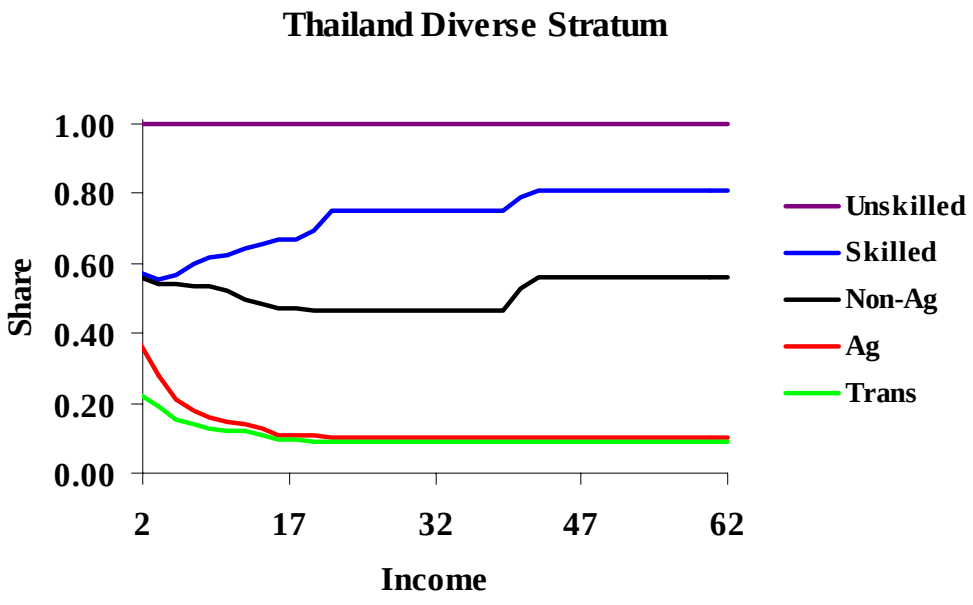

Figure 13. Composition of income in the diversified households for Uganda

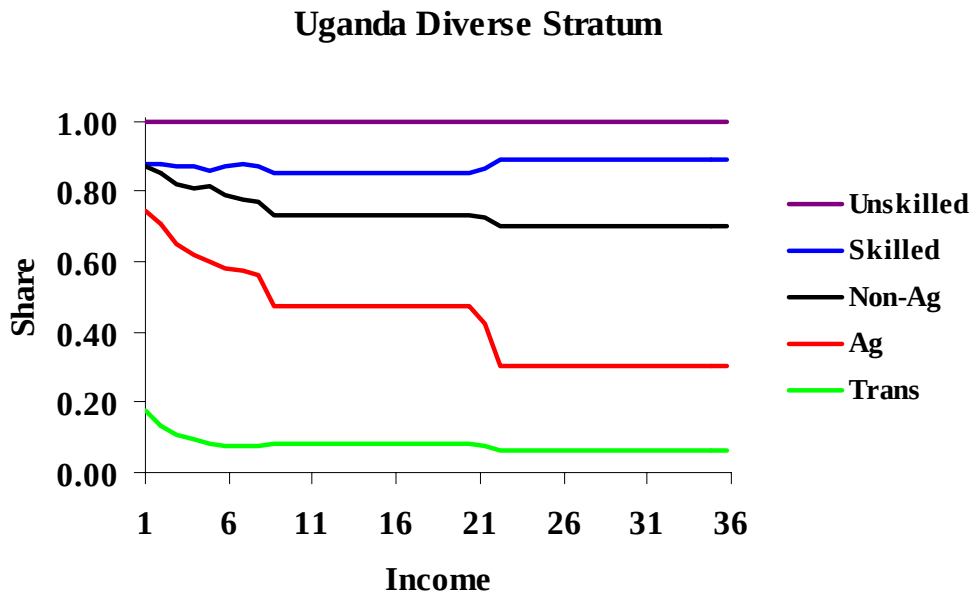

Figure 14. Composition of income in the diversified households for Zambia

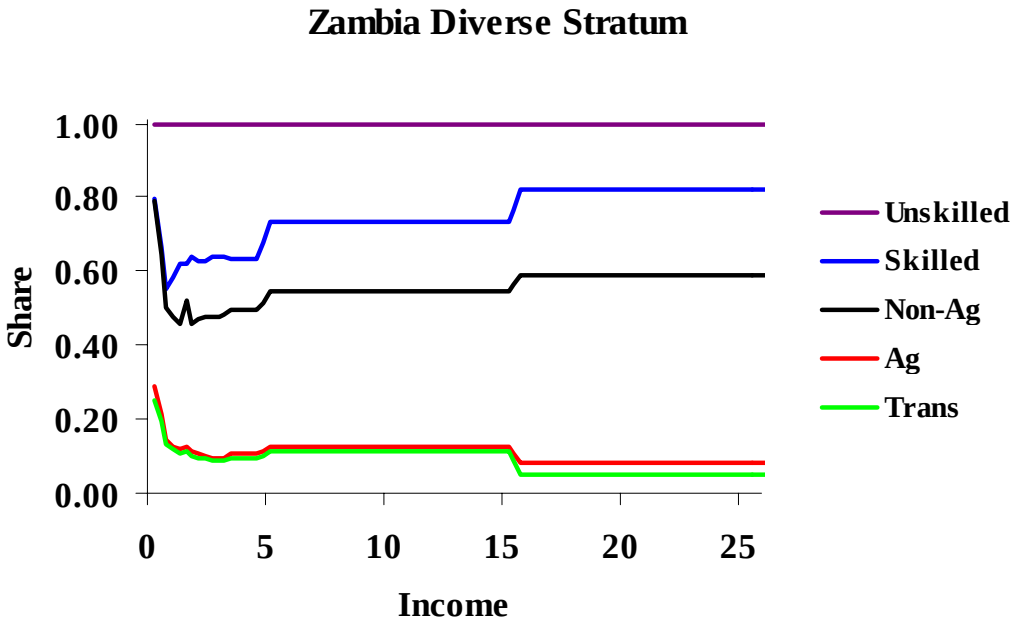

Figure 15. Composition of income in the labor-specialized households for Brazil

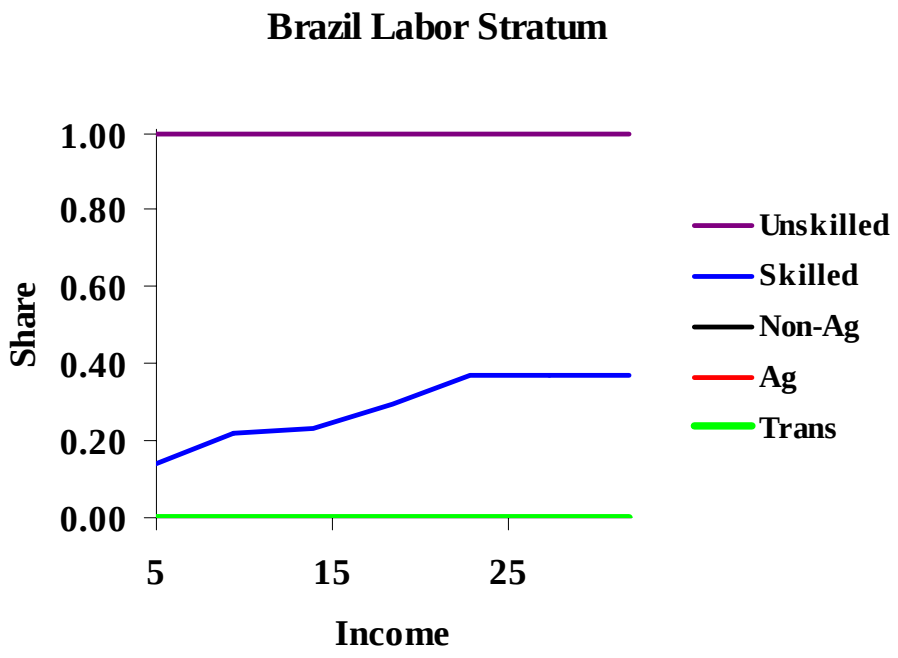

Figure 16. Composition of income in the labor-specialized households for Chile

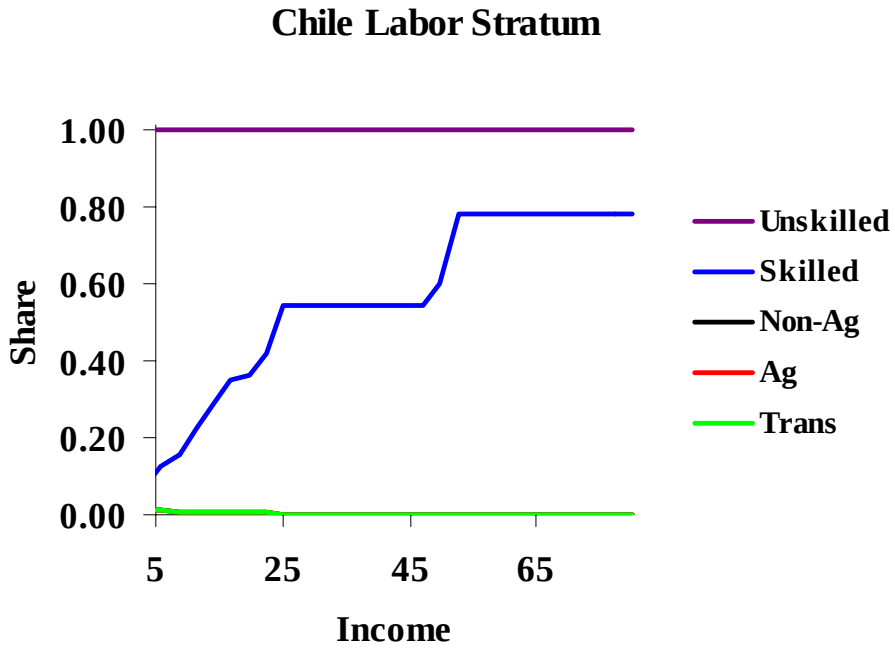

Figure 17. Composition of income in the labor-specialized households for Indonesia

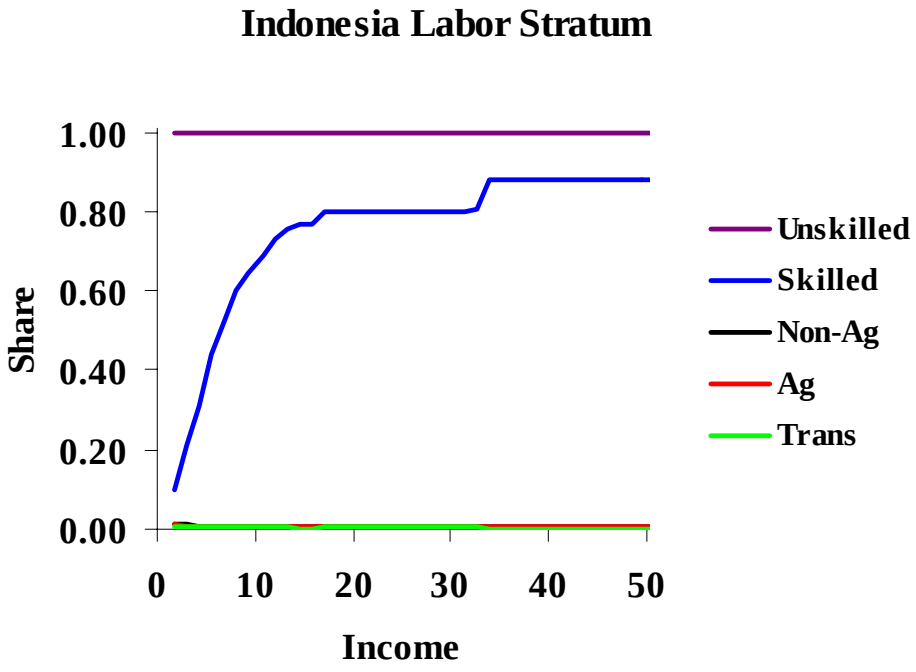

Figure 18. Composition of income in the labor-specialized households for Philippines

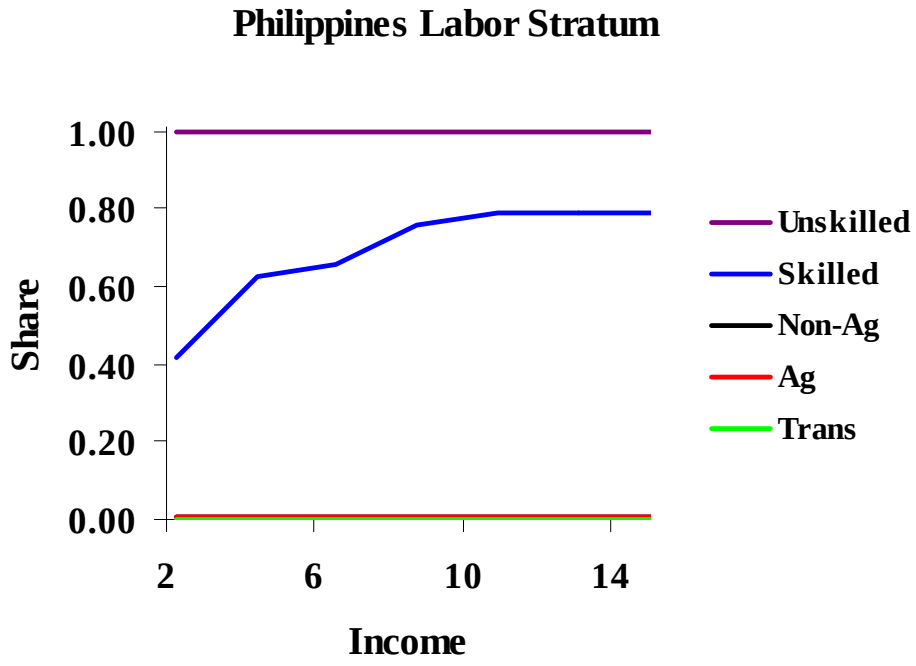

Figure 19. Composition of income in the labor-specialized households for Thailand

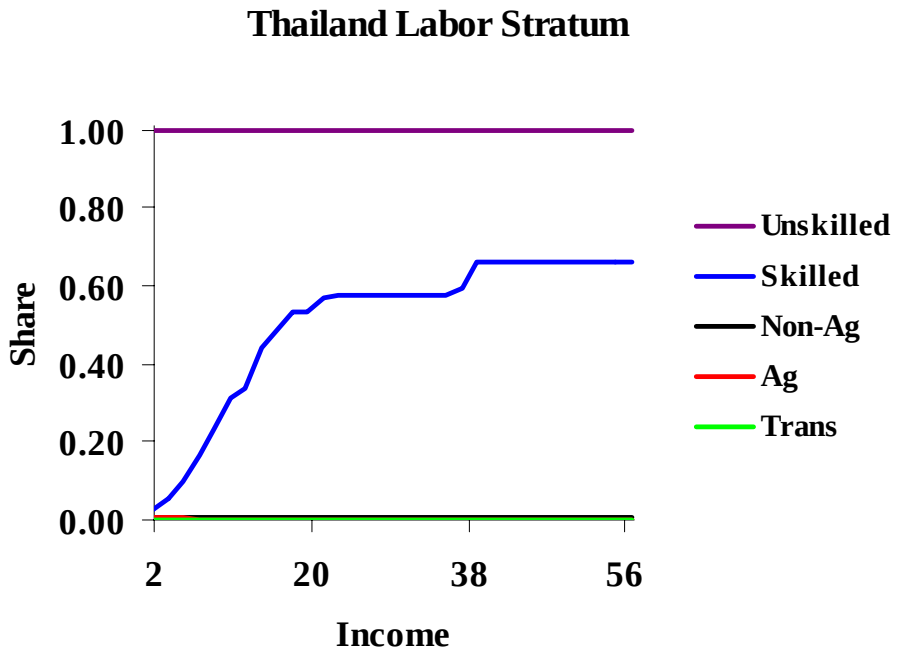

Figure 20. Composition of income in the labor-specialized households for Uganda

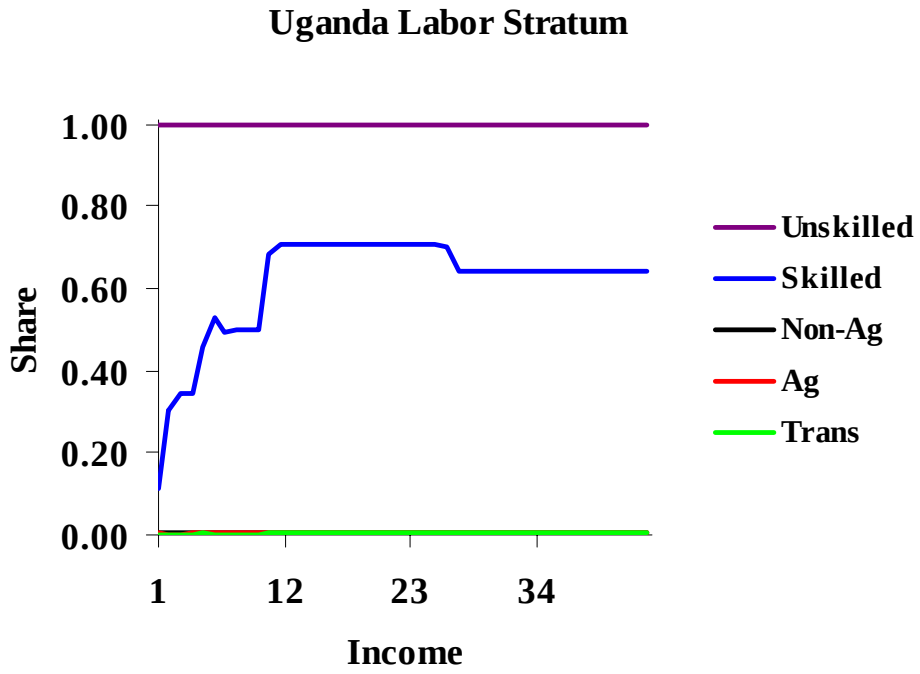

Figure 21. Composition of income in the labor-specialized households for Zambia

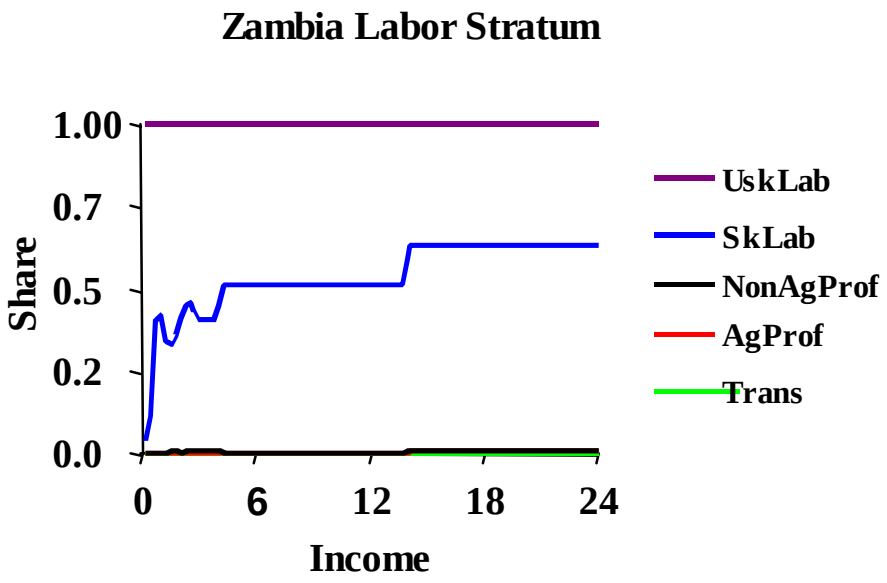

Figure 22. Predicted budget shares across income levels in all representative countries, evaluated at Thailand's price level

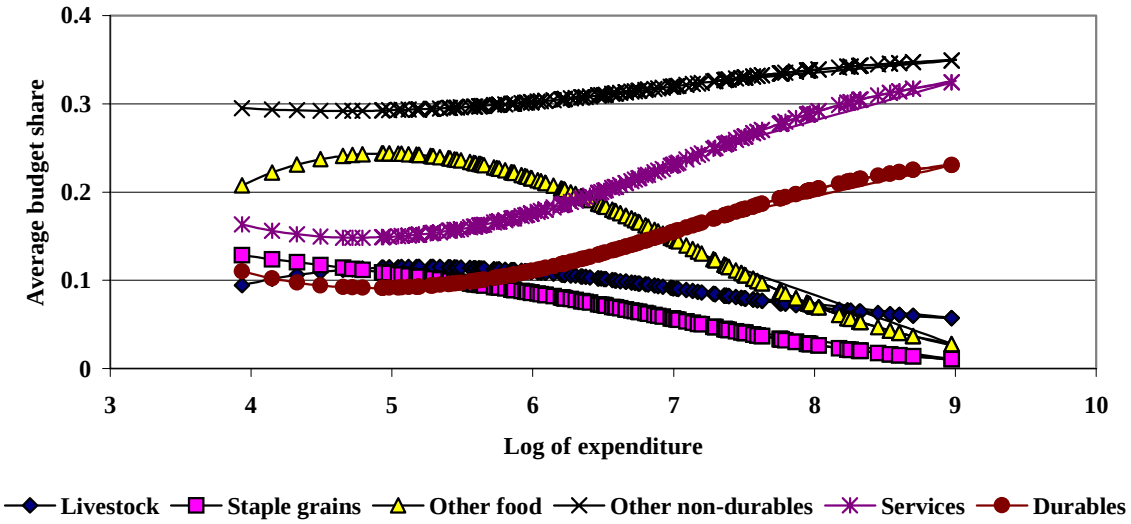

Table 1. ADADS Parameter Estimates

	Grains	Livestock	Other Food	Non-durables	Durables	Services
α	0.1135	0.1383	0.3079	0.2805	0.0529	0.1069
β	0.0000	0.0494	0.0000	0.3562	0.2483	0.3461
γ	14.2859	0.0000	0.0000	10.0090	6.5971	14.7321

Table 2. Average Rates of Protection, by Region and Sector

Region	Primary Agriculture	Processed Food	Textiles &Apparel	Other Manufactures
AusNZL	2	5	18	5
Japan	42	50	11	1
Indonesia	5	14	16	10
Philippines	14	18	14	5
Thailand	19	37	27	13
Namerica	10	15	10	2
OthLatAm	10	18	19	13
Peru	15	15	16	12
Brazil	8	17	17	19
Chile	11	11	11	11
Weurope*	7	12	5	1
EIT	14	21	15	10
OthrAsia	38	36	15	7
OtherAfrica	16	40	27	15
Zambia	5	15	21	13
Uganda	45	21	19	15
ROW	5	12	16	9

* Includes un-taxed intra-European trade, thereby understating the degree of protection against external imports

Source: GTAP version 5.0 data base, Dimaranan and McDougall, 2001

Table 3. Disaggregate Market Price Changes for the Seven Focus Economies

	Brazil	Chile	Indonesia	Philippines	Thailand	Uganda	Zambia
Land	11.5	20.2	4.0	8.1	37.1	1.0	8.4
UnSkLab	-1.0	1.7	5.0	5.3	3.2	2.2	2.7
SkLab	-0.6	1.5	4.8	4.4	2.1	3.1	2.6
Capital	0.3	2.7	3.7	2.3	1.3	1.6	2.4
NatRes	-5.4	6.8	-6.0	0.2	-11.8	0.9	-0.5
rice	-1.4	-0.5	7.9	-2.4	22.3	-6.6	1.3
wheat	8.1	18.1	4.1	2.6	28.8	-19.3	1.0
feedgrains	-1.4	-4.0	-0.1	0.0	3.9	-2.7	-1.1
othagr	1.2	12.1	3.8	10.3	0.9	1.3	0.7
oilseeds	12.0	14.3	-3.9	-3.5	-5.5	4.4	1.5
rawsugar	14.8	0.8	1.4	7.9	7.2	4.9	10.4
meatlstk	18.7	8.0	0.9	-0.3	3.4	3.0	0.9
rawmilk	-4.4	17.6	1.8	-15.4	6.0	1.8	0.8
forestry	-0.1	-0.8	6.2	2.6	-4.2	-1.6	1.2
fishing	-1.3	7.8	-2.1	1.1	-6.1	1.1	-2.7
procmeat	10.8	6.1	0.5	-2.8	2.9	5.6	0.7
fatsoils	5.5	0.5	1.0	0.1	-10.4	-13.0	0.4
procdairy	-3.0	5.0	2.0	8.5	-1.4	2.1	1.4
procrice	-0.1	-2.1	6.4	-4.1	19.0	-7.9	-0.7
procsgr	5.9	0.9	2.5	8.8	5.0	2.4	10.7
othprfood	-0.1	3.8	3.7	1.2	2.5	1.9	-0.4
bevtobac	-1.0	2.2	-7.2	-7.5	-5.6	-3.4	-0.1
textiles	-2.7	-2.8	1.3	0.1	2.3	-5.3	-3.5
wearapp	-3.2	-2.0	3.5	2.5	2.8	-13.4	-6.2
woodpaper	-1.5	-0.9	3.6	-1.3	-0.6	-3.3	-5.1
mining	-3.4	-1.7	-1.6	-1.2	-2.3	-1.1	-5.7
pchemineral	-2.5	-3.6	0.3	-2.6	-1.1	-6.0	-7.5
metals	-2.2	-1.7	-0.8	-3.3	-2.6	-5.2	1.1
autos	-9.2	-6.3	-11.3	-5.3	-11.8	-11.9	-8.5
electronics	-5.4	-3.8	-2.6	-2.6	-1.3	1.5	-7.8
othmnfcs	-3.1	-2.8	2.4	0.4	0.2	-8.2	0.2
houseutils	-1.4	-0.2	1.5	-0.5	0.0	0.7	0.7
tradetrans	-1.6	0.5	3.0	0.9	0.8	0.5	-0.4
construction	-1.3	-0.4	2.4	2.0	0.0	1.1	-3.4
busfinance	-1.1	0.9	3.3	0.2	-0.1	0.6	-1.1
govservice	-1.0	0.3	4.0	1.9	1.5	0.8	-0.6

Source: Authors' simulation

Note: All price changes are relative to the numerare, which is the global average return to primary factors.

Table 4. Aggregated Market Price Changes for the Seven Focus Economies

	Brazil	Chile	Indonesia	Philippines	Thailand	Uganda	Zambia
Factors							
AgProf	10.9	17.8	3.3	4.8	4.2	1.0	5.9
NonAgProf	-1.2	0.7	3.1	2.3	1.7	2.1	2.2
USkLab	-1.0	1.7	5.0	5.3	3.2	2.2	2.7
SkLab	-0.6	1.5	4.8	4.4	2.1	3.1	2.6
Commodities			Producer Prices				
stpgrn	1.2	14.7	9.0	-1.4	31.7	-2.4	3.6
lvstk	7.5	11.1	2.6	5.7	7.1	4.0	4.8
othfd	3.1	9.6	5.5	8.7	0.6	3.1	5.0
nondur	-1.2	1.3	-0.8	-0.9	4.4	-3.9	1.4
dur	-7.3	-5.4	-7.5	0.8	-2.9	-10.9	-8.1
svces	0.5	5.0	5.6	5.9	11.6	2.4	4.3
margins	-1.3	0.6	3.2	0.5	0.8	0.6	-0.7
Commodities			Consumer Prices				
stpgrn	0.1	12.5	7.4	-0.8	16.2	-2.2	1.5
lvstk	3.8	9.4	2.8	4.1	4.1	3.9	2.1
othfd	1.3	8.2	4.9	6.1	0.7	3.0	2.2
nondur	-1.23	1.0	0.6	-0.3	4.2	-0.6	0.5
dur	-5.2	-3.2	-4.8	0.81	-2.5	-1.6	-7.7
svces	0.5	5.0	5.6	5.9	11.6	2.4	4.3

Source: Authors' simulation

Note: All price changes are relative to the numerare, which is the global average return to primary factors.

Table 5. Transfer Required to Move All Households Out of Poverty as a Share of Poverty Line Income

Strata	Brazil	Chile	Indonesia	Philippines	Thailand	Uganda	Zambia
Ag	0.0023	0.0104	0.0535	0.0625	0.0357	0.0818	0.1856
Non-Ag	0.0003	0.0048	0.007	0.0161	0.0067	0.0231	0.1536
Labor	0.0384	0.0413	0.0148	0.0788	0.0247	0.0325	0.1713
Trans	0.0085	0.0119	0.0077	0.0152	0.023	0.0086	0.0366
Diverse	0.0151	0.0186	0.1272	0.2526	0.1236	0.2992	0.1984
Total	0.0646	0.0869	0.2101	0.4251	0.2137	0.4452	0.7455

Table 6. Welfare Changes for Marginal Household by Primary Income Source

	Strata				
Brazil	Ag	NonAg	Labor	Trans	Diverse
Marginal Household	11.0783	-1.0700	-0.7515	0.5982	0.7615
Per Capita	0.3515	0.3515	0.3515	0.3515	0.3515
Consumption Diff.	-0.1749	-0.1749	-0.1749	-0.1749	-0.1749
Income Diff. Strata vs. *Per Capita*	10.8875	-1.2412	-0.9161	0.4212	0.3546
Income Diff. Strata vs. Marginal	0.0142	-0.0054	-0.0119	0.0004	0.2303
Chile					
Marginal Household	13.1936	-3.7802	-2.8791	-1.1569	-1.3101
Per Capita	-1.0545	-1.0545	-1.0545	-1.0545	-1.0545
Consumption Diff.	-0.5642	-0.5642	-0.5642	-0.5642	-0.5642
Income Diff. Strata vs. *Per Capita*	14.7937	-2.1669	-1.2769	0.4614	0.2877
Income Diff. Strata vs. Marginal	0.0187	0.0055	0.0165	0.0005	0.0210
Indonesia					
Marginal Household	0.7666	0.5594	2.3342	1.7405	1.5017
Per Capita	1.5084	1.5084	1.5084	1.5084	1.5084
Consumption Diff.	-0.0633	-0.0633	-0.0633	-0.0633	-0.0633
Income Diff. Strata vs. *Per Capita*	-0.6781	-0.8858	0.8649	0.2951	0.0160
Income Diff. Strata vs. Marginal	-0.0003	0.0001	0.0242	0.0004	0.0406
Philippines					
Marginal Household	2.0466	-0.3386	2.0364	1.2138	0.8031
Per Capita	1.3047	1.3047	1.3047	1.3047	1.3047
Consumption Diff.	-0.0264	-0.0024	-0.0024	-0.0024	-0.0024
Income Diff. Strata vs. *Per Capita*	0.7683	-1.6427	0.8683	-0.0857	-0.2075
Income Diff. Strata vs. Marginal	0.0000	0.0018	-0.1342	-0.0028	-0.2917
Thailand					
Marginal Household	-0.7838	-3.2745	-1.9501	-1.4397	-2.2289
Per Capita	-2.2140	-2.2140	-2.2140	-2.2140	-2.2140
Consumption Diff.	0.0257	0.0257	0.0257	0.0257	0.0257
Income Diff. Strata vs. *Per Capita*	1.4046	-1.0883	0.0767	0.7483	-0.0204
Income Diff. Strata vs. Marginal	-0.0002	0.0020	0.1614	0.0002	-0.0203
Uganda					
Marginal Household	0.0836	1.1767	1.7188	1.0199	0.6932
Per Capita	0.9199	0.9199	0.9199	0.9199	0.9199
Consumption Diff.	-0.2571	-0.2571	-0.2571	-0.2571	-0.2571
Income Diff. Strata vs. *Per Capita*	-0.5865	0.5141	0.9087	0.3555	-0.0225
Income Diff. Strata vs. Marginal	0.0073	-0.0002	0.1474	0.0017	0.0530
Zambia					
Marginal Household	4.8103	1.3427	1.7459	2.8507	1.7323
Per Capita	2.6197	2.6197	2.6197	2.6197	2.6197
Consumption Diff.	-0.3647	-0.2504	-0.2504	-0.2504	-0.2504
Income Diff. Strata vs. *Per Capita*	2.5813	-1.0244	-0.6112	0.4920	-0.5725
Income Diff. Strata vs. Marginal	-0.0260	-0.0022	-0.0122	-0.0105	-0.0645

Table 7. Decomposition of Spending and Earnings Effects For Brazil

	Share Differences					Price Change
Marginal –*Per Capita*						
	Agriculture	Non-Ag	Labor	Transfers	Deversified	
Staple Grains*			0.0136			0.1499
Livestock			0.0086			3.7891
Other Foods			0.0312			1.2511
Nondurables			-0.0083			-1.2297
Durables			-0.0202			-5.1718
Services			-0.0248			0.5355
Stratum – *Per Capita*						
Agri Profits	0.9417	-0.0564	-0.0565	-0.0564	0.0225	10.9233
Non-Ag.Profits	-0.0961	0.8951	-0.0958	-0.0959	0.1191	-1.2329
Skilled Labor	-0.1108	-0.1095	0.0578	-0.1108	-0.0333	-0.5846
Unskilled Labor	-0.5268	-0.5224	0.3027	-0.5270	-0.2017	-0.9666
Public Transfers	-0.1870	-0.1860	-0.1873	0.7110	0.0838	0.4372
Private Transfers	-0.0209	-0.0208	-0.0210	0.0791	0.0096	0.4372
Marginal - Stratum						
Agri Profits	0.0012	-0.0001	0.0000	0.0000	0.0144	10.9233
Non-Ag.Profits	-0.0001	0.0070	-0.0001	-0.0001	-0.0892	-1.2329
Skilled Labor	-0.0001	-0.0014	-0.0310	-0.0001	-0.0190	-0.5846
Unskilled Labor	-0.0006	-0.0039	0.0312	-0.0002	0.0637	-0.9666
Public Transfers	-0.0003	-0.0013	0.0000	-0.0045	0.0244	0.4372
Private Transfers	0.0000	-0.0002	0.0000	0.0049	0.0057	0.4372

*Because the demand system is identical for marginal households regardless of their income source, only one set of consumption changes is listed that applies to all strata

Table 8. Sources of Poverty Change, by Liberalizing Sector/Region

Source of Liberalization	Ag	NonAg	Labor	Trans	Diverse	Total
Brazil						
OwnAg	24.4487	-3.7297	-3.3450	-1.2470	-0.0976	-2.5632
OwnNAg	-30.7115	7.5790	8.4372	1.8017	2.4724	6.9306
LDCAg	-44.8922	3.4781	2.3620	-1.5506	-3.2130	1.0099
LDCNAg	13.3101	-3.2272	-4.1017	-2.7853	-1.9259	-3.5842
EUAg	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
DCAg	-63.7614	6.6494	5.0792	-0.1578	-2.8975	3.1546
DCNAg	2.8511	-1.5778	-2.0431	-1.7890	-1.4432	-1.9041
Total	-99.7935	9.0419	6.1883	-5.9037	-7.3667	2.8298
Chile						
OwnAg	2.6339	-0.8612	-0.8550	-0.5240	-0.5627	-0.7085
OwnNAg	0.0006	2.3353	2.2111	1.6368	1.9437	2.0869
LDCAg	-6.6009	0.4868	0.3923	-0.2674	-0.1868	0.1019
LDCNAg	1.6169	-0.1257	-0.5682	-0.2589	-0.3378	-0.4536
EUAg	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
DCAg	-14.4174	3.2647	2.6424	1.1011	1.2607	1.9503
DCNAg	-0.0696	-0.2991	-0.2066	-0.2596	-0.2144	-0.2095
Total	-16.7273	4.7386	3.5824	1.4179	1.8819	2.7401
Indonesia						
OwnAg	-0.0726	-0.6071	-1.2805	-0.4188	-0.4611	-0.4593
OwnNAg	2.1990	-0.9482	-1.2896	-0.5249	0.2815	0.3635
LDCAg	-0.3378	-0.2363	-0.1034	-0.1191	-0.2010	-0.2083
LDCNAg	0.2294	0.0462	-0.8827	-0.1869	-0.1307	-0.1263
DCAg	-3.2537	1.7138	0.6584	-0.0629	-0.8094	-0.9235
DCNAg	0.5389	-1.2895	-2.1749	-0.6120	-0.5978	-0.5687
Total	-0.7763	-1.3229	-5.0060	-1.9037	-1.9048	-1.9145
Philippines						
OwnAg	2.8181	-0.2356	0.2955	0.5578	0.4503	0.5264
OwnNAg	2.2546	0.9179	-0.4167	0.0341	0.3116	0.3300
LDCAg	-3.3915	0.4444	-0.6335	-0.4492	-0.5290	-0.6441
LDCNAg	0.5826	-0.3399	-0.1143	-0.1287	-0.0991	-0.0752
DCAg	-3.5460	0.3200	-0.6542	-0.6850	-0.6445	-0.7535
DCNAg	-0.2075	-0.7647	-0.7936	-0.4787	-0.6362	-0.6330
Total	-1.5542	0.3830	-2.2734	-1.1336	-1.1239	-1.2280

continued

Table 8. Sources of Poverty Change, by Liberalizing Sector/Region (continued)

Source of Liberalization	Ag	NonAg	Labor	Trans	Diverse	Total
Thailand						
OwnAg	2.9740	-3.4721	-1.8806	-0.5706	-0.2175	-0.3091
OwnNAg	4.2202	12.2948	10.6736	2.5708	4.8883	5.4153
LDCAg	-2.2877	1.0410	-0.2662	-0.0600	-0.4689	-0.4816
LDCNAg	1.1505	-0.5102	-0.8274	-0.1597	-0.0085	-0.0526
DCAg	-6.5137	3.5578	0.0084	-0.0618	-1.1116	-1.1053
DCNAg	1.0994	-1.5847	-2.3951	-0.4057	-0.5146	-0.6388
Total	0.3730	11.1956	5.3279	1.3189	2.5496	2.8045
Uganda						
OwnAg	-0.2474	-0.2539	-0.2923	-0.0898	-0.3251	-0.3198
OwnNAg	0.2924	-0.3862	-0.4270	-0.0655	0.0555	0.0606
LDCAg	-0.0957	0.0411	-0.0851	-0.0281	-0.0919	-0.0912
LDCNAg	0.3046	-0.4132	-0.0987	0.0087	0.1479	0.1504
DCAg	-0.2687	0.0519	-0.2275	-0.0799	-0.2687	-0.2662
DCNAg	-0.0445	-0.0344	-0.0562	-0.0192	-0.0581	-0.0571
Total	-0.0615	-0.9740	-1.1725	-0.2707	-0.5346	-0.5178
Zambia						
OwnAg	0.0628	-0.0212	0.0491	0.0112	0.0212	0.0292
OwnNAg	0.0809	-0.1580	0.0575	-0.1320	-0.0782	-0.0250
LDCAg	0.0469	-0.0376	0.0187	-0.0060	-0.0039	0.0065
LDCNAg	-0.0386	-0.2771	-0.3985	-0.2106	-0.3887	-0.2934
EUAg	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
DCAg	-0.5240	0.1578	-0.3329	-0.0697	-0.1401	-0.2154
DCNag	-0.0145	0.0148	0.0039	0.0053	0.0072	0.0031
Total	-0.3945	-0.3239	-0.6164	-0.3991	-0.5909	-0.5036

Appendix: Data Sources and Procedures

Detailed discussion of the consumer expenditure function, by country

Estimation of the AIDADS demand system is based on a sample of 53 countries from the ICP data set for which corresponding quintile data were available. These are shown in Table A1. The fitted parameters are reported in Table 1 of the text. To provide some intuition regarding the pattern of response that is be observed within particular countries, given prices, AIDADS parameter estimates and the recovered expenditure distribution, Figures A1 – A6 plot the budget shares for all six goods, respectively, across 15 household income levels (3 levels within each quintile), for the five focus countries.[14] Figure A1 shows that, in all five countries, the predicted budget shares for grain decline over the relevant range of expenditure. Of particular note is the dramatic reduction in grain's budget share in Zambia as one moves from the low- to high-income groups. Figure A2 shows that the shape of the livestock budget share function differs across countries. For example, over the relevant range of expenditure classes in Zambia, a hump shape is present in the budget share path. This means that as we move from low- to high-income households, the importance of livestock in the consumption bundle first increases, then reaches a maximum, and finally declines; a more modest hump shape is observed for Indonesia. In contrast, the budget share paths for livestock in Thailand and Turkey fall over the relevant range of expenditure, reflecting higher *per capita* incomes in these countries. Budget shares for other food (Figure A3) offer a similar pattern to that for livestock products while other non-durables and durables show a budget share that

[14] The fitted values refer to 1997, the base year for our analysis below. They have been updated from 1985 (the year of the ICP data) in the following manner. It is assumed that relative prices remain constant, but that expenditure levels for each quintile increase first by the observed percent change in the respective country's real *per capita* GDP from 1985 to 1997.

increases with income (Figure A4). Except for Zambia, the predicted budget shares for services rise over the relevant range of expenditure (Figure A5); for Zambia, service's budget share falls slightly at low expenditure levels, reaches a minimum and then begins to rise. Lastly, durable good's budget share rises over the range of expenditure in Brazil, Thailand and the Philippines (Figure A6). However, at low expenditure levels in Zambia and Indonesia, durable good's budget share falls as expenditure grows, reaches a minimum and then rises.

To better illustrate the change in budget shares across expenditure levels in each country, Figures A7 - A11 provide area graphs with markers indicating marginal (on the edge of poverty) and average households. Note that in every case except one (staple grains in Zambia where the *marginal* household is wealthier than the *per capita* household), the marginal household is more heavily reliant on food products than is the *per capita* household. Thus a rise in food prices as a result of trade liberalization, *ceterius paribus* will have an adverse effect on the incidence of poverty – unless there is a strong rise in *per capita* welfare (the first RHS term in equation (7)). On the other hand, with the exception of Zambia, the non-food expenditure share difference in the second term on the RHS of (7) is negative, indicating that an increase in non-food prices will benefit the *marginal* household relative to the average.

Combining Household Survey Earnings Data with GTAP Data

Household survey earnings data for the seven focus countries were used to adjust factor earnings in the existing GTAP data base. In some cases, the GTAP data were also used to adjust the survey data when underreporting of profits was a problem. Before this could be done, the GTAP expenditure tables were translated into the four factors identified in the survey[15] by summing the capital, land and natural resources into profit factors, labeled as either agricultural profit or non-agricultural profit, based on the character of the sector;[16] this was required due to the difference in the sets of primary factors in GTAP and the household surveys. The reconciliation was aimed only at bringing the share of each factor's expenditure into line with that observed in the household surveys. We retain the value-added total from GTAP, because it is compatible with the rest of the model.

As Appendix Tables A3a-c show, the differences between the original GTAP shares and those suggested by the surveys were very significant in some cases. We used the RAS algorithm to change the expenditure matrix while leaving value added for each sector unchanged. For three countries, where there was evidence of underreporting of profit income (Brazil, Indonesia and Thailand), a weaker sort of reconciliation was employed. In particular, we imposed only a combined share of agricultural and non-agricultural profits along with the shares for skilled and unskilled labor. In the case of Brazil, even this restriction was infeasible, and thus only the relative shares of skilled and unskilled labor were imposed. Table A3c provides the resulting factor expenditure shares after the adjustment of the factor expenditure tables. For these three countries we

[15] Unskilled Labor, Skilled Labor, Agricultural Profits, Non-agricultural Profits

[16] Based on the surveys, agricultural sectors are: rice, wheat, feedgrains, othagr, oilseeds, rawsugar, meatlstk, rawmilk,

subsequently adjusted the household survey data, scaling up the profit income for each household in order to match the shares in Table A4c.

Computing Welfare Changes, by Stratum

In the text we refer to several different means of computing the change in welfare of the marginal households in each stratum as a consequence of trade liberalization. In appendix Table A5, we compute the exact Equivalent and Compensatory Variations, with the approximate compensating variation used in equation (7) and Table 6 of the text. The equivalent variation (EV) measures the pre-liberalization transfer required to make the household as well off as they would be after the liberalization experiments (i.e. at pre-liberalization prices). The compensating variation (CV) measures the compensation required to restore the household's initial level utility, once trade liberalization has taken place – i.e. at post-liberalization prices. This may be approximated by the expression in equation (7).

In Table A5, it is clear that these three measures of welfare are quite similar and use of the approximation is unlikely to be misleading. Since it greatly facilitates our analysis, we rely exclusively on the approximation in the text.

---

forestry, fishing

Figure A1. Predicted budget shares across the income spectrum for staple grains

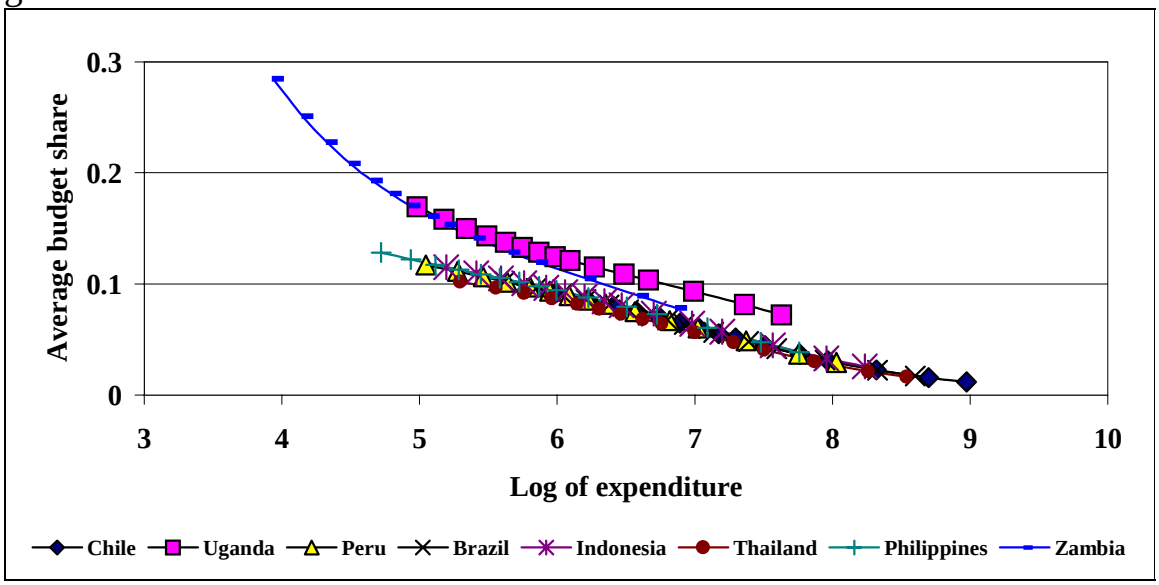

Figure A2. Predicted budget shares across the income spectrum for livestock

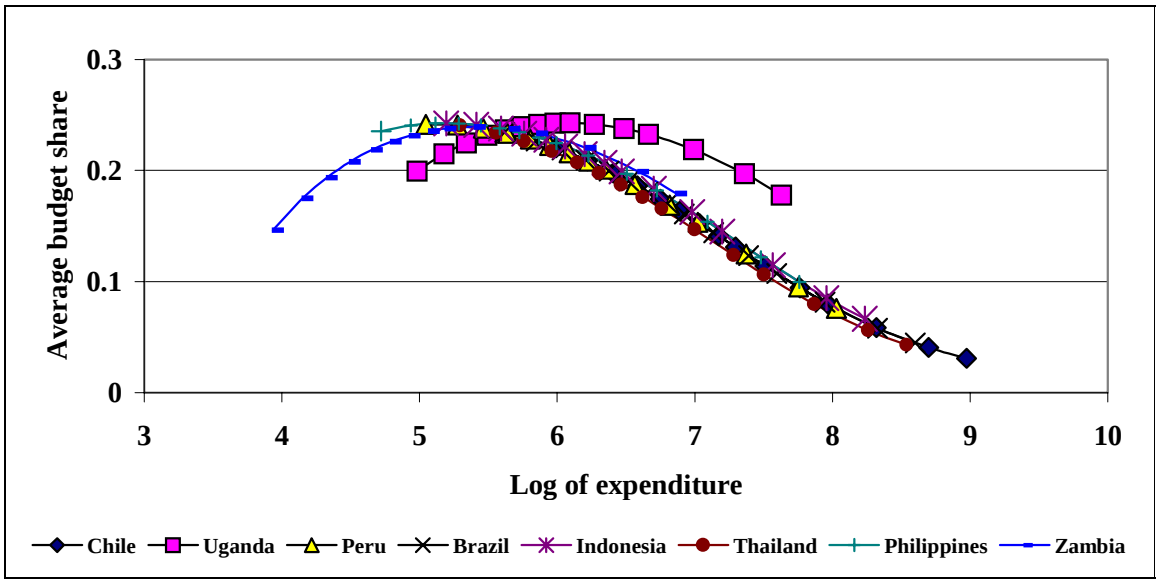

Figure A3. Predicted budget shares across the income spectrum for other food

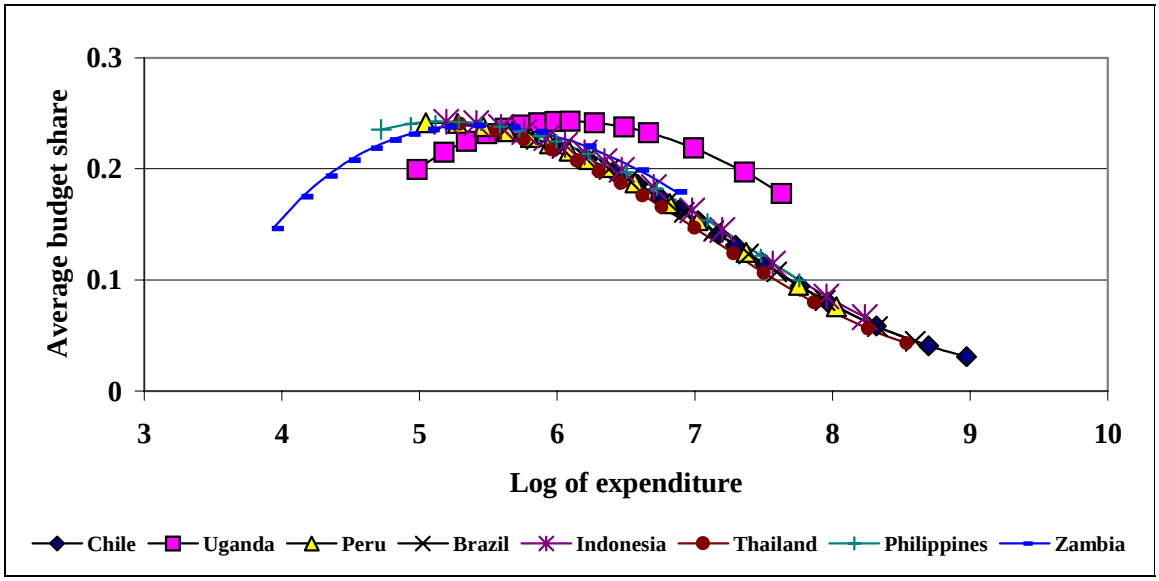

Figure A4. Predicted budget shares across the income spectrum for other non-durable goods in 2005

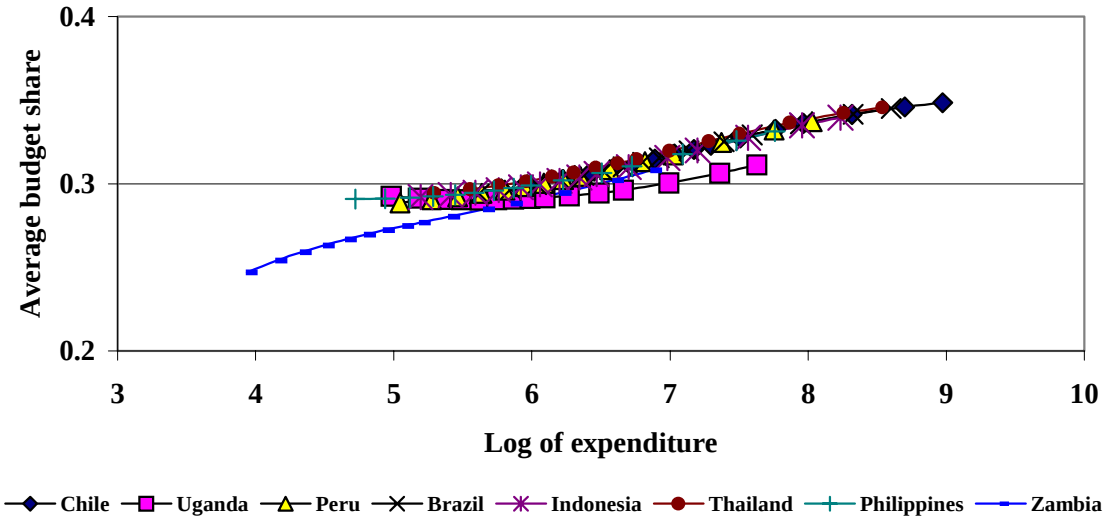

Figure A5. Predicted budget shares across the income spectrum for services

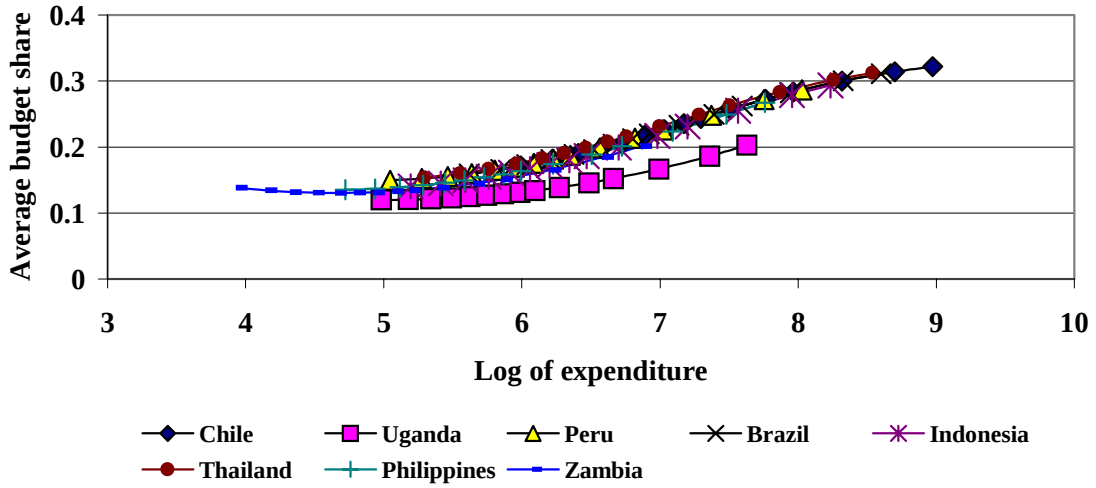

Figure A6. Predicted budget shares across the income spectrum for durable goods

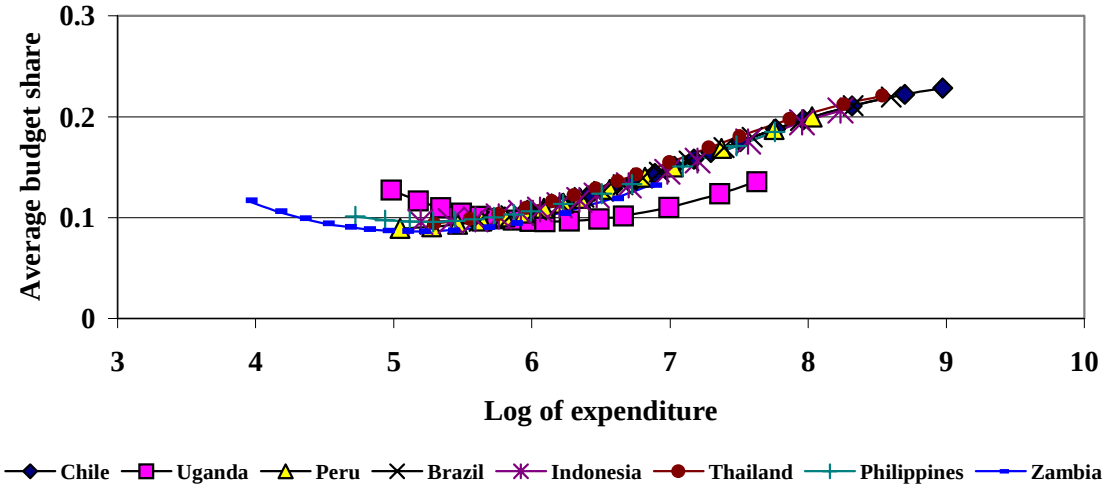

Figure A7. Predicted budget shares for Brazil

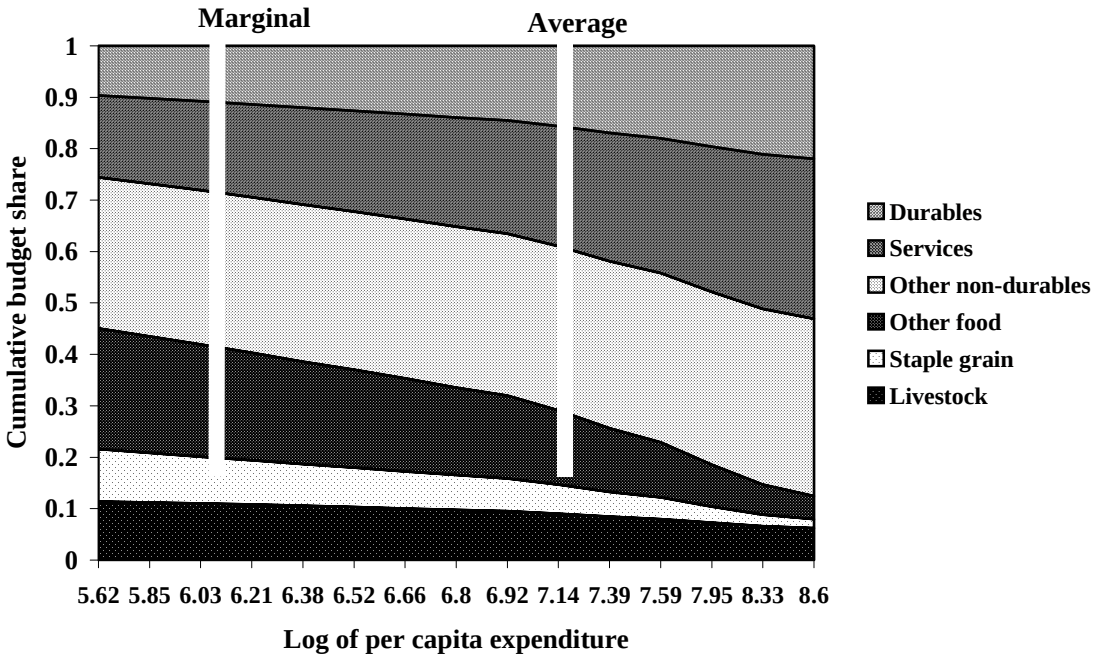

Table A1. Description of Sectors and Regions in the Model

31 Sectors		Code in model	17 Regions		Code in model
1	Rice	Rice	1	AusNZL	Australia
2	Wheat	wheat	2	OthrAsia	Rest of Asia
3	Feed grains	feedgrains	3	Japan	Japan
4	Other agricultural products	othagr	4	Indonesia	Indonesia
5	Oil seeds	oilseeds	5	Philippines	Philippines
6	Sugar cane, sugar beet	rawsugar	6	Thailand	Thailand
7	Animal produce	meatlstk	7	NAmerica	Canada
8	Raw milk	rawmilk	8	OthLatAm	Other Latin America
9	Forestry	forestry	9	Peru	Peru
10	Fishing	fishing	10	Brazil	Brazil
11	Mining	mining	11	Chile	Chile
12	Meat: cattle,sheep,goats,	procmeat	12	WEurope	West Europe
13	Vegetable oils and fats	fatsoils	13	EIT	Economies in transition
14	Dairy products	procdairy	14	OthrAfrica	Rest of Africa
15	Processed rice	procrice	15	Zambia	Zambia
16	Sugar	procsgr	16	Uganda	Uganda
17	Food products nec	othprfood	17	ROW	Rest of World
18	Beverages and tobacco pro	bevtobac			
19	Textiles	textiles			
20	Wearing apparel	wearapp			
21	Other manufactures	othmnfcs			
22	Wood and paper products	woodpaper			
23	Petcoal, crp, nmm	pchemineral			
24	Metals and metal products	metals			
25	Motor vehicles and parts	autos			
26	Electronic equipment	electronics			
27	Housing and utilities	houseutils			
28	Construction services	construction			
29	Trade and transport services	tradetrans			
30	Business and financial	busfinance			
31	Government services	govservice			

Table A2. GTAP Commodity Aggregation

From GTAP(v.5) Full Scale Data (57 sectors) to Aggregated Data (31 sectors)

50 Sectors		GTAP code	31 Sector code
1	Paddy rice	pdr	rice
2	Wheat	wht	wheat
3	Cereal grains nec	gro	feedgrains
4	Vegetables, fruit, nuts	v_f	othagr
5	Oil seeds	osd	oilseeds
6	Sugar cane, sugar beet	c_b	rawsugar
7	Plant-based fibers	pfb	othagr
8	Crops nec	ocr	othagr
9	Cattle,sheep,goats,horses	ctl	meatlstk
10	Animal products nec	oap	meatlstk
11	Raw milk	rmk	rawmilk
12	Wool, silk-worm cocoons	wol	meatlstk
13	Forestry	for	forestry
14	Fishing	fsh	fishing
15	Coal	col	mining
16	Oil	oil	mining
17	Gas	gas	mining
18	Minerals nec	omn	mining
19	Meat: cattle,sheep,goats,horse	cmt	procmeat
20	Meat products nec	omt	procmeat
21	Vegetable oils and fats	vol	fatsoils
22	Dairy products	mil	procdairy
23	Processed rice	pcr	procrice
24	Sugar	sgr	procsgr
25	Food products nec	ofd	othprfood
26	Beverages and tobacco products	b_t	bevtobac
27	Textiles	tex	textiles
28	Wearing apparel	wap	wearapp
29	Leather products	lea	othmnfcs
30	Wood products	lum	woodpaper
31	Paper products, publishing	ppp	woodpaper
32	Petroleum, coal products	p_c	pchemineral
33	Chemical,rubber,plastic prods	crp	pchemineral
34	Mineral products nec	nmm	pchemineral
35	Ferrous metals	i_s	metals
36	Metals nec	nfm	metals

continued

Table A2. GTAP Commodity Aggregation (continued)

From GTAP(v.5) Full Scale Data (57 sectors) to Aggregated Data (31 sectors)

50 Sectors		GTAP code	31 Sector code
37	Metal products	fmp	metals
38	Motor vehicles and parts	mvh	autos
39	Transport equipment nec	otn	othmnfcs
40	Electronic equipment	ele	electronics
41	Machinery and equipment nec	ome	othmnfcs
42	Manufactures nec	omf	othmnfcs
43	Electricity	ely	houseutils
44	Gas manufacture, distribution	gdt	houseutils
45	Water	wtr	houseutils
46	Construction	cns	construction
47	Trade	trd	tradetrans
48	Transport nec	otp	tradetrans
49	Sea transport	wtp	tradetrans
50	Air transport	atp	tradetrans
51	Communication	cmn	tradetrans
52	Financial services nec	ofi	busfinance
53	Insurance	isr	busfinance
54	Business services nec	obs	busfinance
55	Recreation and other services	ros	houseutils
56	PubAdmin/Defence/Health/Educat	osg	govservice
57	Dwellings	dwe	houseutils

Table A3. GTAP Region Aggregation

From GTAP(v.5) Full Scale Data (66 regions) to Aggregated Data (17 regions)

45 Regions		GTAP code	17 region code
1	Australia	aus	AusNZL
2	New Zealand	nzl	AusNZL
3	China	chn	OthrAsia
4	Hong Kong	hkg	OthrAsia
5	Japan	jpn	Japan
6	Korea	kor	OthrAsia
7	Taiwan	twn	OthrAsia
8	Indonesia	idn	Indonesia
9	Malaysia	mys	OthrAsia
10	Philippines	phl	Philippines
11	Singapore	sgp	OthrAsia
12	Thailand	tha	Thailand
13	Vietnam	vnm	OthrAsia
14	Bangladesh	bgd	OthrAsia
15	India	ind	OthrAsia
16	Sri Lanka	lka	OthrAsia
17	Rest of South Asia	xsa	OthrAsia
18	Canada	can	NAmerica
19	United States	usa	NAmerica
20	Mexico	mex	NAmerica
21	Central America, Caribbean	xcm	OthLatAm
22	Colombia	col	OthLatAm
23	Peru	per	Peru
24	Venezuela	ven	OthLatAm
25	Rest of Andean Pact	xap	OthLatAm
26	Argentina	arg	OthLatAm
27	Brazil	bra	Brazil
28	Chile	chl	Chile
29	Uruguay	ury	OthLatAm
30	Rest of South America	xsm	OthLatAm
31	Austria	aut	WEurope
32	Belgium	bel	WEurope
33	Denmark	dnk	WEurope
34	Finland	fin	WEurope
35	France	fra	WEurope
36	Germany	deu	WEurope

continued

Table A3. GTAP Region Aggregation (continued)

From GTAP(v.5) Full Scale Data (66 regions) to Aggregated Data (17 regions)

45 Regions		GTAP code	17 region code
37	United Kingdom	gbr	WEurope
38	Greece	grc	WEurope
39	Ireland	irl	WEurope
40	Italy	ita	WEurope
41	Luxembourg	lux	WEurope
42	Netherlands	nld	WEurope
43	Portugal	prt	WEurope
44	Spain	esp	WEurope
45	Sweden	swe	WEurope
46	Switzerland	che	WEurope
47	Rest of EFTA	xef	WEurope
48	Hungary	hun	EIT
49	Poland	pol	EIT
50	Rest of Central European Assoc	xce	EIT
51	Former Soviet Union	xsu	EIT
52	Turkey	tur	OthrAsia
53	Rest of Middle East	xme	OthrAsia
54	Morocco	mar	OthrAfrica
55	Rest of North Africa	xnf	OthrAfrica
56	Botswana	bwa	OthrAfrica
57	Rest of SACU	xsc	OthrAfrica
58	Malawi	mwi	OthrAfrica
59	Mozambique	moz	OthrAfrica
60	Tanzania	tza	OthrAfrica
61	Zambia	zmb	Zambia
62	Zimbabwe	zwe	OthrAfrica
63	Other Southern Africa	xsf	OthrAfrica
64	Uganda	uga	Uganda
65	Rest of Sub-Saharan Africa	xss	OthrAfrica
66	Rest of World	xrw	ROW

Table A4. Original and Adjusted Factor Earnings Data

A4a. Original GTAP Data

Shares of factor expenditures	Unskilled Labor	Skilled Labor	Agricultural Profits	Non-Agricultural Profits	Total
Brazil	34%	16%	7%	43%	100%
Chile	28%	12%	6%	54%	100%
Indonesia	34%	7%	12%	47%	100%
Philippines	32%	11%	12%	45%	100%
Thailand	12%	4%	7%	77%	100%
Uganda	48%	7%	17%	28%	100%
Zambia	40%	10%	11%	39%	100%

A4b. Suggested by Household Surveys

Shares of factor expenditures	Unskilled Labor	Skilled Labor	Agricultural Profits	Non-Agricultural Profits	Total
Brazil	60%	18%	4%	17%	100%
Chile	39%	19%	9%	33%	100%
Indonesia	24%	26%	21%	30%	100%
Philippines	21%	14%	8%	57%	100%
Thailand	34%	19%	13%	34%	100%
Uganda	14%	12%	44%	30%	100%
Zambia	31%	24%	2%	43%	100%

A4c. Adjusted Shares

Shares of factor expenditures	Unskilled Labor	Skilled Labor	Agricultural Profits	Non-Agricultural Profits	Total
Brazil	40%	10%	7%	43%	100%
Chile	39%	19%	9%	33%	100%
Indonesia	24%	26%	13%	37%	100%
Philippines	21%	14%	8%	57%	100%
Thailand	34%	19%	3%	44%	100%
Uganda	14%	12%	44%	30%	100%
Zambia	31%	24%	2%	43%	100%

Appendix Table A5. Approximate Negative of Compensating Variation, Negative of Compensating Variation, and Equivalent Variation

	Ag	NonAg	Labor	Trans	Diverse
Brazil					
Approximation	11.0783	-1.0700	-0.7515	0.5982	0.7615
-Compensating Variation	11.1044	-1.0439	-0.7254	0.6243	0.7876
Equivalent Variation	10.0652	-1.0622	-0.7358	0.6248	0.7869
Chile					
Approximation	13.1936	-3.7802	-2.8791	-1.1569	-1.3101
-Compensating Variation	13.2918	-3.6820	-2.7809	-1.0587	-1.2120
Equivalent Variation	10.9132	-3.5287	-2.6417	-0.9891	-1.1339
Indonesia					
Approximation	0.7666	0.5594	2.3342	1.7405	1.5017
-Compensating Variation	0.8237	0.6165	2.3913	1.7976	1.5588
Equivalent Variation	0.7807	0.5854	2.2325	1.6878	1.4669
Philippines					
Approximation	2.0466	-0.3386	2.0364	1.2138	0.8031
-Compensating Variation	2.0863	-0.2987	2.0763	1.2536	0.8429
Equivalent Variation	1.9406	-0.2846	1.9333	1.1765	0.7942
Thailand					
Approximation	-0.7838	-3.2745	-1.9501	-1.4397	-2.2289
-Compensating Variation	-0.6547	-3.1455	-1.8210	-1.3106	-2.0998
Equivalent Variation	-0.5989	-2.9477	-1.6846	-1.2065	-1.9478
Uganda					
Approximation	0.0836	1.1767	1.7188	1.0199	0.6932
-Compensating Variation	0.1049	1.1981	1.7401	1.0412	0.7146
Equivalent Variation	0.1029	1.1622	1.6792	1.0117	0.6965
Zambia					
Approximation	4.8103	1.3427	1.7459	2.8507	1.7323
-Compensating Variation	4.8508	1.3939	1.7971	2.9019	1.7835
Equivalent Variation	4.5460	1.3557	1.7411	2.7815	1.7281

Table A6. Inequality Data Description

Country	PCE	Q1	Q2	Q3	Q4	Source	Year	Inc.	Pers.	Tax
Ethiopia	89.47	0.0860	0.2130	0.3770	0.5880	WDR-93	1981-1982	N/A	N/A	N/A
Nepal	112.17	0.0911	0.2200	0.3868	0.6050	1	1984	I	P	N
Bangladesh	149.90	0.0699	0.1935	0.3442	0.5397	1	1986	I	H	G
Kenya	196.91	0.0339	0.1011	0.2084	0.3816	1	1981-1983	E	P	N
India	198.64	0.0850	0.2100	0.3740	0.5890	1	1986	E	P	N
Rwanda	229.59	0.0970	0.2279	0.3944	0.6108	1	1983	E	P	N
Zambia	230.33	0.0557	0.1515	0.2931	0.5029	1	1991	E	P	N
Madagascar	261.38	0.0585	0.1565	0.2978	0.5016	1	1993	E	P	N
Pakistan	265.31	0.0854	0.2088	0.3710	0.5863	1	1985	E	H	N
Tanzania	265.60	0.0685	0.1775	0.3303	0.5456	1	1993	E	P	N/A
Sri-Lanka	310.23	0.0506	0.1414	0.2752	0.4761	1	1987	I	H	G
Zimbabwe	337.29	0.0398	0.1027	0.2028	0.3766	1	1990	E	P	N
Senegal	359.22	0.0350	0.1048	0.2207	0.4138	1	1991	E	P	N
Cote-Divor	416.34	0.0500	0.1300	0.2610	0.4740	WDR-92	1986-1987	I	H	N/A
Morocco	428.10	0.0658	0.1765	0.3296	0.5385	1	1984	E	P	N
Philippnes	434.75	0.0520	0.1430	0.2760	0.4790	1	1985	I	H	G
Thailand	488.75	0.0420	0.1290	0.2600	0.4690	1	1986	I	H	G
Botswana	510.64	0.0360	0.1048	0.2190	0.4111	1	1986	E	H	N
Egypt	535.02	0.0871	0.2120	0.3747	0.5891	1	1991	E	P	N/A
Nigeria	622.66	0.0696	0.1916	0.3523	0.5580	1	1986	E	P	N
Jamaica	657.12	0.0541	0.1519	0.2968	0.5097	1	1988	E	P	N
Mauritius	753.49	0.0590	0.1720	0.3210	0.5430	1	1986	E	P	N
Turkey	781.01	0.0524	0.1485	0.2891	0.5006	1	1987	I	H	G
Tunisa	812.13	0.0586	0.1627	0.3154	0.5367	1	1990	E	P	N/A
Yugoslavia	1035.76	0.0733	0.1971	0.3694	0.6038	1	1985	I	P	G
Poland	1258.31	0.0984	0.2413	0.4219	0.6492	1	1985	I	P	G
Hungary	1302.77	0.1050	0.2510	0.4300	0.6530	1	1987	I	P	N
Rep-Korea	1410.40	0.0680	0.2050	0.3650	0.5810	1	1985	I	H	G
Portugal	1448.15	0.0553	0.1700	0.3391	0.5750	1	1980	I	H	N
Greece	2472.86	0.0619	0.1778	0.3482	0.5882	1	1988	E	H	N
Spain	2900.52	0.0966	0.2356	0.4260	0.6558	1	1985	E	H	N
Barbados	3120.72	0.0225	0.1025	0.2500	0.4900	1	1979	I	H	G
Ireland	3167.35	0.0493	0.1464	0.3048	0.5540	1	1987	I	H	N
Trnd-Tbag	3865.18	0.0343	0.1354	0.2963	0.5514	1	1981	I	H	G
New-Zland	4150.48	0.0552	0.1714	0.3447	0.5889	1	1985	I	H	G
Hong-Kong	4244.46	0.0631	0.1579	0.2977	0.5071	1	1986	I	H	G
Italy	4975.12	0.0820	0.2117	0.3861	0.6178	1	1984	I	H	N
Unit-King	5240.54	0.0890	0.2244	0.3877	0.6215	1	1985	I	Pe	N
Austria	5549.50	0.1006	0.2526	0.4415	0.6721	1	1987	I	Pe	N
Netherland	5949.14	0.0757	0.2152	0.3970	0.6331	1	1985	I	He	N
Belgium	6152.63	0.0860	0.2291	0.4160	0.6526	1	1985	I	H	N
Luxemborg	6296.78	0.0875	0.2267	0.4072	0.6400	1	1985	I	H	N
Wgermany	6383.26	0.0659	0.1938	0.3735	0.6112	1	1984	I	H	G
France	6445.32	0.0658	0.1901	0.3575	0.5803	1	1984	I	H	G
Bahamas	6614.25	0.0305	0.1049	0.2480	0.5114	1	1986	I	H	G
Finland	6656.06	0.0680	0.1930	0.3790	0.6300	1	1984	I	H	N
Australia	6670.18	0.0510	0.1560	0.3280	0.5780	1	1985	I	H	G

continued

Table A6. Inequality Data Description (continued)

Country	PCE	Q1	Q2	Q3	Q4	Source	Year	Inc.	Pers.	Tax
Denmark	6803.67	0.0521	0.1759	0.3706	0.6222	1	1987	I	H	G
Sweden	6947.09	0.0704	0.2005	0.3798	0.6184	1	1985	I	H	N
Japan	7152.85	0.0590	0.1770	0.3487	0.5818	1	1982	I	H	G
Norway	7683.56	0.0818	0.2087	0.3876	0.6312	1	1985	I	H	N
Canada	8813.03	0.0627	0.1881	0.3665	0.6088	1	1985	I	H	G
Usa	12018.52	0.0470	0.1560	0.3240	0.5650	1	1985	I	H	G

1. Mnemonics in this table are as follows:
   PCE – total nominal expenditure *per capita*, source: 19ICP data.
   Q1 – Cumulative share of total expenditure for the first quintile.
   Q2 – Cumulative share of total expenditure for the second quintile.
   Q3 – Cumulative share of total expenditure for the third quintile.
   Q4 – Cumulative share of total expenditure for the fourth quintile.
   Source – A value of 1 indicate Deninger and Squire, while WDR-denotes World Development Report (1993) and WDR-denotes World Development Report (1992).
   Year – Year the quintile data covers.
   Inc. – Indicates whether the quintile data are based on income (I) or Expenditure (E)
   Pers. - Indicates whether the quintile data are based on households (H), persons (P), household equivalents (He), or person equivalents (Pe).
   Tax – Indicates whether the quintile data are net (N) or gross (G) of taxes.
   N/A – Information is not available.

2. Country coverage in this table is limited by the intersection of the 19ICP data and the data on income distribution, by quintile.