Predicting the Poverty Impacts of Trade Reform

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ABSTRACT Quantifying how international trade affects poverty in developing countries is currently an area of intense research activity. This paper surveys the developments taking place, identifies four major methodological groupings, and summarizes preliminary findings from this literature. Methodologies currently used include ‘bottom-up’ approaches based on detailed household expenditure data, and ‘top-down’ approaches based on national accounts data. The survey’s general conclusion is that any analysis of trade and poverty needs to be informed by both perspectives, and indeed, an increasing number of studies do so in what can be labelled ‘micro—macro’ synthesis. Future work should be directed towards improving the treatment of factor markets, domestic marketing costs, taxes and transfer payments, as well as devoting more attention to the reconciliation of household survey with national accounts data.

KEY WORDS: Modelling, poverty, trade

Introduction

Predicting the effects of trade policies on developing-country poverty is currently of intense interest in policy circles and in the research community. The World Bank is now required to assess the poverty impacts of prospective trade reforms for all least-developed countries. Under the ‘Millennium Development Goals’ the international community has committed to halve poverty by 2015, and several key targets relate to trade. The Doha negotiations sponsored by the World Trade Organization experienced a severe blow over the question of impacts on poverty in developing countries and, in particular, the adverse effects of agricultural protection in rich countries.

In turn, these issues increasingly arise in national policy debates. Concern for the rural poor incited Indonesia to place an import tariff on rice in 2000,
and temporarily ban the importation of rice altogether in 2004 (Warr, 2005). Concerns about urban poverty during the Asian financial crisis caused the government of Thailand to consider re-introducing an export tax on rice (Warr, 2001). China’s recent debate over WTO accession – largely a unilateral trade policy reform – was permeated by a concern for its potential adverse impacts on rural poverty (Bhattasali et al., 2004).

Without an empirical model grounded in economic theory and data, it is very difficult to make good predictions of the likely effects of an economic shock on consumers and producers, especially for the poorest households in an economy. Consider the Indonesian rice import tariff examined in Warr (2005). He finds that the intended beneficiaries – the rural poor – are hurt by this policy since rice constitutes a large share of their budget and they gain little from the resulting expansion of the paddy industry. The proposed Thai export tax examined by Warr (2001) also finds that the intended beneficiary – in this case, the urban poor – will be hurt, but this time because the policy has an adverse effect on unskilled wages. These outcomes would have been difficult to anticipate without a theoretically rigorous simulation model.

Warr’s analyses rely on a computable general equilibrium (CGE) model, which is an increasingly common means of specifying and quantifying the links between trade and poverty. Of course, CGE models and other market-oriented simulation models are not without well-known drawbacks for poverty research. They depend critically on parameters and functions that may be difficult to estimate, often focus on sectors in which the poor have little involvement, and typically rely on the concept of a single ‘representative’ consumer. In the words of Winters et al. (2004, p. 102), the results of CGE and other such models ‘are predictions . . . and are complementary to, not substitutes for empirical studies [based on] ex post data.’

Yet these same authors also point out that these models are ‘almost the only tool available for predicting the effects of future trade policy changes’ (Winters et al., 2004, p. 101). Others emphasize their usefulness for evaluating the claims of special-interest groups, and identifying policy packages that promote poverty reduction (Harrison et al., 2003a). In turn, practitioners recognize and have been making progress towards alleviating the drawbacks identified above (e.g. Hertel et al., 2005). In addition, government and international institutions have invested tremendous resources in developing capacity to utilize such predictive simulation models.

The purpose of this paper is to survey recent developments in the literature focusing on how trade policies – in both developed and developing countries – affect the incidence of poverty in the latter. Our objectives are to review and critique the results and methodologies of trade-poverty studies, and identify the areas where improvements are of greatest need. We focus on areas of need common to all types of methodologies.

Our survey fills a gap left by two recent, prominent studies in this area. First, Winters et al. (2004) review the empirical evidence on the
main economic mechanisms linking trade policy and poverty. Second, Bourguignon & Pereira da Silva (2003) provide a review of tools currently available for evaluating the poverty impacts of economic policies. These studies cover only briefly the advancements targeted in this paper, and make few concrete suggestions about how future research in this area might most profitably proceed.

Consider one of the key conclusions of Bourguignon & Pereira da Silva. These editors find that while there are (i) a wide range of methodologies available for assessing the micro-economic incidence of micro-policies, and (ii) many tools for assessing the impact of macro-level policies on markets and broad groups of representative households, there is a gap in the literature when it comes to eliciting disaggregated household and firm-level impacts of trade and other macro-economic policies. This gap is being rapidly filled in, however, by studies that link ‘top-down’ economy-wide modelling approaches with ‘bottom up’ household-based data-intensive approaches, and this is the focus of our survey.

We place particular emphasis on the factor-market aspects of trade and poverty – especially the impacts of trade on employment and earnings. Studies that focus exclusively on consumption impacts tend to miss a large part of the impacts on the poor, as households tend to be much more specialized with regard to income sources than consumption. With these two observations in hand, this study surveys a broad and exciting new literature that (with time) we believe will enable us more accurately to model and predict the poverty effects of proposed trade reforms.

The remainder of the paper is organized as follows. In the following section we briefly identify the linkages between trade and poverty, and argue why general equilibrium approaches, and the impacts of trade on employment and earnings in particular, are essential. In the section after, we review a number of important partial-equilibrium approaches, including what has been learned from econometric analysis of factor market effects. In the fourth section we review a number of recent general equilibrium approaches, especially those that discard the single representative consumer hypothesis and focus on heterogeneous households. In the fifth section, we study a relatively recent approach – general equilibrium simulation coupled with incidence analysis based on household survey data. These studies may be thought of as involving a micro-macro synthesis. While the term ‘micro–macro’ has been used differently in other contexts, in this paper it refers to the linking of a model based on household survey (micro) data with a model based primarily on macro-level data. In the sixth section we review recent, related advances in estimating the linkages between trade, growth and poverty, as economic growth is the only proven means of obtaining significant reductions in global poverty in the long run. The seventh section provides a detailed description of several areas that need immediate research attention. The final section summarizes and concludes.
Trade-Poverty Linkages

The linkages between trade, trade policy, and poverty have been identified in studies such as Winters (2000) and include changes in: (a) the consumer price and availability of goods; (b) factor prices and quantities employed; (c) government taxes and transfers influenced by changes in revenue from trade-related taxes; (d) the terms of trade and other external shocks; (e) incentives for investment and innovation that affect long-run economic growth; (f) remittances; and (g) short-run risk and adjustment costs.

Most studies focus on only one or two of these linkages and abstract from the rest. Nearly all of the studies in this survey consider the consumption side of the trade-poverty linkage (a). This is particularly important, given the highly distorted nature of world food trade and the prevalence of food in the poorest households’ budgets (often as much as 70 per cent of household spending).

Coverage of links (b) through (g) is more uneven. For example, a study by Levin (2000) focuses on transfers, link (c). Several of the studies emphasize long-run growth as the primary vehicle for poverty reduction (Anderson et al., 2005; Cline, 2004; Dollar & Kraay, 2002; World Bank, 2004). Of course, a full exploration of the linkages between trade and economic growth would require a survey in its own right, so we restrict ourselves to work that has focused on the poverty dimension of the trade/growth linkage. Most of the economy-wide analyses account for terms of trade effects, link (d). Each study typically abstracts from at least two of the linkages in order to keep the model tractable, and because the necessary data may not have been available.

A key point of this survey is the need to pay particular attention to the factor price, income, and employment link (b), which has often been neglected in the past, especially by cost-of-living studies. Two households may have identical consumption patterns and income levels, but entirely different sources of income; for example, one derives all income from agricultural self-employment, while the other relies on transfers from a relative who works abroad. This point arises in Ravallion & Lokshin’s (2004) study of prospective trade reforms in Morocco, for example. They distinguish vertical inequality (impacts on households at different income levels) from horizontal inequality (impacts on households at the same initial income level), and find that the latter tends to dominate in their results. In other words, it is the source of income – and the availability of alternative income sources – that needs particular attention when assessing the impact of external shocks.

The importance of this point frequently arises in classical trade theory. For instance, by the Heckscher–Ohlin theorem, a country has a comparative advantage in the good that intensively uses the country’s relatively abundant factor. Free trade increases the relative price of that good, and by Stolper & Samuelson’s (1941) theorem, it increases the real
return of the relatively abundant factor by an even larger percentage. Thus, changes in commodity prices tend to magnify the impact on factor prices (Jones, 1965; 1971). This effect is particularly strong in the short run when some factors are sector-specific.

This importance of linkage (b) is emphasized in a recent collection of papers on the poverty impacts of the WTO’s Doha Development Agenda (Hertel & Winters, 2005a). The likely impacts of WTO reform in Brazil, China, and Indonesia are strongly influenced by developments in the markets for unskilled labour in those economies. Harrison et al. (2000) similarly find that factor price changes drive the incidence of trade liberalization in Turkey. They employ three restricted simulations in which the 40 representative households in the analysis (differentiated by rural/urban orientation and by income level) have (i) identical consumption shares, (ii) identical factor income shares, and then (iii) identical consumption and factor income shares. Since the results from simulation (i) are nearly identical to those generated when the heterogeneity of the 40 households is left intact, the authors conclude that ‘clearly, for the poor it is the source of income, not the pattern of expenditure that is driving the adverse impact relative to the average household’ (Harrison et al., 2000, p. 107).

An analysis of rice export taxation in Thailand by Warr (2001) also suggests that factor earnings effects heavily influence welfare and distributio-nal effects. Although an export tax generates government revenue and lowers the price of rice for consumers, it also lowers the return to unskilled labour, which is used intensively in the Thai rice industry. Because both the rural and urban poor derive more than 40 per cent of their income from unskilled labour (according to the Thai survey upon which the stylized households are based), the negative income effect ends up outweighing the consumption benefit, such that both the rural and urban poor are harmed by the export tax in Warr’s analysis.

Despite the apparent importance of factor earnings effects, until recently they have seldom been accounted for in studies that quantify the effects of external shocks on the poor. As will be seen in the next section, this is particularly the case historically for analyses based on detailed household surveys.

**Partial Equilibrium Analysis**

One general category of studies quantifying the links between trade and poverty is partial equilibrium analysis. While this classification covers a wide range of studies that differ in many important aspects, they are similar in that they focus on a very limited number of linkages in Winters’ list. Some of these studies track commodity price shocks resulting from trade policy through to poor households, and may be termed ‘cost-of-living’ studies. Others are multi-region simulation models that focus on a single commodity
of particular importance to developing-country consumers and producers (e.g., rice). The partial-equilibrium category also contains micro-simulation models that focus on incidence and behaviour at the individual or household level.

One prominent study from this category is Levinsohn et al. (2000), who examine how the 1997–98 Indonesian economic crisis affected poor households in that country. Although their study does not involve trade liberalization, the approach can be used for such a purpose, and it serves to highlight the general methodology of many studies within this category. The authors combine 1993 consumption data for 58,100 households from the Susenas survey, along with price changes contemporary with the crisis, to compute household-specific cost-of-living changes. The salient finding is that very-low-income households were not insulated from the international shocks, and in fact tended to be hurt the most. Regardless of urban or rural orientation, households at lower expenditure levels experienced larger cost-of-living increases. Additionally, the consumer price impacts of the crisis were greater for urban than rural areas, and greatest overall for the urban poor.

A strength of the Levinsohn et al. analysis is its simplicity and high level of household disaggregation. However, from a methodological perspective, this work has several weaknesses. First, the analysis does not isolate the financial crisis from other phenomena, including the El Niño drought and widespread forest fires that occurred in the same period. To do so would require a more complete model of macro-economic activity. A second limitation is their abstraction from changes in the households’ pattern of consumption in the wake of the financial crisis. The possibility of movements along or shifts in the demand curve are ignored. Therefore, Indonesian households may not have fared as badly as the paper might suggest. In subsequent work, Friedman & Levinsohn (2002) address the latter limitation by estimating a set of own- and cross-price elasticities of demand and utilizing these to refine their welfare predictions. Inclusion of these substitution effects cuts the welfare losses in half. This difference underscores the importance of incorporating households’ behavioural responses to large external shocks.

Another important limitation of the Levinsohn et al. work is its exclusive focus on the consumption side of the crisis (link (a) in the second section). This precludes calculation of real income effects in a situation where households’ factor earnings responses to the Indonesian crisis were also quite dramatic. In a careful analysis of this issue, Smith et al. (2002) find that while real wages were sharply reduced during the Indonesian crisis (by as much as 60 per cent in the case of formal sector employment in rural areas), combined family income in these rural areas fell by only about 37 per cent during the crisis. This dampening effect arises from the relative stability of returns to self-employment activities (primarily agriculture) and the increased allocation of family labour to self-employment. When the value
of production for home use is also included in the calculations, the authors find that ‘full’ family incomes (wages, plus self-employment income, plus production for home consumption) fell by only 21 per cent in rural areas. This amounts to just one-third of the observed decline in wages. Smith et al. (2002, p. 191) conclude that ‘Indonesian families have displayed a remarkable capacity for resilience in the face of the crisis’.

The urban households in Indonesia were not so fortunate. While urban wages fell by somewhat less than rural wages (55 per cent), Smith et al. (2002) find that full family income in the urban areas fell by twice as much as in the rural areas (43 per cent versus 21 per cent in rural areas) during the first year of the crisis. An important part of the rural households’ ability to withstand the Indonesian crisis was due to the relative increase in the price of food, as well as farmers’ ability to increase production in response to higher food prices. In fact, during this crisis, the agricultural sector showed a remarkable ability to absorb workers, with the farm labour force expanding by 20 per cent (7.2 percentage points, when measured relative to the entire workforce) during the period of just one year.

Minot & Goletti (2000) bypass some of the methodological problems of cost-of-living studies in their in-depth examination of how rice market liberalization affected poverty in Viet Nam. They estimate household demand behaviour and link this to a multi-market spatial equilibrium model of rice production and consumption. The distributional consequences of trade liberalization are predicted based on the net rice sales position of different household classes. A simulated removal of a rice export quota is found to raise rice prices within the country, particularly in the country’s rice exporting areas. The higher prices have a positive effect on rural incomes, and generally reduce the poverty headcount. Relaxing the restrictions on the internal movement of rice also generates net benefits for the country.

Since rice production is highly labour intensive in Viet Nam, a rise in rice prices should increase demand for agricultural labour, and consequently the agricultural wage rate. Higher rice prices would then lead to a greater decrease in poverty, particularly in households that derive a share of their income from agricultural labour. Yet, Minot & Goletti’s partial equilibrium approach assumes that labour demand and wage rates remain constant. Bringing econometric evidence to bear on this issue would seem a very useful extension.

In an explicit study of this issue in Bangladesh, Ravallion (1990) addresses both the short- and long-run impacts of an increase in the price of rice on rural wages and poverty. He derives a simple condition that may be used to determine whether such households will gain from an increase in the price of rice. This requires that the elasticity of wages with respect to the price of rice exceeds net food (rice) expenditure divided by net wage income. Based on his short- and long-run estimates of this wage elasticity, he concludes that the average landless poor household loses from an increase in the rice price.
in the short run (when the wage elasticity is relatively small), but gains in the long run (5 years or more) as the elasticity of wages, with respect to the price of rice, rises over time.

Porto (2003a, 2003b) offers a natural generalization of Ravallion’s work for the case of Argentina. He estimates a set of wage equations for unskilled, semi-skilled and skilled labour, where the explanatory variables are tradable commodity prices, educational attainment and individual household characteristics. He then utilizes the resulting wage-price elasticities to estimate the impact on wages of potential changes in domestic commodity prices owing to trade reforms. In one paper, he provides an ex post analysis of the distributional impacts of MERCOSUR, concluding that it had a pro-poor bias (Porto, 2003b). By removing policies that favoured the rich relatively more, MERCOSUR is estimated to have a favourable impact on the distribution of income in Argentina.

In a separate paper, Porto (2003a) uses the same framework to conduct an ex ante assessment of prospective domestic and foreign trade policy reforms. In this case, he draws on outside estimates of the impact of foreign trade reforms on world prices. Developed-country elimination of agricultural subsidies and trade protection is more helpful for poverty alleviation than removal of Argentine import tariffs. The marginal effect of domestic reforms is greater, but the scope for foreign reforms is much larger.

Nicita (2003) uses the same approach as Porto to estimate how Mexican trade liberalization in the 1990s affected poverty. In addition, he accounts for differential price transmission from the border to different regions of the country. Nicita concludes from his ex post analysis that households gained from lower priced consumption goods, in the wake of trade reforms, but these gains were largely offset by reductions in unskilled wages and agricultural profits. With the poorest households hardest hit by these income losses, Nicita concludes that they gained much less than the rich. Therefore, the trade reforms are estimated to have increased income inequality.

The papers by Ravallion, Porto, and Nicita further highlight the importance of labour earnings in determining the poverty impacts of trade policies. We now turn to studies in which these labour markets, as well as other factor markets, are explicitly modelled.

Factor Market Effects: General-Equilibrium Analysis

Although data requirements scale up considerably, GE analysis is a logical approach for shedding light on the impacts of trade and other macro-level policies on various types of low income households. Löfgren (2000) is representative of the conventional, comparative-static GE approach to trade-poverty analysis. His analysis incorporates links (a), (b), (c) and (d) on Winters’ list of trade-poverty linkages, that is, the commodity,
factor/employment, taxes/transfers, and terms-of-trade links. He investigates how reduced agricultural and industrial protection affect representative Moroccan households in the short run. The model is calibrated to a detailed Social Accounting Matrix that captures Morocco’s pronounced disparities in economic structure, wages, and education between rural and urban areas. Four household groups are distinguished according to whether they are rural or urban, poor or non-poor. A counterfactual scenario involving domestic trade liberalization in agriculture is determined to produce gains for the country as a whole, while the rural poor lose out. If rural households are to benefit from trade reforms, government transfer payments and investments in rural education and infrastructure are necessary. Indeed this theme of the need for ‘complementary domestic reforms’ in the context of trade liberalization is a common one in this literature (Hertel & Winters, 2005a).

Löfgren’s analysis excludes only the links associated with investment and innovation (e), remittances (f), and risk and adjustment costs (g). Ignoring (e) and (g), for example, likely results in systematic underestimation of the long-run benefits and short-run costs of trade liberalization, respectively. However, determining the ultimate importance of linkages (e), (f) and (g) would require development of a far more complex stochastic, dynamic model, as well as the appropriate data or econometric estimates to support this work.

Löfgren’s approach is fairly representative of a large number of trade and poverty studies carried out over the past decade. One variant is to address in greater detail how external shocks affect the total income distribution of a country. This means estimating a distribution of income for each representative household type (as in Adelman & Robinson, 1978) or working at the level of individual workers (as in Cogneau & Robilliard, 2000, to be discussed below). If the distribution of income within a given group of households is estimated a priori, it can be used in conjunction with the GE model to assess the impact of exogenous shocks on income distribution and poverty. The mean and total income levels for a household group are typically made endogenous, while higher moments of the distribution are fixed.

Dealuwé et al. (1999) consider this basic approach and provide further refinements. Within-group income distributions are modelled with a flexible Beta distribution instead of the more restrictive log-normal or Pareto distributions that are commonly used. The shape of the income distribution can thus more closely mimic the observed socio-economic characteristics of each household type, which differ markedly. In turn, an endogenous poverty line is developed based on the cost of obtaining a subsistence level of consumption.

Cogneau & Robilliard (2000) offer a fundamentally different approach to trade, poverty, and income distribution modelling. They assess the impact of different growth strategies on poverty in Madagascar by embedding an
econometrically estimated labour allocation model based on 4508 households within a GE framework. The combination of micro-simulation and GE facilitates the modelling of a country’s overall income distribution, since it is no longer necessary to assume *a priori* an income distribution for each household type. In addition, the representative household assumption and its associated theoretical shortcomings are dropped almost entirely. However, these accomplishments entail higher data requirements and computational costs, and may require other dimensions of the model to be scaled back (e.g. the authors consider only three sectors and four commodities).

Cogneau and Robilliard analyse a variety of sector-level shocks to Madagascar’s economy including, among others, shocks to the world price of cash crops. Without exception, they find that the impact of poverty and inequality is small. One reason is that most of the households are diversified in their sources of income, such that the impact of sector-specific shocks is muted. In turn, to the extent that households are not initially diversified, they may respond to the external shock by changing their allocation of labour, in an effort to equate factor returns across sectors, thereby spreading the impact beyond the directly affected sector. Finally, they point out that the second-round benefits of any favourable development tend to accrue to those individuals who own the factors of production in the economy. Therefore, a disproportionate share of the gains goes to the wealthy, thereby preserving the initial degree of inequality. This stability of the overall income distribution in the face of policy interventions has long been observed by those working in this field (see, for example, Dervis *et al.*, 1982).

**Micro-Macro Syntheses**

While the approach of Cogneau & Robilliard is innovative and ambitious, its household complexity requires them to dramatically scale back detail on the production side of the economy. Accordingly, it remains beyond the reach of most GE modellers seeking to obtain some basic insights into the links between trade and poverty. This is particularly true in larger countries, where greater sector detail is required, and where survey data may involve more than 100,000 households. It is also complicated by the fact that researchers with expertise in GE modelling are typically different from those with expertise in household modelling. As a result, it can be difficult to integrate satisfactorily the two frameworks into one grand model.

Therefore, we turn to a series of studies that capitalize on detailed household survey data while retaining more manageable GE models. For lack of a better term, we label this category ‘micro-macro synthesis.’ An alternative description might be ‘general equilibrium simulation with post-simulation analysis of household impacts.’ The approach is best characterized by its two-step nature, whereby the GE model is first simulated to get
commodity and factor price changes. These are then fed into a micro-simulation framework that calculates the effects on individual, or highly disaggregate, representative households. Various poverty measures can be applied to assess the distributional effects of shocks.\(^5\)

An obvious limitation of post-simulation analysis, at least in the view of general equilibrium practitioners, is that the reactions of households to commodity and factor price changes in the post-simulation analysis are not transmitted back to the GE model. Although this absence of feedback is not satisfactory from a theoretical point of view, the resulting measurement error is generally very small. This is because spending patterns tend to be a function of household income per capita, so the transfer of income between two households with similar income levels (e.g. rural non-farm labour and agricultural labour) has little effect on aggregate demand. In turn, the change in spending patterns as households become wealthier is gradual, and change in the overall income distribution stemming from trade reform is also modest (recall the results from Cogneau & Robilliard above).\(^6\)

The simplest micro-macro syntheses are really just an extension of partial equilibrium cost-of-living studies to include both factor and commodity price changes, as well as explicit assumptions about tariff revenue replacement. Chen & Ravallion’s (2003) study of the poverty implications of China’s WTO accession is a good example of this approach. These authors combine disaggregated household survey data with trade liberalization results from the Global Trade Analysis Project (GTAP) model of global trade. They infer the change in household welfare associated with marginal price changes by multiplying these price changes by the households’ budget shares, taking into account net sales by the household as well (including sales of labour and capital services).

One of the main findings in the work of Chen and Ravallion, as well as the subsequent work of Ravallion & Lokshin (2004) on Moroccan trade policy, is the heterogeneity of effects across different types of households with the same pre-reform level of welfare. As discussed in the second section, this is called horizontal inequality. In their Morocco paper, Ravallion & Lokshin (2004) find that, depending on the depth of cuts in cereals protection, the impact on aggregate inequality can be fully explained by the horizontal component. Specifically, they conclude that for small cuts in protection – on the order of 10 per cent – there is an increase in inequality that is largely fuelled by the benefits flowing disproportionately to the wealthy (vertical inequality). However, in the case of full liberalization in the grains markets, they find the opposite to be the case; horizontal inequality dominates. That is, the predominant impact of trade liberalization on inequality is through differential impacts on households with the same level of pre-reform income.

The potential for generating highly disaggregate policy impacts is a great advantage of the Ravallion \textit{et al.} approach. However, like the cost-of-living approach, this abstracts from the second-order impact that price changes might have on the households’ mix of consumption and earnings. While
households are unlikely to change radically their consumption patterns in the wake of a modest change in relative prices, this is not necessarily the case with sales revenue. While a farm household might reduce its consumption of maize slightly in response to a 10 per cent increase in price, it might shift completely from producing and selling oilseeds to growing maize. In the latter case, the welfare predictions made based on a first-order approximation may be quite misleading. By way of example, consider a Chinese farm household with a choice between producing two commodities: maize or wheat. Initially they specialize in wheat, but suppose that WTO accession lowers the price of wheat, boosting that of maize. So they switch all of their land to maize production. The welfare approximation based on the initial (wheat) sales earnings shares suggests they will lose from WTO accession, whereas after adjustment (to maize), their income may be boosted, possibly even lifting them out of poverty.

Another significant limitation of the Ravallion et al. approach to micro-macro analysis stems from the potential for individual workers to become unemployed as a result of trade shocks – or alternatively for previously unemployed individuals to find a new job. Ferreira-Filho & Horridge (2005) introduce an innovative way to dealing with this issue in a very large scale micro-macro model. Dubbed the ‘quantum approach’ to job allocation, they break up individual records in their survey in order to reflect the fact that some individuals become unemployed. Thus, if employment in the textile industry falls by 5 per cent, they ‘fire’ 5 per cent of the workers by taking each individual in their survey and creating two survey records, one that is fully employed and one that is unemployed, each with new weights which sum to the original one. For example, if a given textile employee in the national household survey was deemed to represent 200 individuals in the population, then, after the trade reform, there would be two individuals in the ‘augmented survey’, one of which is employed and receives a weight of 190, and one which is unemployed and receives a weight of 10 (5 per cent of the total). In this way, they capture the full impact of job loss on the households with which these individuals are affiliated.

Ferreira-Filho & Horridge (2005) bring this method to bear in an analysis of the Doha Development Round impacts on poverty in Brazil. They utilize the entire national household survey in that country, encompassing 264,000 individuals located in the 27 different states of Brazil. They fix total employment in the country, as well as fixing the population in each state, but they permit jobs to move across state boundaries. Since the poverty rate varies dramatically across regions in Brazil (from 14 per cent in the Southeast to nearly 60 per cent in the Northeast), a trade reform-induced shift in regional economic activity can have a significant impact on national poverty. They find that WTO reforms tend to shift economic activity from the relatively wealthy, highly industrialized Southeast region to the states with higher poverty rates. As a consequence, national poverty, as well as inequality, falls. This is an important finding, since many opponents of
WTO reforms in agriculture have argued that they will only benefit the wealthy landowners in Brazil, thereby worsening an already severely skewed income distribution.

While readily amenable to implementation at a highly disaggregate level, the quantum approach embodies the assumption that everyone is equally likely to lose their job (or find one in the case of increased employment). However, in practice, the probability of obtaining a newly created job will depend on a variety of individual and household characteristics. In their analysis of the potential Doha Round impacts on poverty in Indonesia, Robilliard & Robinson (2005) utilize an econometric model to predict which types of individuals will lose their job when formal sector employment contracts, and which will be hired when employment expands. They point out that the poverty outcome depends critically on who gets the new jobs. If the new jobs go to individuals from non-poor households, i.e. families with other wage earners or other sources of income, this could worsen income inequality since the pool of unemployed workers prevents unskilled wages from rising and, without the benefit of higher wages, the poverty reduction would be muted. Their central finding for Indonesia is that accounting for reductions in unemployment in the wake of multilateral trade reforms would enhance the estimated poverty reduction – although large standard errors preclude them from making definitive statements about this important question.

Of course a key consideration is whether this extra work on labour markets makes a difference to the results – and whether it improves the ability of models to predict poverty changes in the wake of external shocks. Bourguignon et al. (2003) compare the results based on the same micro-macro model of Indonesia used by Robilliard & Robinson, to that obtained using the more standard GE model, based on representative household groups (RHGs). The latter identifies ten different household groups (four agriculture, three rural non-agriculture, and three urban non-agriculture). The distribution of income within each of these groups is assumed to be fixed, so all households get the same percentage increase or decrease. The micro-macro approach that they use involves linking the output of the same GE model with post-simulation analysis based on a micro-simulation model. The micro-simulation model is estimated with a 33,000 person sub-sample of the 1996 Susenas survey, and offers a detailed representation of household income generation. Earnings and occupational choice equations are a function of personal characteristics, so when there is a decline in aggregate demand for wage labour, the model predicts which individuals are forced into the informal sector.

The two models are linked through four groups of variables: (i) the wage rate in each labour market, (ii) income per worker in the informal, self-employed sector, (iii) the number of wage workers and self-employed workers, by labour market segment, and (iv) consumption prices. The micro-simulation model is solved to generate values for these linking
variables that are consistent with the GE model. The authors compare results from the micro-simulation and RHG approaches for a variety of macro-economic shocks. They find the representative household approach systematically under-estimates the effect of the shocks on income inequality and poverty. This makes sense, since the impact of job losses on household welfare is spread across a large group of individuals in the RHG model, whereas in the micro-simulation approach these costs are concentrated on a relatively small group of individuals and households.

But the question remains: does the micro-simulation approach do a better job of capturing the kinds of poverty impacts that have been observed historically? In a related paper, Robilliard et al. (2003) seek to validate their model against the historical record over the period of the Indonesian financial crisis. This validation proceeds in two steps. First, they set aside the GE model and simply impose observed historical changes in the linking variables that drive the micro-simulation model. They then compare the changes in poverty produced by the latter to changes actually observed over the crisis period. Results indicate the model captures the qualitative flavour of the impacts across population segments, but over-predicts the total increase in poverty (+239 per cent estimated versus +67 per cent observed in the poverty headcount).

Second, they add the GE component, which permits them to relate the poverty changes to the underlying factors driving this crisis, including the foreign credit crunch, domestic credit crunch, real devaluation, and El Niño drought. They find that the financial crisis did indeed contribute the majority of the poverty increase, but the impact of El Niño was also quite significant. This is a more nuanced perspective than that offered by Friedman & Levinsohn (see above) who implicitly attribute all of the changes to the financial crisis.

Combining these findings with those of their companion paper leaves us somewhat at a loss to answer definitively the original question posed, since the RHG approach is shown to underestimate the poverty impacts, when compared to the micro-simulation approach; but the latter is shown to overestimate the actual change in poverty in the wake of the financial crisis. Understanding how well the RHG approach does with respect to the historical record would require a further comparison which is not offered in the work of these authors to date. Nevertheless, their comparison of the RHG and micro-simulation approaches is compelling; it suggests that the simplicity of the RHG approach may come at a high cost.

In closely related work, Bussolo & Lay (2003) apply the RBR modelling approach to Colombia, in an effort to understand the impact of the 1990s tariff cuts on poverty. They find that the subsequent rise in unskilled wages as well as the movement of workers from the informal to (higher wage) formal sector employment in rural areas leads to a substantial reduction in rural poverty. They attribute more than half of the national poverty reduction over the 1988–95 period to the tariff reforms. As with the
Indonesia study, Bussolo & Lay compare their findings for Colombia to those obtained using a RHG modelling approach. They find that the RHG approach overestimates urban poverty reduction, while underestimating rural poverty reduction. Thus it appears that one cannot determine a priori the nature of the bias introduced by the RHG approach. A middle ground between individual household modelling and the RHG approach is offered by Hertel et al. (2004b). Their approach is geared towards shedding light on the impacts of global trade liberalization across a wide range of developing countries. This multi-country approach is inevitably less detailed for any given country, which is why they seek a middle ground between the full complexity of household-level micro-simulation, and the RHG approach.

Households are first classified into seven groups, based on earnings specialization. Households receiving 95 per cent or more of income from agricultural self-employment, non-agricultural self-employment, wage labour (rural versus urban) and transfer payments are distinguished. All other households are considered diversified, and broken into rural and urban groups. Up to this point, it is similar to the RHG approach, but within each of the seven strata the authors aggregate the survey data into 20 vinttiles, based on initial income per capita. This results in 140 distinct households per country, and permits analysis of changes in income distribution within strata, as well as between strata. The authors estimate a common demand system for all households and use this to characterize consumption behaviour as well as establishing a poverty level of utility. The micro-simulation model in each country consists of each of the 140 households maximizing utility subject to a budget constraint determined by their endowments and the commodity and factor prices obtained from the GE model. Two factor market closures are explored: limited factor mobility, in which only wage labour is mobile across sectors, and full factor mobility, in which self-employed labour and capital are also mobile. (Agricultural land is sector-specific in both cases.)

In a limited factor mobility analysis of Indonesian poverty impacts of trade reforms, between-stratum earnings differences dominate, while the limited within-stratum differences derive mainly from consumption effects. In particular, trade reforms boost food prices relative to non-food prices in Indonesia, which hurts the poor within each stratum much more than the rich. On the earnings side, wages rise, particularly for unskilled workers. So, in the short run, poverty falls in the wage-labour strata as well as for diversified households. However, agricultural profits fall, since producer costs rise faster than revenues. Thus, agricultural poverty rises slightly in the short run. In the terminology of Ravallion & Lokshin (2004), horizontal impacts dominate the vertical ones when inter-sectoral factor mobility is limited.

Under full factor mobility, such that labour and capital are perfectly mobile across sectors, the authors find that within-stratum earnings differences are much greater. Now, the welfare of the low-income
self-employed workers hinges largely on changes in unskilled wages, regardless of their sector of employment, while the fate of the wealthy households depends on skilled wages and returns to capital and land. (In this medium-run factor market closure, agricultural land absorbs the reduction in agricultural profits.) With unskilled wages rising, this results in very similar rates of poverty reduction across all strata. So with full factor mobility, the horizontal inequality tends to be eliminated, while vertical inequality is exacerbated. This is a hypothesis that warrants further examination for other countries and other types of trade reforms. As with Bourguignon et al. (2003), the work of Hertel et al. (2004b) highlights the drawbacks of assuming a common income shift for all households within a given ‘representative group’.

Estimating Linkages between Trade, Growth and Poverty

In the long run, there is little doubt that the only way to obtain large reductions in poverty is through economic growth. In the last ten years, much has been written on the connection between trade and growth from both a theoretical and an empirical perspective. Much of the empirical work relies on cross-country regression analysis, as exemplified by Dollar & Kraay’s (2001) paper on the poverty impacts of trade liberalization.

These authors first categorize developing countries as either globalizers or non-globalizers based on changes in trade volumes and tariff rates since 1980. Looking at anecdotal evidence on poverty, including time-series Gini coefficients and income growth rates for average households versus the poorest quintile, they find no general trend in inequality among countries classified as globalizers. Globalizers, however, tend to have higher rates of growth than non-globalizers. This leads to the conclusion that globalization tends to be associated with a decline in absolute poverty. Verifying these findings in a more rigorous manner, the authors undertake cross-country regression analysis, and determine that no systematic relationship exists between changes in trade volumes and changes in the income share of the poorest. Additionally, no statistical relationship is found between changes in trade volumes and changes in income inequality.

Rodrik (2000) offers a sharp critique of the Dollar–Kraay study, and cross-country regression analysis more generally. Estimating the relationships among trade policy, growth, and poverty depends critically on finding appropriate measures of these variables, and carefully sorting out omitted variable and endogeneity problems, all of which are quite challenging given the very limited data available.

An even more ambitious approach is that of Cline (2004), who combines estimated elasticities of growth with respect to trade, and country-specific elasticities of poverty with respect to growth, with GE analysis of global trade liberalization. This permits him to synthesize an estimate of the aggregate, long run poverty reduction that might arise from such reforms.
He begins with the global GE model of Harrison et al. (1997), augmenting the usual static gains from trade with ‘steady-state’ quasi-dynamic gains that follow from long run increases in investment.

To this, he adds another pure productivity effect which he infers by multiplying the increase in trade for each region – as estimated by the GE model – by a ‘central estimate’ of the elasticity of output with respect to trade. (The latter is distilled from a review of the cross-country growth regression literature.) Having obtained an estimate of long run growth in per capita income resulting from trade reform, Cline then applies a country-specific ‘poverty elasticity’ with respect to growth, based on an assumed log-normal income distribution for each region, in order to obtain a final estimate for poverty reduction. His estimates are large, totalling nearly 650 million people – the bulk of these in Asia – where the absolute number of poor (based on a $2/day 1999 purchasing power parity poverty line) is large, and trade growth is relatively high following multilateral trade liberalization.

Cline’s growth-based estimates of poverty reductions stemming from trade liberalization are considerably larger than those obtained by the World Bank Development Prospects Group (DPG) (2004). These authors use a recursively dynamic, GE model to estimate the poverty reduction in 2015, owing to gradual global trade liberalization between 2005 and 2010. Unlike Cline, they actually track the accumulation of capital in response to increased investment, and the openness/productivity multiplier is also an explicit part of their model. Like Cline, they use a poverty elasticity with respect to aggregate income to convert economic growth into poverty reduction. However, the DPG study uses a uniform poverty elasticity of 2.0. In contrast, Cline uses estimates ranging from 1.0 to 3.5, with those for most of the Asian region, including India and China, at the top of this range (3.5). Overall, Cline’s elasticities, which are based on a simple formula and are a function of each country’s Gini coefficient and the ratio of mean income to poverty income, appear to be larger for the most populous countries in the developing world. Taken together with the more modest rate of capital accumulation due to the absence of Cline’s steady-state assumption, this helps to explain why the DPG study concludes that such trade reforms would reduce $2/day poverty by 320 million – roughly half of Cline’s estimate.8

Cline’s synthetic estimates – as well as those from DPG – highlight the potential for trade liberalization to have a substantial long run impact on poverty. However, in order to get to this estimate, one must follow a long and arduous path, crossing several research ‘minefields’ in the process including: steady-state CGE analysis, growth theory, cross-country regression analysis, and estimates of the responsiveness of poverty to economic growth. It will be some time before these individual pieces are strong enough to support anything more than back-of-the-envelope estimates of potential long run poverty impacts of trade reform.
In the meantime, the broader body of literature will likely continue to emphasize the short- to medium-run impacts of trade reform on poverty resulting from comparative static estimates of the ensuing commodity and factor price changes. This is consistent with the fact that the most heated debate over trade and poverty tends to focus on near-term impacts (Hertel & Winters, 2005b). Perhaps most importantly, this comparative static emphasis is justified since short run impacts are most significant for households facing extreme poverty.

With this in mind, we turn to a potential research agenda that emphasizes the short- to medium run impacts of trade liberalization on poverty.

**Directions for Future Research**

*Missing Markets and Factor Mobility*

When a market does not exist or high transactions costs preclude participation in it, the implications go beyond the missing market itself. In their paper on the role of market failure in peasant agriculture, de Janvry *et al.* (1991) show that missing markets for labour and staple foods substantially dampen the supply response of peasant households to price changes for cash crops. For this same reason, de Janvry *et al.* (1995) conclude that most small Mexican maize producers are little affected by price declines under the early 1990’s North American Free Trade Agreement. Indeed, their estimates of the decline in Mexican maize production following NAFTA were considerably smaller than those of GE models (e.g. Robinson *et al.*, 1993). In fact, maize production in Mexico did not fall after the price declines, and Taylor attempts to explain this using a village-level GE analysis (Taylor *et al.*, 2003). Taylor argues that higher maize production following the price drops is due to expanded cultivated area by subsistence producers. He emphasizes the role of local labour and land markets in redistributing land away from large commercial producers towards smaller subsistence farmers. In particular, while commercial farm wages fell, land rents also dropped, and subsistence producers consequently took on more land and devoted more hours to self-employment in farming.

Since the main endowment of the poor is their own labour, the labour market clearly deserves the greatest attention by those studying trade and poverty. Assessing how well the labour market in a given economy functions becomes a central empirical question. Fortunately, there is an emerging body of literature aimed at testing for market failure – or as the issue is often framed: testing for the *separation* of household and firm decisions. If the labour market functions effectively, the amount of labour used on a farm should depend only on the wage rate and not on the number of working age individuals in the farm household (separation applies).

Benjamin (1992) tests the separation hypothesis in the context of Indonesian rice production by incorporating demographic variables in the
farm firm’s labour demand equation, and testing for the significance of the associated coefficients. Interestingly, he fails to reject the separation hypothesis, meaning that the labour market appears to be functioning. However, the lack of wage labour income among many of the poorest rural households in some of the poorest countries suggests this hypothesis might be rejected in other cases. Hertel et al. (2004b) note that nearly 40 per cent of the households in the poorest developing countries are completely specialized in farm income. These households are also disproportionately poor. Therefore, further examination of the separation hypothesis is warranted.

This brings us to the more general question of labour mobility – both across sectors and between the formal and informal (self-employed) sectors of the economy. If self-employed workers and physical capital are immobile across sectors, then the pattern of poverty impacts that arises following trade liberalization is quite heterogeneous, since trade reforms invariably hurt some sectors (e.g., manufacturing) at the expense of others (e.g., agriculture). However, with self-employed labour and capital mobile between agriculture and non-agriculture, there is a much more uniform pattern of poverty reduction, with real unskilled wages the driving force behind these changes (Hertel et al., 2004b).

Which specification is correct? This will surely vary by country, and it calls for additional econometric analysis – although this time at the level of markets, as opposed to households. Recent econometric evidence from rural China suggests that the degree of off-farm labour mobility is quite low, particularly for households with low educational attainment (Sicular & Zhao, 2002). Hertel et al. (2004a) find that off-farm mobility is the key determinant of whether poverty amongst agricultural households is reduced following China’s accession to the WTO. At higher levels of off-farm mobility, the boost in unskilled manufacturing wages is transmitted back to the farm, and lifts the welfare of low-income households, despite lower farm prices.

Bussolo et al. (2005) explore the issue of intersectoral factor mobility in considerable detail in their paper on the impacts of WTO reforms on poverty in Brazil over the period from 2005 to 2015. They use a unique panel data set for Brazil to estimate a ‘mover–stayer’ model of off-farm mobility which permits them to predict which individuals will leave the agricultural sector, and which will stay. In their baseline analysis (absent trade reforms), the authors predict substantial poverty reduction due to relatively high rates of productivity growth. Furthermore, they find that a significant portion of the predicted poverty reduction is due to the exit of labour from the relatively low wage agricultural sector to higher wage, non-farm jobs. This labour movement is particularly important to the poorest farm households. Indeed, the authors find that the largest percentage point reduction in poverty over the baseline period is for the ‘movers’ who leave agriculture and experience a 22.4 percentage point reduction in poverty headcount.
(down from 53.4 per cent to 31 per cent). This is also the group that experiences the greatest incremental poverty reduction, above and beyond the baseline, as a result of the prospective multilateral trade reforms.

Robilliard et al. (2003) offer a rather different view of intersectoral labour movement – focusing on the formal-informal distinction, as opposed to agriculture-non-agriculture. They assume the informal sector is the residual claimant for surplus labour, with rigid formal sector wages limiting the amount of adjustment that occurs in that labour market. As a result, they obtain very strong poverty impacts in Indonesia when analysing the Asian financial crisis. They model this crisis as squeezing the formal sector particularly hard, due to its reliance on foreign working capital and imported intermediate inputs. As the formal sector contracts, it sheds workers to the informal sector, and these individuals experience a sharp drop in wages. In fact, it appears this effect is overly strong, as the authors find that their micro-simulation model overstates the poverty increase following the Asian crisis by a considerable margin when they conduct a historical simulation. Thus, a better understanding of the wage gap and worker movements between these two sectors is needed.

Characterizing Consumption Behaviour

Trade-poverty researchers take a wide variety of approaches to characterizing consumer behaviour. GE models all involve the specification of a utility or expenditure function which characterizes preferences globally (not just locally). These demand systems are usually 'calibrated' so that preferences vary by household. For example, in their study of poverty in Brazil, Harrison et al. (2003bn), calibrate Cobb–Douglas preferences to each of ten rural and ten urban households. Since the expenditure patterns differ across all these households, so do the preferences. Since this demand system holds consumer expenditure shares constant, it is essentially equivalent to the approach of Chen & Ravallion, from a spending point of view.

Decaluwe et al. (1999) take a slightly different approach, by identifying a subsistence level of consumption that is associated with the poverty line in a particular country. They utilize the more general, Linear Expenditure System (LES), which permits them to incorporate the subsistence quantities directly into the household demand structure. The other parameters must be calibrated for each different household group. This gives them an endogenous poverty line, which is a determined by the inner product of subsistence quantities and prices.

Hertel et al. (2004b) utilize a generalization of the LES demand system, AIDADS, which has been shown to perform well in predicting expenditure patterns across the income spectrum (Cranfield et al., 2002). This demand system is estimated using a combination of international cross-section data and household survey data from individual countries. The estimated demand system is calibrated to replicate the distribution of total expenditure
and per capita spending by commodity in each individual country before proceeding with policy analysis. The authors then use this demand system to predict the consumption impacts across households at different income levels. This is a very different approach from those above; the household survey data are used in the estimation process, but not in the simulation model itself.

This has several advantages. First, since all households in a given country have the same preferences, there is also a well-defined poverty level of utility, and the analysis of consumption impacts is clean and straightforward. Second, to the extent there are survey measurement errors, they are likely eliminated while estimating the demand system. Finally, one can adjust predicted consumption levels in cases where the survey data and GE model refer to different base periods. On the other hand, one important drawback of this econometric approach is that impacts on a particular household in the survey can no longer be distinguished.10

Transactions Costs and Price Transmission

In their survey of the empirical evidence on trade liberalization, Winters et al. (2004) highlight the important role of transactions costs between the border and the consumer or producer. Assuming these marketing costs are specific (as opposed to ad valorem), they tend to dampen the impact of world commodity price changes on domestic consumers, while exaggerating the impact of such price changes on producers of export products. As a result, marketing costs can sharply alter the predicted impact of trade policy changes on rural households.

Recent work by Arndt et al. (2000) in Mozambique underscores the empirical significance of marketing margins in low-income countries. The authors report producer-consumer margins as high as 300 per cent (cassava). The biggest margins are for food products, which tend to dominate both the consumption and production bundles of the poor in that country. This tends to discourage rural households from participating in markets, hence limiting the potential impact of trade reforms on their livelihood. This is evidenced in the predicted impacts of multilateral trade reform on poverty in Mozambique reported in the recent study by Arndt (2005).

The only study in this survey to seriously come to grips with this issue is Nicita (2004), who estimates a modified version of the popular exchange rate pass-through model (Goldberg & Knetter, 1997). This model offers differential pass-through of Mexican tariff changes, by region, based on a measure of distance from the United States, which the author argues is the primary source of most imports. In keeping with most of this literature, he finds incomplete pass-through of the tariff changes to consumers in Mexico, with the extent of pass-through smaller for agriculture than manufactured goods. Ultimately, agricultural tariff cuts have little or no impact on the
more remote regions of Mexico. Nicita argues that the low pass-through for agricultural products is due to high transportation costs, making local production more profitable in regions further from the border. Indeed, he notes: ‘domestic supply is likely to set the price of certain agricultural products regardless of border measures’ (p. 23). The opposite is likely true for exportable products. This type of assessment sharply alters our view of the impact of trade liberalization on rural households. Accordingly, much more work on the problem of price transmission is needed.

Data Reconciliation

The proper treatment of marketing margins is also important when one seeks to reconcile household survey data with the national accounts upon which GE models are based. Expenditures in the survey are reported at consumer prices, while most GE models measure consumer demand at producer prices. In order to bridge the two, one needs a producer-consumer transition matrix (e.g., Ballard et al., 1985). Of the studies referred to above, only Hertel et al. (2004b) explicitly model the wholesale/retail/transport margin. In most studies, the two data sets are either allowed to diverge, or they are forced to balance by making arbitrary adjustments on both sides. This can give rise to misleading inferences about the incidence of commodity price changes on the poor, in particular, for the same reasons mentioned above.

Data reconciliation between household surveys and national accounts is also required on the income side (Robilliard & Robinson, 2003). Indeed, due to under-sampling of wealthy households, and under-reporting of income, it is not uncommon for total income reported in a household survey to be less than half that reported in the national accounts. In addition, the under sampling/reporting problem tends to be more severe for capital, as opposed to labour, and for non-farm activities as opposed to agriculture (Ivanic, 2004). Thus, a failure to correct for this problem can result in two very different looking economies, depending on whether one uses the survey or national accounts data. Consequently, estimates based on the household survey data will tend to be excessively intensive in labour and agricultural value-added. This gives rise to misleading inferences when household results are aggregated up to the national level.

An example of this problem arises in two recent studies of the poverty impact of China’s WTO accession. The first is a global GE analysis in which final demand in China is modelled via a single representative consumer (Ianchovichina & Martin, 2003). They find that China as a whole gains from accession, but the authors are unable to speak to the poverty issue. Towards this end, a second study (Chen & Ravallion, 2003) takes the price changes from their global GE model and applies them at the individual household level to elicit the distributional consequences of accession using full detail in the household survey. Thus, the authors are able to identify which types of
households in which provinces and with which demographics lose and which gain. This is extremely useful information. However, when the individual household impacts are aggregated up to the national level, China is found to lose, not gain, from WTO accession, thereby contradicting the original macro results from which the household impacts are driven. It is easy to see why this might be the case. Agriculture is hurt most by China’s WTO accession and if this portion of national income is overstated in the survey, then it will take on disproportionate importance in the estimated national impacts – thereby giving the misleading impression of an overall loss. Such contradictions are common in the so-called micro-macro synthesis literature, and this highlights the need to reconcile the underlying databases before undertaking serious policy analysis (Ivanic, 2004).

**Tax Revenue and Transfer Payments**

Trade taxes are an important part of total revenue in many developing countries and the fiscal implications of their modification under trade reform scenarios requires serious consideration (Harrison et al., 2000). Depending on the choice of tax replacement instrument, the poor may be adversely affected. This is highlighted by Emini et al. (2005) for the case of Cameroon where the authors view the Value Added Tax (VAT) as the most likely tax replacement tool. This tax has many exemptions that lead to a very heterogeneous incidence across sectors, with effective rates ranging from zero in the case of agriculture, to 13 per cent in the case of petroleum refining. Since the poor consume disproportionately goods that are favoured by the exemptions, using this as a revenue replacement tool is favourable to the poor. However, when a uniform consumption tax is used instead, the poverty impacts of trade reform are quite adverse. Indeed, they conclude that the choice of tax instrument used to replace the lost tariff revenue is equally as important as the type of trade liberalization undertaken (full liberalization versus a modest Doha Round scenario). Of course, one alternative to tax replacement involves a reduction in government spending. Given the heavy reliance of the poor in many countries on public transfer payments, reductions in this area of the budget could also have adverse consequences for poverty. There is still a strong urban bias in government spending, so it may be that area, rather than the rural areas, that may suffer from budget cuts. In general the determinants of transfer payments, both domestic and overseas remittances, are not well fleshed out in trade-poverty analyses, and deserve greater attention in the future.

**Conclusions**

This survey offers a critical review of studies that attempt to quantify the effects of trade and other macro-economic reforms on poor households in developing countries. Special emphasis is given to the critical role of factor
markets in determining the poverty impacts of trade policy change. The preponderance of the evidence points to the dominance of earnings-side impacts over consumption side effects. This is problematic, since household surveys are notable for their under-reporting of income. From the perspective of the poor, the market for unskilled labour is most important. The poverty impacts of trade reform often hinge crucially on how well the increased demand for labour in one part of the economy is transmitted to the rest of the economy via increased wages, increased employment, or both. Further econometric research aimed at discriminating between competing factor mobility hypotheses is urgently needed.

A number of interesting recent studies link top-down, macro-level analyses with bottom-up micro-econometric approaches in a two-step procedure, such that general equilibrium mechanisms are incorporated along with detailed household survey information. While not necessarily elegant in a theoretical sense, this approach appears to account for the majority of trade-poverty linkages, can be based on solid empirical foundations, and is compatible with both single and multi-region trade modelling. With time, the degree of integration between micro- and macro-analyses should tighten, with fully integrated GE models increasingly used at both the national and global levels.

In many developing economies, there exist substantial wage gaps between the formal and informal sectors, and the loss of a high wage job can be sufficient to plunge an entire household into poverty. Remittances to rural relatives also can be affected. A few of the most recent studies attempt to predict not only how many jobs will be lost (or gained) in the formal sector from a trade policy shock, but also which individuals are most likely to lose their job. This level of resolution represents the ultimate goal of the literature in this area, but much more work is required before such predictions can be made with confidence.

Other research issues needing immediate attention include: (a) the treatment of marketing costs and the associated transmission of border price changes to rural producers and consumers, since weak price transmission severely limits the gains or losses to the poor from trade reforms; (b) reconciliation of household survey and national accounts data, since micro- and macro-predictions are otherwise often highly inconsistent; and (c) the appropriate characterization of consumption behaviour. In the longer run, research on trade/poverty linkages will also benefit greatly from independent advances in the literature characterizing the links between trade, trade policy, and economic growth, for the latter is the only proven means of obtaining significant long-run reductions in global poverty.

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Notes
1 A few of the studies in this category are: Deaton (1989, 2003); Ravallion (1990); Ravallion and van de Walle (1991); Levinsohn et al. (2000); Minot and Goletti (2000); McCulloch and Calandrino (2003). Summaries are in Reimer (2002).
2 This finding is reinforced by the study of Suryahadi et al. (2000), who estimate that the poverty headcount in Indonesia rose by 152 per cent in urban areas, versus just 57 per cent in rural areas, during the 1996–99 period.
3 Other studies in this category include: Adelman and Robinson (1978); Lysy and Taylor (1980); Bourguignon and Morrison (1989, 1992); Bourguignon et al. (1991a, 1991b); Devarajan and van der Mensbrugghe (2000); Sadoulet and de Janvry (1992); Coxhead and Warr (1995); Bautista and Thomas (1997); Harrison et al. (2003a); Levin (2000); Chia et al. (1994); and Cockburn (2001). Summaries are provided in Reimer (2002). See also Löfgren et al. (2003) for a brief introduction to this topic.
4 In similar fashion, Rutherford et al. (2004) incorporate more than 50,000 households into an otherwise conventional GE model of Russia.
5 A few studies in this general category are: Robilliard et al. (2003); Ianchovichina et al. (2001); and Hertel et al. (2004b). Selected summaries are provided in Reimer (2002).
6 Informal discussions with authors working in this area confirm this fact. Both Thomas Rutherford and Maros Ivanic report that equilibrium results obtained with a single aggregate household differ little from those obtained with GE models, which disaggregate a large number of households.
7 Sensitivity analysis by the authors indicates that the classification of households is robust to variation in the cut-off point between 90 per cent and 99 per cent specialization.
8 More recent estimates of the global poverty impacts of trade reform using the DPG Linkage model are much lower (Anderson et al., 2005). This is due to their use of a more recent global trade and protection database as well as empirically derived poverty elasticities based on actual household surveys for a large number of developing countries.
9 Kuiper and van Tongeren (2005) explore the impacts of WTO reforms on poverty in rural China using a village-level model of a community in Jiangxi Province. They explicitly account for the lack of an integrated labour market in modelling the households’ responses to the reforms.
10 Furthermore, this approach needs to be more extensively validated. While the authors have found that it does a good job of predicting expenditure patterns by commodity across the income spectrum in Indonesia, more work is required to ensure that its predictive performance is satisfactory across a range of developing countries.
11 Chen and Ravallion take an exogenous margin into account when computing their consumer prices.

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Ivanic, M. (2004) Reconciliation of the GTAP and household survey data. GTAP Research Memorandum No. 5, Center for Global Trade Analysis, Purdue University.


