Trade Liberalisation and Spatial Inequality: Methodological Innovations in Vietnamese Perspective

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Abstract

This paper develops a SAM database encompassing 6,002 representative Vietnamese households, mapping one-to-one with 16 aggregate households. The database is used to calibrate two Computable General Equilibrium (CGE) models with respectively 16 aggregate and 6,002 disaggregate households. Aggregate model results are compared to those of the disaggregated model to demonstrate the importance of endogenous modelling of micro households within a static CGE model framework. The methodology of relying on a consistent micro-household data-set achieves the twin objectives of allowing for changes in the distribution of household expenditures and the possibility of computing poverty measures at a very disaggregate level. As such, we aim at contributing with methodological advances in the assessment of the poverty impact of macro-policies.

Standard changes in trade policy are in focus in this paper. Poverty measures used are, however, re-normalised versions of traditional Foster-Greer-Thorbecke (FGT) poverty measures. We argue that FGT poverty measures should be normalised on the number of poor individuals within a given group rather than on the group population. Our simulations indicate that poverty will rise following a revenue-neutral lowering of trade taxes, which we interpret as a worst case scenario. This leads us to suggest that the government should be proactive in combining trade liberalization efforts with a proper fiscal response in order to avoid increasing poverty in the short- to medium-term.

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1.   Introduction

Vietnam has come a long way since the *doi moi* reforms were initiated in 1986. Wide-ranging institutional changes have been initiated, and Vietnam has, in parallel with domestic reforms, started a process of opening up its economy to regional and global economic forces. "Openness" to trade as measured by the share of imports and exports to GDP grew considerably during the 1990s. Nevertheless, average tariff rates have increased over the same period from 10.7 percent in 1992 to 16.2 percent in 2000 (Niimi, Vasudeva-Dutta, and Winters, 2002). Increased tariff-barriers are not consistent with Vietnam's commitment to continuing and deepening the process of trade liberalisation. Vietnam is a major world market actor in several important agricultural sectors including coffee, pepper and rice, but is not yet a member of the World Trade Organisation (WTO). Membership has, however, become a priority since China joined the WTO as its 143rd member in 2001. It is clear that Vietnam will be faced with stern demands for trade liberalisation before it can join the WTO. It is also becoming clear that Vietnam might be willing to pay the price in terms of policy choices. Proactive integration in the international economy was a declared aim emerging from the Ninth Party Congress. Thus, there is an increasing need to understand how impending trade liberalisation may affect the relative well being of poor Vietnamese people throughout the country.

Measuring the poverty impact of macro policy interventions within a CGE model framework has recently been studied by Decaluwé et al. (1999). They use a specific statistical distribution function as an approximation to the distribution of income within aggregate household groups. In particular, they argue that the beta distribution represents a sufficiently flexible functional form so as to provide a more appropriate functional specification for within-household income distribution than the lognormal and Pareto distributions which have previously been studied (Adelman and Robinson, 1979; de Janvry, Sadoulet and Fargeix, 1991).

Our study takes another approach by solving for the entire distribution of income among a representative set of 6,002 households surveyed in the most recently available Vietnamese Living Standards Survey (VLSS98). We compare two different approaches to modelling the income distribution of micro-households. The first relies on a top-down procedure by modelling 16 aggregate households followed by consistent disaggregation of income and expenditures among the 6,002 micro-households. Consistency with aggregate household expenditures is maintained by adjusting average household expenditure shares at the micro level. The second approach avoids consis-

tency problems by modelling income and expenditure decisions separately for each of the 6,002 micro-households. It also allows for feedback-effects from changes in the micro level distribution of income and expenditures to macro level variables. We compare the two modelling approaches in order to investigate the importance of micro-household feedback-effects. Each of the two modelling approaches relies on a consistent micro-household data-set. In this way, both allow for detailed assessments of the poverty impact of macro policies, without having to rely on distributional approximations regarding intra-household income and assumptions to shift these distributions in relation to changes in macro variables.

Our main purpose is to study the relative impact on poverty of reductions in trade taxes. In this regard we experiment with different kinds of government budget closures to judge the poverty impact of various government options to maintain a balanced budget. Most of our analyses are carried out under a plausible revenue-neutral government budget closure where lost revenue from reduced trade taxes is made up by increasing household taxes. The analyses in this paper are based on a recently developed 2000 Social Accounting Matrix (SAM) and micro-household information from the VLSS98 household survey. Two CGE models – one aggregate and one disaggregate - is established on this basis and used to analyse the poverty impact of trade liberalization. We use adjusted Foster-Greer-Thorbecke (FGT) measures as the basis for our analyses. The normalisation of the traditional FGT measures means that they cannot be compared across regions and by extension across countries. We therefore rely extensively on adjusted FGT poverty measures, including the poverty headcount (P0), and adjusted poverty gap (P1*), and poverty depth (P2*) measures, which are comparable among household sub-groupings.

Section 2 presents the SAM data set, the CGE models we use in our experiments, and a review of our use of the FGT poverty measures. Section 3 summarizes the results of our experiments, including an evaluation of the two aggregate and disaggregate modelling alternatives, and a discussion of how reduced trade taxes will affect poverty across different household groups characterised by location (rural/urban), and the employment status (farmer, self-employed/wage-worker/non-employed) of the head of household. Section 4 concludes.

2. Data and model framework

The data underlying the current analyses is the 1998 Vietnam Living Standards Survey (VLSS98) and the 2000 Vietnam Social Accounting Matrix (VSAM) established by Tarp, Roland-Holst, Rand, and Jensen (2002). The VSAM includes accounts for 97 activities and commodities, 14 factors, 16 aggregate households, and three enterprises as well as accounts for the current government budget, capital accumulation, inventories, and the balance of payments. The 14 factors include capital and land in addition to 12 different kinds of labour categorised according to gender (male/female), location (rural/urban) and educational level (low/medium/high). Similarly, the 16 kinds of households are categorised according to location (rural/urban), gender of the head of household (male/female), and employment status of the head of household (farmer/self-employed/wage-worker/non-employed).

The disaggregation of the aggregate VSAM household account into 16 separate household accounts was based on information from VLSS98. This survey includes 6,002 households making up a countrywide representative sample of households. The first step was to categorise the 6,002 micro-households into the 16 aggregate household categories to be included in VSAM. Based on a mapping, which allocated each micro-household to one and only one of the 16 aggregate household categories, information on micro-level income and expenditure patterns of the 6,002 micro-households were aggregated to derive priors for the income and expenditure patterns of the 16 aggregate household categories. This information was subsequently used in deriving the consistent VSAM matrix.

The fundamental mapping between the 16 aggregate VSAM households and the 6,002 micro VLSS households was in turn used to establish a consistent economy wide Vietnamese SAM data set with 6,002 micro households. Since each aggregate household was made up of a unique set of micro households, the main issue was how to disaggregate each aggregate household among its component micro households. The problem of disaggregating the household account into micro households therefore consisted of 16 sub-problems – one for each of the 16 aggregate households in VSAM. Each problem represented a standard problem in achieving consistency among SAM data accounts: The double-entry book-keeping principle of maintaining consistency between income and expenditures was fulfilled for the aggregate VSAM household account, but not for the individual micro households.

In order to achieve consistency for each of the micro household accounts, the method of minimum cross entropy, proposed in Golan, Judge and Robinson (1994), was relied on. This statistical method was used to minimize the entropy distance between the prior income and expenditure shares, derived from VLSS98, and the ex post income and expenditure shares, derived to ensure accounting consistency for each micro household. In addition, the statistical method ensured consistency with other economic flow accounts in VSAM, by imposing the aggregate household income and expenditure patterns as fixed control totals.

In order to make the above calculations feasible, the dimensions of the production and goods sectors were reduced. Accordingly, the original 97 activities and commodities accounts were aggregated into 10 separate activities and commodities accounts. The 10 activities and commodities accounts consists of three agricultural accounts including Rice, Other Agricultural Crops, and Livestock and Fishery, three industrial accounts including Mining and Oil, Food Processing and Manufacturing, and four service sectors including Water and Gas, Construction, Trade, and Other Services. Altogether, the fully consistent micro-household SAM data set therefore contains 10 activities, 10 commodities, 14 factors, 6,002 households, and three enterprises, in addition to accounts for the current government budget, capital accumulation, inventories, and the balance of payments. The creation of the full SAM data set might be viewed as a two-step procedure, whereby a consistent SAM with 16 aggregate households was established in the first step, while the full disaggregation into 6,002 micro households was left to the second step. The two-step procedure was preferable in the current case, since it broke one large and unmanageable statistical balancing problem into 16 smaller and more manageable balancing problems. An important aspect of our procedure is that it allows for reconciling micro household income and expenditure information with more reliable macro totals.

Our two models are standard static CGE models along the lines of the model used in Arndt, Jensen, Robinson and Tarp (2000). It specifies a Cobb-Douglass production function of value added, and a Leontief specification for determining intermediate demand. In addition, it specifies a Linear Expenditure System (LES) for household consumption including home consumption of goods at the activity level and marketed consumption of goods at the commodity level. Finally, it includes a Constant Elasticity of Transformation (CET) function for determining the supply of goods for the export market, and an Armington (CES) specification for determining the demand for imported goods. The LES expenditure system was implemented by assuming zero minimum consumption levels. Furthermore, the CET and CES functional relation-

ships were implemented by assuming that transformation and substitution elasticities for the 10 Vietnamese commodities are similar to estimates derived for Mozambique in Arndt, Robinson and Tarp (2001). In general, the closures of the two models include full employment of factor resources, savings-driven investment, as well as a flexible exchange rate and fixed foreign savings inflows. The closure of the government budget varies with the set of experiments, but for most experiments in this paper a standard revenue-neutral closure where flexible household tax rates make up for lost revenue from reduced trade taxes is used. Finally, the consumer price index for marketed goods is used as price numeraire.

The two models were implemented on the basis of the VSAM data set with (i) 16 aggregate household categories and (ii) 6,002 disaggregate micro-households. The latter disaggregate model allows for endogenous derivation of the entire distribution of income and consumption expenditures. The methodology of the former aggregate model was to carry out experiments and measure relative price effects at the aggregate level, before studying distributional effects at the micro level. In the current setup, important distributional effects might arise from using the simple top-down approach. Accordingly, the distribution of income and expenditures changes when changing relative factor prices lead to changing factorial income for each of the 6,002 micro households. One problem with calculating micro changes in expenditures from micro changes in income is that micro-household goods demand will be inconsistent with aggregate household goods demand. The current paper circumvents this problem by additively adjusting average expenditure shares for micro-households to match consumption by the aggregate household categories. This is seen as a reasonable way to maintain consistency since it is likely to maintain the relative ranking of micro-households in terms of welfare increases.

In the next section, we implement the two aggregate and disaggregate CGE models to study how changes in trade taxes affect poverty at the micro level. Poverty measures are calculated on the basis of an updated poverty line for 2000, derived from the Cost of Basic Needs (CBN) methodology. The updated poverty line for 2000, which accounts for basic food and non-food expenditures, amounts to 1.68 million Dong or approximately 120US$ per year. The poverty line for 2000 updates the official poverty line for 1998, i.e. 1.65 million Dong, based on official price changes for food and non-food items.[2]

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[2] These poverty lines are measured in local currency terms and are not corrected to take account for possible systematic divergence from purchasing power parity. This might explain the very low level of the poverty lines.

Different dimensions of poverty can be analysed using the traditional Foster-Greer-Thorbecke (FGT) measures of poverty headcount (P0), poverty gap (P1), and poverty depth (P2). These measures are convenient since they allow for simple additive decompositions among household groupings with different characteristics. While the FGT measures are widely used measures of poverty, we introduce additional adjusted measures of poverty gap (P1*) and poverty depth (P2*) to study the impact on poverty among poor individuals. The FGT poverty headcount (P0) measure provides immediate information on the relative number of poor individuals within a specific household grouping. Normalising on the total population of the particular grouping provides relevant information in this case.

However, normalising on the total group population does not provide relevant information in the case of the FGT poverty gap measure (P1). The practise of normalizing the P1 measure on the total group population implies that a populous region can seem to have a lower poverty gap than a less populous region, even if the reverse is true. In fact, the FGT measure provides a multiplicative measure (P1=P0xP1*), which is not comparable across different household groupings, since P0 differ between groupings. The FGT measure of poverty depth (P2) encounters the same normalisation problem. The impaired comparability between regions, and by extension between countries, implies that the traditional P1 and P2 measures are not suitable for comparative work. This includes standard eye-balling of simulation results as well as cross-country regression analyses. In contrast, the adjusted FGT poverty measure P1* and P2* has the clear interpretation of measuring the average distance resp. squared distance to the poverty line among poor individuals. In this way, the adjusted measures yield relevant information, comparable across regions and countries.

One interesting feature about the traditional FGT poverty gap measure (P1) is that relative changes in this measure reflect relative changes in the monetary poverty gap (POVGAP), defined as the total amount necessary to raise the income of every poor individual to the poverty line level (NxP1xPOVLINE). [3] Given a constant household group population and a constant poverty line, the relative change in the monetary poverty gap is given by dPOVGAP/POVGAP = d(NxP1xPOVLINE)/ (NxP1xPOVLINE) = d(P1)/P1. While this is an interesting feature of P1, it would be more appropriate to use the monetary poverty gap measure itself to represent these relative changes. In what follows, we will rely on the poverty headcount (P0), the ad-

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[3] P1* is the poverty gap measure which is normalised on the number of poor individuals in a particular household grouping (N*), in contrast to P1 which is normalised on the total population of the household grouping (N).

justed poverty gap among poor individuals (P1*), the adjusted poverty depth among poor individuals (P2*) and the monetary poverty gap (POVGAP), to analyse the poverty impact of trade liberalization.

The results of our experiments with trade policies are presented in the next section. The impact on different dimensions of poverty is studied in the aggregate and at a regional level by grouping households into three regions, i.e. northern, central, and southern Vietnam. Additional analyses study more detailed groupings of households according to: (i) rural/urban location, and (ii) farmer/self-employed/wage-worker/non-employed employment status of the head of household. These groupings were chosen because of their significance in policy debates. They also reflect the household groupings in the aggregate VSAM data set. Other groupings could be studied equally well, e.g. groupings at the level of the 61 Vietnamese provinces, or according to household size and composition.

3.   Results

Table 3.1 presents the set of trade policy experiments carried out in the current paper. The base run experiment replicates the underlying 2000 Vietnam SAM data set; experiment 1 measures the impact of eliminating export taxes; experiment 2 measures the impact of eliminating import tariffs; while experiment 3 measures the combined impact of eliminating all trade taxes. The set of experiments are common to the subsections 3.1 and 3.2. Issues such as the specification of the government budget closure, the use of micro household data for poverty analysis, and the proper calculation of poverty indices are addressed in section 3.1. Subsequently, a more elaborate analysis of the impact of trade liberalisation on the distribution of welfare and poverty is undertaken in section 3.2. This analysis is based on results from the model with 6,002 endogenous micro households, assuming a revenue-neutral government budget closure.

Table 3.1 Trade Tax Experiments

Base run	Calibrated 2000 SAM values
Exp. 1	Elimination of export taxes
Exp. 2	Elimination of import tariffs
Exp. 3	Exp. 1 & 2

3.1. Government Budget Closure, Poverty Measures, and Endogenous Micro Households

Table 3.2 presents the impact of trade liberalisation on monetary poverty gaps, when (i) micro households are modelled endogenously, and (ii) micro household data are used in a two-step procedure to calculate the poverty gaps. The elimination of export taxes has little impact on regional monetary poverty gaps, regardless of the treatment of micro households. It is, however, worth noting that the overall impact switches sign, when micro households are modelled endogenously. The elimination of import tariffs has a relatively large negative impact on monetary poverty gaps. Monetary poverty gaps increase in every region, but the endogenous modelling of micro-households income and expenditure decisions has an important dampening effect. The overall increase in monetary poverty gap is 1.3 percent with endogenous micro households and 2.3 percent with exogenous micro households. This shows that feed-back effects are important in determining the poverty impact of trade liberalisation.

Table 3. 2. Monetary Poverty Gaps, and Endogenous Micro Households (Percentage Changes)					
Micro Households	Region	Base run (10^{12} Dong)	Exp. 1	Exp. 2	Exp. 3
Endogenous	North	5.729	-0.3	1.1	0.9
	Central	4.949	-0.1	1.1	1.0
	South	2.848	-0.2	1.9	1.8
	Total	13.526	-0.2	1.3	1.1
Exogenous	North	5.729	-0.1	2.1	2.1
	Central	4.949	0.1	2.0	2.2
	South	2.848	0.2	3.4	3.7
	Total	13.526	0.1	2.3	2.5

This conclusion is reinforced when looking at the combined third experiment, where all trade taxes are eliminated simultaneously. In this case, the monetary poverty gap increases by 1.1 percent with endogenous households and by 2.5 percent with exoge-nous households. These numbers confirm that the endogenous modelling of micro household income and expenditure decisions is important. The ranking of the regional impact does not depend on the modelling choice - the monetary poverty gap increases relatively more in the south compared to the central and northern regions. This is re-lated to the fact that southern households pay higher taxes and therefore have to bear a higher burden when lost trade tax revenues have to be replenished from domestic sources.

Table 3.3 presents the impact of trade liberalisation on monetary poverty gaps, using the model with endogenous micro households. The table compares results for different choices of government budget closure, including (i) a non-revenue neutral closure where household tax rates are kept fixed, and (ii) a revenue-neutral closure where household tax rates are allowed to vary proportionately. The results show that the choice of government budget closure is very important in determining the poverty impact of trade liberalisation in the short- to medium-term. When the government sterilises the budget impact of declining trade tax revenues, regional monetary poverty gaps generally tend to increase. In contrast, if the government allows for a partly non-sterilised revenue decrease, monetary poverty gaps will decline relatively strongly. If no sterilisation takes place, the overall monetary poverty gap will decrease by almost nine percent. The regional ranking of poverty is also affected by the government closure. When no sterilisation takes place, the largest relative decline in monetary poverty gap will occur in the relatively developed southern province, while the less developed central and northern provinces will benefit less. This shows that poor households in the southern province will benefit the most from pure trade liberalisation. On the other hand, replenishment of government income through increased domestic revenue collection will put large burdens on poor southern households. In this case, households from the southern provinces will be worse off than other regional household groups after trade liberalisation.

Table 3.3. Monetary Poverty Gaps, and Government Budget Closure (Percentage Changes)					
Govt Budget Closure	Region	Base run (10^{12} Dong)	Exp. 1	Exp. 2	Exp. 3
Fixed Revenues	North	5.729	-0.3	1.1	0.9
	Central	4.949	-0.1	1.1	1.0
	South	2.848	-0.2	1.9	1.8
	Total	13.526	-0.2	1.3	1.1
Flexible Revenues	North	5.729	-2.3	-6.1	-8.3
	Central	4.949	-2.2	-6.0	-8.1
	South	2.848	-3.1	-8.4	-11.4
	Total	13.526	-2.4	-6.5	-8.9

Table 3.4 presents the impact of trade liberalisation on traditional and adjusted poverty gap measures, using the model with endogenous micro households. The table compares the impact on the traditional FGT poverty gap measure, which is normalised on the total group population, to the adjusted FGT poverty gap measure, which is normalised on the number of poor individuals in the group. It is clear from the base

run calculations that the two poverty gaps give rise to different pictures of the dispersion of poverty among Vietnamese regions. While the traditional FGT measure (P1) indicates that the poverty gap is highest in the central region of the country, the adjusted measure (P1*) indicates that poverty gaps are equally high among the central and northern regions, and relatively high in the southern region as well. This shows how the practise of normalizing the P1 measure on the total group population implies that a populous region will seem to have a lower poverty gap than a less populous region, even if the reverse is true. This observation implies that the traditional FGT poverty gap measure is not comparable between different household groupings.

Table 3. 4.	Traditional and Adjusted FGT Poverty Gap Measures (Percentage Changes)				
Poverty Measure	Region	Base run (10^{12} Dong)	Exp. 1	Exp. 2	Exp. 3
P1	North	0.121	-0.3	1.1	0.9
	Central	0.141	-0.1	1.1	1.0
	South	0.060	-0.2	1.9	1.8
	Total	0.104	-0.2	1.3	1.1
P1*	North	0.351	-0.7	-1.2	-1.1
	Central	0.348	-0.4	0.2	-0.1
	South	0.275	0.0	1.5	1.4
	Total	0.331	-0.4	-0.1	-0.1

Looking at the results, it can be noticed that the percentage changes for the traditional P1 measure matches the percentage changes for the monetary poverty gaps in Tables 3.2 and 3.3. This follows since (i) the real poverty line is unchanged, and (ii) the group populations are unchanged. Accordingly, the elimination of export taxes leads to uniformly small declines in poverty gaps, while the elimination of import tariffs leads to stronger increases in poverty gaps. This picture changes when looking at the adjusted poverty gap measure. Average poverty gaps generally decline or stay unchanged for poor individuals in the northern and central regions. The average poverty gap only increase along with the traditional poverty gap measure for the southern region. The economy-wide adjusted poverty gap measure shows that the elimination of trade taxes has little impact on average poverty gaps among poor individuals. This shows that increasing monetary poverty gaps follow from increasing numbers of poor individuals rather than increasing average poverty gaps among the poor.

3.2. Trade liberalisation analyses

Having analysed the importance of different aspects of our modelling methodology in section 3.1, we now turn to a more in depth analysis of how trade liberalisation will affect the Vietnamese economy at macro- and micro-levels. Based on our findings in section 3.1, we decided to use the model with endogenous micro households and revenue-neutral government budget closure for the more in-depth analysis. Our macro-economic analyses will be focussed on how macroeconomic aggregates and relative price changes affect the distribution of welfare among aggregate household groups. Our micro-economic analyses will focus on using the adjusted FGT measures and monetary poverty gaps to analyse the distribution of poverty among varying groups of poor households.

Tables 3.5-3.11 present the macroeconomic effects of trade liberalisation in Vietnam. The macroeconomic indicators, presented in Table 3.5, show that the elimination of trade taxes will have little macroeconomic impact on the Vietnamese economy. Real GDP expands marginally due to improved efficiency in the allocation of otherwise fixed factor stocks, while nominal GDP declines marginally. Moreover, nominal absorption declines marginally indicating that the overall welfare level of Vietnamese people will decrease only slightly in the short- to medium-term.

Table 3.5. Macroeconomic Indicators (Percentage Changes				
	Base run (10^{12} Dong)	Exp. 1	Exp. 2	Exp. 3
Real GDP	444.7	0.0	0.1	0.1
Nominal GDP	444.7	-0.0	-0.1	-0.1
Nominal Absorption	455.1	-0.1	0.0	-0.1

Table 3.6 shows how the composition of real GDP changes with trade liberalisation. The two consumption items, including home and marketed consumption, decline, while investment and trade aggregates expand. The simultaneous reductions in consumption and increases in investment come about as household tax income replaces the tax revenue of the government lost due to trade liberalization. The burden of trade taxes is partly borne by enterprises through reduced returns to capital. The sole reliance on household taxes to make up for lost revenue therefore releases funds for enterprises. These funds are partly used to increase savings and accordingly investment. In contrast, household consumption has to be reduced along with household disposable income since the increased tax-burden more than outweighs increased factor in-

come. Trade aggregates expand in parallel, due to trade-tax induced changes in relative export and import prices, to maintain a fixed balance of payments.

Table 3.6. Components of Real GDP (Percentage Changes)				
	Base run (10^{12} Dong)	Exp. 1	Exp. 2	Exp. 3
Home Consumption	23.4	0.0	-2.0	-2.0
Marketed Consumption	272.5	-0.3	-0.8	-1.1
Recurrent Govt.	28.2	0.0	0.0	0.0
Investment and stocks	130.9	0.7	2.3	3.0
Exports	241.4	0.6	1.6	2.2
Imports	-251.7	0.5	1.6	2.1
Real GDP	444.7	0.0	0.1	0.1

Table 3.7 shows how the elimination of trade taxes leads to increasing export prices and decreasing import prices. The elimination of export taxes leads to lower export prices as perceived by domestic producers, while the elimination of import tariffs leads to lower import prices as perceived by domestic consumers. Subsequently, higher export prices and lower prices on (imported) intermediate inputs drive domestic producer and value added prices up, while declining import prices drive domestic demand prices down. The real exchange rate depreciates slightly to accommodate the pressure for an expansion of the current account deficit. Finally, Table 3.7 shows how the numeraire consumer price index for marketed goods remains unchanged.

Table 3.7. Price Indices (Percentage Changes)				
	Base run (Index)	Exp. 1	Exp. 2	Exp. 3
GDP	100.0	-0.1	-0.1	-0.3
Producer	100.0	0.3	1.5	1.7
Demand	100.0	-0.2	-0.3	-0.5
Value added	100.0	1.0	3.6	4.7
Export	100.0	0.9	3.2	4.1
Import	100.0	-0.9	-2.6	-3.5
Consumer	100.0	0.0	0.0	0.0
Traded goods	100.0	-0.1	0.1	0.0
Non-traded goods	100.0	-0.2	-0.3	-0.5
Real Exchange Rate	100.0	0.2	0.4	0.5

Table 3.8 presents relative agricultural price indices to judge the transmission of relative price changes through the economy. The elimination of export taxes and import tariffs leads to increases in relative agricultural export and import prices. Relative ag-

ricultural export prices increase in experiment 1 since agricultural exports are more heavily taxed than other exports. Similarly, relative agricultural import prices increase in experiment 2, since agricultural trade protection is lower than for other non-agricultural sectors. The former increase in export prices lead to increasing relative producer and value added prices for agricultural output, while the latter increase in relative import prices leads to declining relative value added prices The overall effect of eliminating all trade taxes in experiment 3 is to increase relative agricultural producer prices but lower relative agricultural value added prices. Increasing relative import and producer prices also leads to increasing relative consumer prices for agricultural goods. This explains why the cost of living indices presented below tend to increase more for rural compared to urban households.

Table 3.8. Agricultural Terms of Trade (Percentage Changes)				
	Base run (Index)	Exp. 1	Exp. 2	Exp. 3
Domestic/Export Composite	100.0	0.4	0.6	0.9
Domestic/Import Composite	100.0	0.0	2.0	2.1
Value Added	100.0	0.2	-0.5	-0.3
Export	100.0	3.6	0.0	3.6
Import	100.0	0.0	0.9	0.9
Consumer (marketed)	100.0	-0.3	1.7	1.3

Table 3.9 shows that cost of living indices, including the impact of changes in the value of home consumption, vary little across households. The elimination of export taxes has virtually no effect on cost of living indices. In contrast, the elimination of import tariffs raises the implicit cost of home consumption, and therefore leads to small increases in cost of living for most households. Similarly, the cost of living is increased for most households when all trade taxes are eliminated. The combined experiment 3 shows that the cost of living increases slightly more for rural households compared to urban households. This is consistent with the relative increase in agricultural consumer prices, which was observed above, and the fact that rural households have relatively large agricultural consumption shares.

Table 3.10 shows that factor prices generally change in parallel, but also that some variation occur due to differences in relative factor intensities among production activities. Agricultural production activities and construction have relatively high male factor intensities, while food processing, manufacturing, trade and other services have relatively high female factor intensities. Capital intensities are relatively low in agri-

cultural production activities and relatively high in Oil production/Mining and in the supply of Water and Gas, while land is used exclusively in agricultural production. The elimination of relatively high agricultural export tax rates leads to increasing relative agricultural producer and value added prices. This spills over into relative increases in wages for rural and urban males with low education, and returns to land, which are all used relatively intensively in agricultural production. The expansion of real investment due to increased enterprise savings also benefits male wages, while (urban) female wage increases are below average, since the female factor intensity is particularly low in construction.

Table 3.9.	Cost of Living Indices (Percentage Changes			
Household	Base run (Index)	Exp. 1	Exp. 2	Exp. 3
Rural male farm	100.0	-0.1	0.1	0.0
Rural male self-employed	100.0	0.0	0.2	0.2
Rural male wage	100.0	0.0	0.1	0.2
Rural male non-employed	100.0	0.0	0.4	0.4
Rural female farm	100.0	-0.1	0.2	0.1
Rural female self-employed	100.0	0.0	0.1	0.1
Rural female wage	100.0	0.0	0.1	0.1
Rural female non-employed	100.0	0.2	1.1	1.3
Urban male farm	100.0	-0.0	0.0	-0.0
Urban male self-employed	100.0	-0.0	0.1	0.1
Urban male wage	100.0	-0.0	0.0	-0.0
Urban male non-employed	100.0	-0.0	-0.0	-0.1
Urban female farm	100.0	-0.1	-0.0	-0.1
Urban female self-employed	100.0	-0.0	0.0	0.0
Urban female wage	100.0	-0.0	0.0	-0.0
Urban female non-employed	100.0	-0.0	0.1	0.1

Experiment 2 shows that the elimination of import tariffs has a similar differentiated impact on relative factor prices. Male wages tend to increase relative to female wages. Import tariff collection is concentrated in food processing and manufacturing. The elimination of these tariffs has a a negative effect on relative female wages, since it leads to reduced protection in these sectors. This effect is reinforced by the expansion of real investment which leads to increasing demand for male factors and increasing relative male wages. Returns to highly educated male labour increases particularly strongly, since construction has a high factor intensity for this labour category. The factor price movements in the combined experiment 3 reflect the sum of the factor price movements in the two separate experiments 1 and 2. Male wages increase relative to female wages, and highly educated male wages increase the most. Returns to capital increase above average and returns to land increase below average, since the elimination of import tariffs raise relative non-agricultural value added prices.

Production Factor	Base run (Index)	Exp. 1	Exp. 2	Exp. 3
Table 3.10. Factor Prices (Percentage Changes				
Rural male low education	100.0	1.3	3.5	4.8
Rural male med education	100.0	1.3	3.8	5.0
Rural male high education	100.0	1.2	4.1	5.3
Rural female low education	100.0	0.9	3.5	4.3
Rural female med education	100.0	0.8	3.5	4.3
Rural female high education	100.0	0.9	3.4	4.3
Urban male low education	100.0	1.1	3.2	4.2
Urban male med education	100.0	0.9	3.9	4.8
Urban male high education	100.0	0.7	4.2	5.0
Urban female low education	100.0	0.6	3.6	4.3
Urban female med education	100.0	0.5	3.8	4.3
Urban female high education	100.0	0.5	3.8	4.3
Capital	100.0	1.0	4.2	5.2
Land	100.0	1.6	1.9	3.5

Table 3.11 presents measures of equivalent variation for each of the 16 aggregate household types.[4] It appears that only non-employed households and urban households with a wage-earning female head gain from the combined elimination of trade taxes in experiment 3. Urban households with a wage-earning male head of household also gain slightly from the elimination of import tariffs, but loose marginally when all trade taxes are eliminated. In general, household groupings with employed heads of household loose out from our experiments. The government makes up for lost trade tax revenue by increasing household taxes, and this puts added burden on the tax-ridden employed households, since the initial incidence of trade taxes was borne partly by enterprises. The combination of increased household tax rates and increased cost of living hurts rural households with an employed head of household the most. The loss of welfare is particularly strong for rural households with a self-employed head of household, as well as urban households with a male farmer as head of household.

The remainder of this section is dedicated to studying the micro-economic impact on the distribution of poverty among varying groups of poor households. Table 3.12 presents the impact of trade liberalisation on poverty indices and monetary poverty gaps at the regional level. The overall headcount ratio in the base run indicates that the total number of poverty-stricken people amounts to 31.3 percent of the Vietnamese

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[4] The equivalent variation measures are calculated from trade tax experiments with aggregate households, i.e. without endogenous micro household behaviour.

population. Given a total population of 77.6 million in Vietnam, this translates into 24.3 million people living in poverty. The highest concentrations of poverty-stricken individuals are to be found in the central and northern parts of Vietnam, where respectively 40.3 and 34.3 percent of the population live in poverty. Given regional population totals of 20.9 and 28.3 million, it follows that there are 8.4 million poverty-stricken individuals living in the central provinces, and 9.7 million people living below the poverty-line in the North. In contrast, only around 6.2 million poverty-stricken people are living in the populous southern provinces, boasting a total population of 28.4 million. Altogether, poverty is most widespread in the northern region, and least widespread in the southern region.

Table 3.11. Equivalent Variation (Percentage Changes)				
Household	Base run (10^{12} Dong)	Exp. 1	Exp. 2	Exp. 3
Rural male farm	99.3	-0.2	-1.4	-1.7
Rural male self-employed	23.4	-0.6	-2.7	-3.5
Rural male wage	19.0	-0.2	-1.2	-1.5
Rural male non-employed	0.5	-0.3	1.1	1.4
Rural female farm	21.1	-0.1	-0.9	-1.0
Rural female self-employed	5.9	-0.8	-1.8	-2.7
Rural female wage	3.1	-0.2	-1.0	-1.1
Rural female non-employed	0.2	-0.5	-7.6	-8.0
Urban male farm	7.3	-0.6	-2.4	-3.0
Urban male self-employed	30.8	-0.2	-0.6	-0.8
Urban male wage	34.7	-0.1	0.1	-0.1
Urban male non-employed	1.0	-0.2	1.1	0.7
Urban female farm	4.6	0.0	-0.5	-0.5
Urban female self-employed	23.9	-0.3	-0.0	-0.4
Urban female wage	19.8	-0.2	0.3	0.2
Urban female non-employed	1.4	-0.6	2.6	1.9

The experiments indicate that the elimination of export taxes and import tariffs *per se* will do little to raise people out of poverty, if the government responds with increased taxation at the household level. The elimination of export taxes will, by itself, raise a small number of individuals above the poverty line in the southern region. However, the main impact will be to raise the number of poor people in the central and, in particular northern provinces. Overall, the elimination of import tariffs will move 1.3 percent or 320,000 people into poverty. Experiment 2 indicates that more than half of these people (235,000) live in the North, while less than 10 percent (25,000) live in the populous southern provinces. Interestingly, the overall number of poor individuals does not change when export taxes are eliminated on top of import tariffs. Experiment

3 shows that a non-linear decrease in the number of poor individuals in the North even out with an increase in poor individuals located in central provinces.

Measure	Region	Base run (Rate/Dong)	Exp. 1	Exp. 2	Exp. 3
P0	North	0.343	0.4	2.4	2.0
	Central	0.404	0.2	0.8	1.1
	South	0.217	-0.2	0.4	0.4
	Total	0.314	0.2	1.3	1.3
P1*	North	0.351	-0.7	-1.2	-1.1
	Central	0.348	-0.4	0.2	-0.1
	South	0.275	0.0	1.5	1.4
	Total	0.331	-0.4	-0.1	-0.1
P2*	North	0.177	-0.8	-0.5	0.1
	Central	0.161	-0.4	1.0	-0.4
	South	0.106	-0.0	2.0	-0.1
	Total	0.154	-0.5	0.6	-0.1
POVGAP (10^{12} Dong)	North	5.729	-0.3	1.1	0.9
	Central	4.949	-0.1	1.1	1.0
	South	2.848	-0.2	1.9	1.8
	Total	13.526	-0.2	1.3	1.1

Table 3.12. Regional Households, Poverty Indices and Monetary Poverty Gaps (Percentage Changes)

The adjusted FGT poverty gap (P1*) measures indicate, as already discussed in relation to Table 3.4, that average poverty gaps among the poor are relatively high in the northern and central regions, amounting to around 35 percent of the poverty line, and lower in the southern provinces where it amounts to around 27.5 percent of the poverty line. The results show that average poverty gaps among poor individuals will decrease in the northern provinces, remain unchanged in central provinces, and increase in southern provinces. This suggests that trade liberalisation will even out regional differences in poverty gaps among the poor. The economy-wide impact shows a small decline of 0.1 percent. This implies that the strong 1.1 percent increase in the overall monetary poverty gap, equivalent to an increase of 153 billion Dong or approx. US$11 million, is due mainly to an increase in the number of impoverished individuals.

The regional measures of poverty depth among poor (P2*) indicate that the northern and central provinces have not only the largest poverty gap but also the largest poverty depth. The elimination of export taxes will, by itself, reduce average poverty depth in the North, while the elimination of import tariffs, by itself, will increase pov-

erty depth among poor in the southern provinces. The complete elimination of trade taxes will, however, not affect regional average poverty depth measures significantly. At the economy-wide level, this indicates that the main impact of trade liberalisation under the current government closure, will be to increase the number of poor individuals, leaving economy-wide average poverty gap and poverty depth among poor unchanged. At the regional level, the distribution poor individuals will be further skewed towards the northern and central provinces, but average poverty gaps will be more similar. Overall, the relative increase in monetary poverty gap for the southern provinces indicate that the elimination of trade taxes will even out regional differences in poverty levels.

Tables 3.13-3.17 present adjusted FGT poverty measures and monetary poverty gaps for varying sub-samples of our micro households defined by location (rural/urban), sex of the head of household (male/female), and the employment status of the head of household (wage-worker/self-employed/farmer). The data presented in Table 3.13 indicate that poverty is concentrated among households located in rural areas. Comparing rural headcount measures (P0) to regional headcount totals in Table 3.12, rural poverty headcount measures are uniformly above average across all regions. The data indicate that the share of poverty-stricken individuals in rural areas amount to 41.1 percent of in the northern region, 46.2 percent in the central region, and 29.8 percent in the southern region. In contrast, the data presented in Table 3.14 indicate that the share of poverty-stricken individuals in urban areas amount to only 5.6 percent in the northern region, 4.9 percent in the central region, and 2.3 percent in the southern region.

Since poverty is mainly a rural phenomenon, it is not surprising that rural poverty gap and poverty depth measures mirror the economy-wide measures. Accordingly, average poverty gap and poverty depth among poor individuals is highest in northern and central region rural areas, and lower in southern region rural areas. A slightly different picture emerges for the smaller group of impoverished urban households, where average poverty gaps amount to around 25 percent in northern and southern provinces, and only 17 percent in central provinces. This indicates that average poverty gaps between rural and urban areas are relatively homogenous in the southern provinces, and very heterogenous in the central provinces.

Table 3.13. Rural Households, Poverty Indices and Monetary Poverty Gaps (Percentage Changes)

Measure	Region	Base run (Rate/Dong)	Exp. 1	Exp. 2	Exp. 3
P0	North	0.411	0.4	2.4	2.0
	Central	0.462	0.2	0.8	1.1
	South	0.298	-0.2	0.4	0.4
	Total	0.389	0.2	1.3	1.3
P1*	North	0.355	-0.7	-1.3	-1.1
	Central	0.351	-0.4	0.2	-0.1
	South	0.275	0.0	1.5	1.4
	Total	0.333	-0.4	-0.1	-0.2
P2*	North	0.180	-0.8	-0.5	0.1
	Central	0.163	-0.4	1.0	-0.4
	South	0.107	-0.1	2.0	-0.2
	Total	0.156	-0.5	0.6	-0.1
POVGAP (10^{12} Dong)	North	5.601	-0.3	1.1	0.9
	Central	4.908	-0.1	1.0	1.0
	South	2.767	-0.2	1.9	1.8
	Total	13.275	-0.2	1.2	1.1

Table 3.14. Urban Households, Poverty Indices and Monetary Poverty Gaps (Percentage Changes)

Measure	Region	Base run (Rate/Dong)	Exp. 1	Exp. 2	Exp. 3
P0	North	0.056	0.0	1.9	1.9
	Central	0.049	0.0	0.0	0.0
	South	0.023	0.0	0.0	0.0
	Total	0.038	0.0	0.9	0.9
P1*	North	0.250	-0.0	1.8	1.9
	Central	0.171	1.2	2.4	3.7
	South	0.254	0.9	1.9	2.9
	Total	0.233	0.5	2.0	2.6
P2*	North	0.100	0.1	1.1	0.2
	Central	0.053	1.1	0.6	1.2
	South	0.083	1.1	1.6	1.3
	Total	0.085	0.5	1.3	0.6
POVGAP (10^{12} Dong)	North	0.128	-0.0	3.7	3.8
	Central	0.042	1.2	2.4	3.7
	South	0.081	0.9	1.9	2.9
	Total	0.251	0.5	2.9	3.5

The image of poverty being a rural phenomenon persists when we look at monetary poverty gaps. Noting that 60.9 million people live in rural areas, the total poverty gap (13,525 billion Dong) can be decomposed into a rural gap of approx. 13,275 billion Dong and an urban gap of 250 billion Dong. The rural gap can be further decomposed into a northern region rural gap of 5,600 billion Dong (US$400 million), a central region rural gap of 4,900 billion Dong (US$350 million), and a southern region rural gap of 2,800 billion Dong (US$200 million). This regional distribution of rural poverty gaps closely resembles the distribution of economy-wide poverty gaps. These numbers compare to urban monetary poverty gaps in the order of 130 billion Dong (US$10 million) in provinces of the North, 4 billion Dong (US$3 million) in central provinces, and 80 billion Dong (US$6 million) in southern provinces.

Since poverty is a rural phenomenon in Vietnam, the results presented in Table 3.13 are very similar to the results on economy-wide poverty indicators presented in Table 3.12. While elimination of export taxes has relatively minor effects on rural poverty, elimination of import tariffs increases rural poverty more visibly. The combined third experiment shows that trade liberalisation leads to increasing numbers of poverty-stricken rural inhabitants, while the economy-wide average poverty gap and poverty depth among poor people is relatively unaffected. Nevertheless, regional differences in average rural poverty gaps are evened out to some extent. The impact on urban poverty is different from the impact on rural poverty in the sense that the economy-wide numbers of poverty headcount and poverty depth increase modestly, while the average poverty gap increases strongly. The increase in the urban average poverty gap is particularly strong for the central provinces, implying that regional differences are also evened out somewhat in urban areas. Nevertheless, the strong increase in urban monetary poverty gap in the northern region indicates that while relative urban poverty is evened out, absolute urban poverty is not.

Comparing the poverty impact of trade liberalisation between rural and urban areas, it appears that the number of poor expands more rapidly in rural areas compared to urban areas. Trade liberalisation will therefore not help to reverse the rural poverty headcount bias in Vietnam, in the short- to medium term. However, the average poverty gap and poverty depth measures do increase more rapidly in urban areas, indicating a more equal distribution of poverty among rural and urban areas after trade liberalisation. This conclusion is supported by the relatively strong 3.5 percent increase in the urban monetary poverty gap compared to the more modest 1.1 percent increase in the rural monetary poverty gap. Looking at absolute numbers, it is, however, clear

that the increase in rural poverty of 145 billion Dong (US$10 million) completely dominates the 8 billion Dong (US$0.6 million) increase in urban poverty.

In Tables 3.15-3.17 we present another decomposition of our poverty measures according to the employment status of the head of household. Our data indicate that 47.9 million individuals live in farm households, and 15.2 million individuals have a self-employed head of household, while 14.2 million have a wage-earning head of household. The group of non-employed households account for the remaining 300,000 individuals. Our data further indicate that poverty is most widespread among individuals living in farm households. The risk of being poor is 39.1 percent for individuals living in farm households, or more than double the risk for individuals belonging to the remaining population. The concentration of poverty in farm households is not, however, of the same order of magnitude as the concentration of poverty in rural areas. The average poverty gap (P1*) and the average poverty depth (P2*) are generally higher for farming households compared to households with a wage-earning and self-employed head, but not dramatically so. Accordingly, average poverty gaps vary between 30.5-33.6 percent of the poverty line.

Table 3.15.	Wage Earning Households, Poverty Indices and Monetary Poverty Gaps (Percentage Changes)				
Measure	Region	Base run (Rate/Dong)	Exp. 1	Exp. 2	Exp. 3
P0	North	0.153	4.4	7.8	7.8
	Central	0.299	0.0	2.3	5.0
	South	0.181	0.0	-1.3	-1.3
	Total	0.199	0.9	1.8	2.7
P1*	North	0.321	-4.3	-6.0	-5.9
	Central	0.324	0.0	-0.8	-3.2
	South	0.282	0.1	2.9	3.1
	Total	0.305	-0.9	-0.4	-1.1
P2*	North	0.134	-4.4	-1.5	-0.1
	Central	0.138	0.0	-0.6	-2.4
	South	0.112	0.1	3.1	0.2
	Total	0.125	-0.9	0.8	-0.8
POVGAP (10^{12} Dong)	North	0.327	-0.1	1.4	1.5
	Central	0.518	0.0	1.4	1.5
	South	0.603	0.1	1.5	1.7
	Total	1.448	0.0	1.5	1.6

Table 3.16. Self-employed Households, Poverty Indices and Monetary Poverty Gaps (Percentage Changes)

Measure	Region	Base run (Rate/Dong)	Exp. 1	Exp. 2	Exp. 3
P0	North	0.193	0.0	0.6	0.6
	Central	0.260	2.1	4.0	2.1
	South	0.129	0.0	0.0	0.0
	Total	0.180	0.7	1.6	0.9
P1*	North	0.403	-0.1	0.3	0.2
	Central	0.328	-2.2	-2.7	-1.0
	South	0.225	0.3	2.4	2.8
	Total	0.319	-0.7	-0.3	0.4
P2*	North	0.231	-0.1	0.4	-0.0
	Central	0.146	-2.3	0.0	1.7
	South	0.080	0.2	2.3	0.4
	Total	0.152	-0.8	0.7	0.7
POVGAP (10^{12} Dong)	North	0.614	-0.1	0.9	0.9
	Central	0.523	-0.1	1.2	1.2
	South	0.336	0.3	2.4	2.8
	Total	1.473	-0.0	1.3	1.4

Table 3.17. Farm Households, Poverty Indices and Monetary Poverty Gaps (Percentage Changes

Measure	Region	Base run (Rate/Dong)	Exp. 1	Exp. 2	Exp. 3
P0	North	0.421	0.2	2.1	1.7
	Central	0.464	0.0	0.2	0.4
	South	0.279	-0.3	1.0	1.0
	Total	0.391	0.0	1.2	1.1
P1*	North	0.347	-0.5	-1.0	-0.8
	Central	0.354	-0.1	0.8	0.5
	South	0.282	-0.0	0.9	0.7
	Total	0.336	-0.3	0.0	-0.1
P2*	North	0.174	-0.6	-0.5	0.1
	Central	0.166	-0.2	1.4	-0.4
	South	0.109	-0.1	1.6	-0.3
	Total	0.157	-0.3	0.5	-0.2
POVGAP (10^{12} Dong)	North	4.773	-0.3	1.1	0.9
	Central	3.882	-0.1	1.0	0.9
	South	1.897	-0.3	1.9	1.7
	Total	10.552	-0.3	1.2	1.0

The total monetary poverty gap of 13,525 billion Dong and the 24.4 million associated poverty-stricken individuals can be decomposed into poverty gaps of 10,550 bil-

lion Dong (US$750 million) covering 18.7 million poor individuals belonging to the group of 47.9 million farm households, 1,500 billion Dong (US$110 million) covering 2.7 million poor individuals belonging to the group of 15.2 million households with a self-employed head, and another 1,450 billion Dong (US$105 million) covering 2.8 million poor individuals belonging to the group of 14.2 million households with a wage-earning head. Looking at poverty from this angle, it does appear that poverty in Vietnam is mainly a phenomenon affecting (rural) farming households. Nevertheless, it also appears that farm poverty bias is mainly a matter of poverty headcount rather than average poverty gaps among poor individuals.

Looking at the experiments, it is clear that the poverty impact on individuals varies with the employment status of the head of household. A decomposition of the 320,000 additional poverty-stricken individuals shows that 205,000 belong to farm households, while 25,000 belong to self-employed households and 80,000 to wage-earning households. Moreover, a decomposition of the additional monetary poverty gap of 153 billion Dong (US$11 million) shows that poverty gaps increase by 110 billion Dong (US$8 million) for farm households, 20 billion Dong (US$1.3 million) for self-employed households, and 23 billion Dong (US$1.5 million) for wage-earning households. These numbers clearly indicate that the elimination of trade taxes has a strong absolute impact on poverty in farming households, but also that a large number of individuals with a wage-earning head of household will be pushed below the poverty line. Furthermore, the numbers confirm that the expansion of the monetary poverty gap in self-employed households follows from a combined expansion of the number of poor people and of the average poverty gap of these poor individuals.

Table 3.15 indicates some regional differences in the level and depth of poverty among individuals with a wage-earning head of household. The total poverty gap of 1,450 billion Dong covering 2.8 million poor individuals living in wage-earning households can be decomposed into poverty gaps of 330 billion Dong covering 600,000 poor individuals in the northern region, 520 billion Dong covering 900,000 poor individuals in the central region, and 600 billion Dong covering 1.3 million poor individuals in the southern region. Poverty among wage-earning households is therefore most widespread in the southern region, but the average poverty gap among poor individuals is higher in the central region. The 23 billion Dong increase in monetary poverty gap covering 80,000 additional poverty-stricken individuals living in wage-earning households can be decomposed into: (i) 5 billion Dong covering 50,000 new poor in the northern region, (ii) 10 billion Dong covering 50,000 new poor in the central region, and (iii) 10 billion Dong covering 20,000 new non-poor in the southern

region. It follows that the northern and central regions sees strong increases in poverty headcount and strong associated declines in average poverty gaps among poor individuals from self-employed households. Given the relatively high initial levels of the poverty headcount and average poverty gap in the central region, these relative changes tends towards a less equal regional distribution of poverty headcounts, and a more equal regional distribution of average poverty gaps among poor wage-earning households. Average poverty depth also tends to decline, implying a more equal regional distribution of average poverty depth among poor wage-earning households.

Table 3.16 indicates that there are large regional differences in the level and depth of poverty among self-employed households. A decomposition of the total 1,475 billion Dong poverty gap, covering 2.75 million poor individuals living in self-employed households, shows that some 615 billion Dong cover 910,000 poor individuals in the northern region, 525 billion Dong cover 950,000 poor individuals in the central region, while some 335 billion Dong cover 890,000 poor individuals in the southern region. Poverty among individuals living in wage-earning households is most widespread in the central region. Nevertheless, the average poverty gap among poor individuals is clearly the highest in the northern region, and almost twice the average poverty gap among poor individuals in the southern region. Relative to these numbers, the poverty impact of trade liberalisation is moderate. The 20 billion Dong increase in the poverty gap for self-employed households can be decomposed into 5 billion Dong covering 5,000 additional poor in the northern region, 5 billion Dong covering 20,000 additional poor in the central region, and 10 billion Dong covering no additional poor in the southern region. As was the case for wage-earning households, self-employed households experience a moderately high poverty headcount increase in the central region, and a moderately high average poverty gap increase in the southern region. While the increased poverty headcount in central provinces tends to reinforce the disproportionate share of poor self-employed individuals in this region, the increasing average poverty gap in southern provinces tends to even out regional differences in average poverty gaps among poor self-employed households. The increase in average poverty depth in the central region, is of no major consequence to the regional distribution of average poverty depth among poor self-employed households.

Finally, our data, summarized in Table 3.17, indicate that the total poverty gap of 10,550 billion Dong covering 18.7 million individuals living in farm households can be decomposed into a poverty gap of 4,775 billion Dong covering 8.2 million poor individuals in the northern region, 3,875 billion Dong covering 6.5 million poor indi-

viduals in the central region, and 1,900 billion Dong covering 4.0 million poor individuals in the southern region. These numbers indicate that poverty headcounts and average poverty gaps among poor individuals living in farm households are relatively high in the northern and central regions and relatively low in the southern region. Applying the percentage changes from Table 3.17 to the initial poverty measurements shows that the total additional poverty gap of 110 billion Dong covering 205,000 additional poverty-stricken individuals from farm households, can be decomposed into additional poverty gaps of 40 billion Dong covering 140,000 additional poor individuals in the northern region, 35 billion Dong covering 25,000 additional poor individuals in the central region, and 35 billion Dong covering 40,000 additional poor individuals in the southern region. The relatively uniform increases in monetary poverty gaps and the increase in average poverty gap in the southern region tends to even out regional differences for farming households. However, the increasing poverty headcount in the northern region tend to increase regional differences. Finally, changes in average poverty depth among poor farm households are small.

Summing up, the increase in overall poverty headcount is primarily driven by increasing poverty among farm households in the northern region. Altogether, they account for 140,000 out of a total 310,000 additional poverty-stricken individuals. The increasing regional poverty headcount in the southern region is also strongly influenced by increasing poverty among farm households, while the increased poverty headcount in the central region is dominated by increasing poverty among wage- and self-employed households. The increase in monetary poverty gaps is also dominated by farm households, both at the economy-wide and regional level, accounting for 110 billion Dong of the additional 153 billion Dong monetary poverty gap. Nevertheless, the relatively strong increase in the monetary poverty gap of the southern region tends to even out regional differences in monetary poverty. Moreover, average poverty gaps among poor self-employed, wage-earning and farming households generally increase in southern provinces and decrease in northern provinces. This tends to even out regional differences in average poverty gaps. Finally, changes in average poverty depth are relatively small for poor farm households and varying without a general tendency for poor self-employed and wage-earning households.

4. Conclusion

This paper has presented a methodology for measuring the poverty impact of macro policies within a CGE model framework, which does not rely on assumptions regarding intra-household distributions of income. Income distribution was modelled em-

pirically by disaggregating the household sector into a large number of micro house-holds, each having different compositions of factor endowments implying rich adjustments to changes in relative factor prices. Our results show that feedback-effects from the micro level distribution of income and expenditures to macro level variables are important in determining the poverty impact of trade policy interventions. This implies that endogenous modelling of empirical income and expenditure distributions is an important step forward in analysing the impact of macro-policy interventions on the distribution of welfare and poverty.

We also propose a new normalisation of traditional Foster-Greer-Thorbecke poverty measures to make them comparable across various household groupings. We argue that these adjusted poverty measures have an appropriate interpretation and give more relevant information than the traditional measures. Using these measures, we find that the poverty impact of eliminating trade taxes depends critically on the fiscal response of the government. In particular, the short- to medium term impact on poverty levels among the poor are inversely related to changes in investment expenditures. Overall welfare is relatively unchanged when measured by changes in total absorption. This suggests that the government can, and should, choose a combination of measures to make up for lost revenue from reduced trade taxes. At one extreme, we find that poverty headcounts and poverty levels among the poor will increase if the government decides to make up for lost revenues by relying solely on increased household taxation. At the other extreme, we find that a policy of pure deficit financing of the ensuing budgetary gap will lower the economy-wide monetary poverty gap by almost nine percent. We do not suggest that the government should allow trade liberalisation to be accompanied by an unbalancing of the budget. Nevertheless, our analysis shows that the government should exercise great care in choosing a proper fiscal response in order to avoid increasing poverty in the short- to medium-term.

The main part of our analysis was based on a standard revenue-neutral public finance closure where the government makes up for lost revenue by increasing household tax rates. Our results should therefore be interpreted as a worst case scenario. Altogether, our database indicates that 24.3 million individuals or 39 percent of the Vietnamese population have expenditures, which are lower than the poverty line of 1.68 million Dong (US$120) per year. Our database also indicates that poverty, measured by poverty headcount and poverty gaps among the poor, is a rural phenomenon, and our experiments indicate that the elimination of all trade taxes would (under the closure just referred to) push 1.3 percent or an additional 310,000 people into poverty. Almost half of these people live in rural farm households in the northern region, which al-

ready has some 9.7 million poor inhabitants. This would imply a further worsening of regional discrepancies in poverty headcounts. On the other hand, regional monetary gaps would be more equal following this kind of trade liberalisation strategy, since the monetary poverty gaps in the southern provinces would increase relatively strongly. These distributional implications of reductions in trade taxes and associated changes in tax incidence suggest that the Vietnamese government should carefully consider its fiscal response to trade liberalisation. While replacing trade taxes with household income taxes will tend to even out some regional differences in poverty levels, it will also increase poverty levels in general. The government should therefore consider alternatives to increased household taxation, including increased enterprise taxation and/or reductions in expenditure levels, to accommodate their trade liberalisation efforts.

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