Agricultural Protection and Poverty in Indonesia: A General Equilibrium Analysis

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Abstract

A general equilibrium modeling approach is used to estimate the effects within Indonesia of unilateral and global trade liberalization, including effects on poverty incidence. It is concluded that global reform of trade policy in all commodities is a significant potential source of poverty reduction for Indonesia. The poor – rural and urban – have a strong interest in global trade policy reform. If Indonesia were to liberalize unilaterally, poverty incidence also would decline but the effect is small. If liberalization is confined to agricultural products, the effects are similar but the declines in poverty incidence within Indonesia are much smaller.

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Throughout Indonesia's post-independence period, its trade policies have taxed agriculture relative to manufacturing. But since around 2000, the net impact of the country's trade policy has been roughly neutral between these broad sectors. The reversal occurred immediately following the Asian financial crisis of the late 1990s. The switch took the form of increases in protection of the import-competing commodities sugar and rice, declines in taxation of agricultural exports, especially rubber and copra, and declines in manufacturing protection. The movement to a more democratic form of government has weakened the influence of Indonesia's 'technocrats', who have generally favored liberal trade policies. Greater protection of some key agricultural commodities has been a consequence.

Protection of agriculture primarily takes the form of import restrictions in the import-competing sugar and rice sectors. Other agricultural sectors receive virtually no direct protection. Subsidies to fertilizer and other inputs have been an indirect source of assistance to agriculture, but these rates of subsidy have declined.

The political explanations for protection of the sugar and rice industries are quite different. Protection of the sugar industry is a consequence of the political power of the highly concentrated sugar refining industry, including the state-owned component of this industry, closely linked with large-scale sugar plantations.[1]

In contrast, Indonesia's farm-level production of rice (paddy) is dominated by small scale farm-level producers. The rice milling sector is much more concentrated and better organized, however, and this is relevant because imports compete with milled rice rather than the raw, unmilled product (paddy) produced by the farmer. The political power of rice millers has been an important source of support for protection of the rice industry. The enhanced political power of the Indonesian parliament since the upheavals induced by the

[1] For a fuller discussion of agricultural assistance in Indonesia, see Fane and Warr (2008, 2009). Their estimates of agricultural assistance for Indonesia are incorporated in the World Bank's global agricultural distortions database (Anderson and Valenzuela 2008). Those estimates cover four-plus decades, but the representative values for CGE modeling as of 2004 that are used here are available in Valenzuela and Anderson (2008).

Asian crisis, together with the economic nationalism that dominates the membership of the parliament, have strengthened support for protection of the rice industry. Since 2000 imports of rice have officially been banned. In part, this policy has reflected the dubious claim, advanced by supporters of rice industry protection, that restricting rice imports reduces poverty. A general equilibrium analysis presented in Warr (2005) indicates that the policy increases poverty, within both rural and urban areas, because the poverty-increasing effects of increasing the consumer price of rice far exceed the poverty-reducing effects of increasing the producer price.

The purpose of this study is to analyze the effects of agricultural and other trade policies, both within Indonesia and at a global level, focusing particularly on its effects on poverty incidence within Indonesia. The study examines the effects of both liberalization in markets for all tradable goods and liberalization in agricultural markets only. For this kind of analysis, a general equilibrium approach is essential.

Consider, for illustrative purposes, the effects of reducing protection of the rice industry – a highly controversial issue within Indonesia. An adequate analysis of the distributional effects of this policy needs to take account of its effects on households' expenditures, disaggregated by household group, but also its effects on their incomes. This requires taking account of its effects on wages, operating through effects on the labor market, as well as effects on the returns to agricultural land and capital owned by poor people. But in doing this, the rice industry could not be considered in isolation. A reduction in rice prices will induce some contraction of rice (paddy) production. The paddy industry is a large employer of unskilled labor in absolute terms. Depending on the labor-intensity of this industry relative to others, a contraction of its output could induce either an increase or a decrease in real unskilled wages. Any change in unskilled wages would affect profitability in other industries, with effects on outputs and prices in those industries as well. These effects would have repercussions for household incomes. These effects on incomes would then have to be balanced against the effects on consumers of a reduction in the price of rice. But the consumption of rice could not be considered in isolation either. A reduction in the price of rice will have implications for the demands for other staple foods, such as those based on corn and wheat flour, another significant import. Finally, the reduced protection may reduce government revenue, if the instrument of protection is a tariff, or reduce private rents if the instrument is an import quota. The way this revenue is spent by the government, or the private quota holders, will also influence the net distributional outcome.

The debate over Indonesia's rice protection illustrates the necessity of a general equilibrium approach. The economic issues involved are complex and interrelated. A framework is required which accounts for these interactions and which simultaneously satisfies all relevant market clearing conditions and macroeconomic constraints. To address issues of poverty and inequality, such a framework must include a disaggregated household sector. Moreover, as the above discussion has illustrated, the full effects of a reduction in protection of the rice industry depend on the values of key economic parameters. In the case of the rice example, these include the supply response of domestic producers and the elasticity of supply of rice imports to Indonesia. But the true values of these parameters are uncertain. A framework is therefore needed in which the values of key parameters can be varied, where appropriate, to determine the sensitivity of the results to the assumed values of these parameters.

The next section describes the *Wayang* general equilibrium model of the Indonesian economy, the principal analytic tool used in this study. The following section describes the simulations performed with this model in combination with the LINKAGE model of the world economy (van der Mensbrugghe 2005). The simulations involve both unilateral agricultural and trade policy reform in Indonesia and reform by the rest of the world, so as to assess the relative importance of own-country versus rest-of-world policies on Indonesian households. The results are presented with a focus on the implications for poverty incidence within Indonesia. The final section concludes.

The *Wayang* General Equilibrium Model of the Indonesian Economy

This section briefly describes the major elements of the *Wayang* model. The household sector of the model is crucial for analysis of poverty incidence and its most important features are summarised in this overview. After an overview, the theoretical structure of the model and its database are described. This is followed by a discussion of important features of the parameter assumptions.

Overview

Wayang identifies ten different types of households, representing ten socio-economic groups

as defined in the Social Accounting Matrix (SAM) published by Indonesia's Central Bureau of Statistics (CBS 2005). For the purposes of the present study each of these 10 SAM household categories is divided into centile groups (100 sub-categories, with equal population in each) arranged by consumption expenditures per capita. The advantage of working with a general equilibrium model containing a highly disaggregated household sector is that it becomes possible to conduct controlled experiments, which focus on the consequences for household incomes, expenditures, poverty and inequality that arise from different economic shocks, taken one at a time.

As well as disaggregating households, *Wayang* also has a disaggregated industry and commodity structure. The microeconomic behaviour assumed within it is competitive profit maximization on the part of all firms and competitive utility maximization on the part of consumers. In the simulations reported in this chapter, the markets for final outputs, intermediate goods and factors of production are all assumed to clear at prices that are determined endogenously within the model.[2] The nominal exchange rate between the rupiah and the US dollar can be thought of as being fixed exogenously. The role within the model of the exogenous nominal exchange rate is to determine, along with international prices, the nominal domestic price level. Given that prices adjust flexibly to clear markets, a 1 percent increase in the rupiah/dollar exchange rate will result in a 1 percent increase in all nominal domestic prices, leaving all real variables unchanged.

Wayang belongs to the class of general equilibrium models that are linear in proportional changes, sometimes referred to as Johansen models, after the seminal work of Johansen (1964), which also used this approach. *Wayang* shares many structural features with the highly influential ORANI general equilibrium model of the Australian economy (Dixon, *et al.* 1982) and the GTAP general equilibrium model of the global economy (Hertel 1997), which also belong to this Johansen category. The specific structure of *Wayang* draws on an earlier version of the model (Warr, *et al.* 1998) and on a revised version of the *ORANI* model, called *ORANI-G* (Horridge 2004) The features of *Wayang* have been adapted to reflect important features of the Indonesian economy and to facilitate the analysis of poverty and inequality within Indonesia.[3] The principal components of the model are summarized below.

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[2] Variations to this assumption are possible. For example, the possibility of unemployment can be introduced by varying the closure to make either real or nominal wages exogenous, thereby allowing the level of employment to be endogenously determined by demand.

[3] For an application of an earlier version of this model to the relationship between economic growth and poverty incidence within Indonesia, see Fane and Warr (2002).

Industries

The national model contains 65 producer goods and services produced by 65 corresponding industries - 18 agricultural industries, 5 ‘resource industries’ (forestry, fishing, mining and quarrying) and 47 other industries. Each industry produces a single output, so the set of commodities coincides with the set of industries. The various industries of the model are classified as either ‘export-oriented’ or ‘import-competing’. The level of exports of an export-oriented industry is treated as being endogenous, while the exports of an import-competing industry are treated as being exogenous.[4] The criterion used to classify these industries is the ratio of an industry's imports to its exports. If this ratio exceeds 1.5, then the industry is regarded as producing an importable. If the import/export ratio is less than 0.5, then the industry is deemed to be export-oriented. For ratios between 0.5 and 1.5, additional relevant information is used in classifying the industry.

Commodities

Wayang contains two types of commodities - producer goods and consumer goods. Producer goods come from two sources: domestically-produced and imported. All 65 producer goods are in principle capable of being imported, although some have zero levels of imports in the database, services and utilities representing most of the examples. The 20 consumer goods identified in the model are each transformed from the producer goods, where the proportions of domestically produced and imported producer goods of each kind used in this transformation is sensitive to their (Armington) elasticities of substitution and to changes in their relative prices.

Factors of production

The mobility of factors of production is a critical feature of any general equilibrium system. 'Mobility' is used here to mean mobility across economic activities (industries), rather than geographical mobility, although the two are clearly connected. The greater the factor mobility that is built into the model, the greater is the economy's simulated capacity to

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[4] Given that the exported and domestically sold good are treated as being identical, this assumption is required to separate the domestic price of the import competing good from the price of the exported good. Otherwise, the Armington structure we have described above would be redundant. An alternative treatment is to distinguish between the commodity being exported and the commodity sold domestically, with a finite elasticity of transformation in production between them.

respond to changes in the economic environment. It is clearly essential that assumptions about the mobility of factors of production be consistent with the length of run that the model is intended to represent.

Two types of labor are identified: ‘unskilled’ and ‘skilled’, distinguished by the educational characteristics of the workforce. Skilled labor is defined as those workers with at least a lower secondary education. Both types of labor are assumed to be fully mobile across all sectors. These assumptions imply that skilled wages must be equal in all sectors, and move together. The same applies to unskilled wages, although the two need not be the same and need not move together.

An alternative treatment, popular in general equilibrium modelling studies, is to assume labor mobility within the agricultural and non-agricultural sectors, but not between them. This approach is rejected here because it denies a central reality of the Indonesian economy, as with many other developing economies, which is the mobility of labor between rural and urban areas, even in the short run. This assumption would rule out all resource mobility between the agricultural and non-agricultural industries, greatly limiting the scope for economic adjustment to a changed pattern of incentives such as that produced by trade liberalization. Within Indonesia, unskilled and semi-skilled workers move readily, often seasonally, between the agricultural and non-agricultural sectors of the economy. Indeed this mobility is a more important phenomenon than direct mobility among the various agricultural regions of the country, although this also happens.

The mobility of capital is somewhat different. It is assumed that there are two kinds of mobile capital: one mobile among agricultural sectors, and another mobile among non-agricultural industries. Mobile agricultural capital cannot be used outside agriculture and mobile non-agricultural capital cannot be used in agriculture. Mobile agricultural capital is thought of as machinery such as tractors of various kinds, which can be used in a variety of agricultural activities. It is best to think of what is called ‘land’ here as all immobile forms of agricultural capital, which includes much true land in the short run. In non-agriculture, plant and buildings are classified as ‘mobile’ because they can be used for many purposes. A factory building is a good example. Machinery is considered ‘immobile’ because most of it is more industry-specific than tractors are in agriculture.

Table 1 summarizes some features of the cost structure of the paddy industry (farm level production of rice) and compares it with the rest of the agricultural sector and the rest of the economy. The paddy industry is intensive in its use of unskilled labor, which accounts for 18.5 per cent of total costs and 31 per cent of total variable costs, both well above other

agricultural industries and the rest of the economy, on average. This point will be important for later discussion.

It is assumed that in every sector there is constant elasticity of substitution (CES) production technology with diminishing returns to scale to variable factors alone. However, we introduce a sector-specific fixed factor in each sector to assure that there are constant returns to scale in production to all factors. We refer to the set of specific factors in the agricultural sectors as 'land', and to the set of those in the non-agricultural sectors as 'fixed capital'. The assumption of constant returns means that all factor demand functions are homogeneous of degree one in output. In each sector, there is a 'zero profit' condition which equates the price of output to the minimum unit cost of production. This condition can be thought of determining the price of the fixed factor in that sector.

Households

The model contains ten major household categories - seven rural and three urban - differentiated by socio-economic group. The sources of income of each of these household types depend on their ownership of factors of production. These differ among the household categories and are estimated from the 2000 *Social Accounting Matrix* (SAM), compiled by the Indonesian government's statistical agency, the Central Bureau of Statistics (CBS 2005). The SAM is based primarily on the household income and expenditure survey, also conducted by CBS, called *Susenas*. Drawing on the 1999 *Susenas* data (CBS 2000), each of the 10 household categories is sub-divided into a further 100 sub-categories each of the same population size, arranged by real consumption expenditures per capita, thus giving a total of 1,000 sub-categories.[5] The consumer demand equations for the various household types are based on the linear expenditure system. Within each of the 10 major categories, the 100 sub-categories differ according to their budget shares in consumption.

Since the focus of the study centers on income distribution, the sources of income of the various households are of particular interest. The source of the factor ownership matrix used in the model is Indonesia's SAM for the year 2002. The households are described as follows:

Rural 1. *Agricultural employees*: agricultural workers who do not own land.

Rural 2. *Small farmers*: agricultural workers with land < 0.5 ha.

Rural 3. *Medium farmers:* agricultural workers with land 0.5 to 1 ha.

[5] The population sizes of the 10 major categories are not the same, but within each of these 10 categories the population sizes of the 100 sub-categories are the same.

Rural 4. *Large farmers:* agricultural workers with land >1 ha.

Rural 5. *Rural low income, non-agricultural households*: small retail store owners, small entrepreneurs, small personal service providers, and clerical and manual workers in rural areas.

Rural 6. *Rural non-labor households*: non-labor force and unclassified households in rural areas.

Rural 7. *Rural high income*: non-agricultural households consisting of managers technicians, professionals, military officers, teachers, large entrepreneurs, large retail store owners, large personal service providers, and skilled clerical workers in rural areas.

Urban 1. *Urban low income households*: small retail store owners, small entrepreneurs, small personal service providers, and clerical and manual workers in urban areas.

Urban 2. *Urban non-labor households*: non-labor force and unclassified households in urban areas.

Urban 3. *Urban high income households*: managers, technicians, professionals, military officers, teachers, large entrepreneurs, large personal service providers, and skilled clerical workers in urban areas.

In the social accounting matrix each household's income and expenditure items are classified as follows: wages and salaries, rent from capital, incoming transfers, outgoing transfers, income tax, final consumption, and savings.

The categories ‘wages and salaries’ and ‘rent from capital’ are each subdivided into various sub-categories. These categories did not correspond exactly to those of the model. In agriculture, returns to land and capital are not separated in the SAM, but returns to owner-provided labor are separated. A previous study on the cost structure of paddy production was used to allocate returns among the land and capital categories, and the various farming households receive the same proportionate breakdown of this total.

The factor ownership characteristics of the 10 major household categories are summarized in table 2. These household categories vary considerably in the composition of their factor incomes but, for the purpose of this study, limitations in the available data made it necessary to impose the assumption that the composition of factor incomes is uniform among the 100 sub-categories within each of these 10 major categories. These 100 sub-categories thus obtain their incomes from factors of production in the same proportions as one another. Of course, the incomes of these 100 sub-categories vary greatly, so they should

be thought of as owning varying quantities of a uniform bundle of factors. The composition of the factor bundle varies across the 10 major household categories but is uniform within each. The composition of expenditures on final commodities does vary among the 100 sub-categories, however, and also across the 10 major household categories.

The characteristics of the ten household categories described above are summarized further in table 3. This table shows the importance of each category within overall poverty incidence in Indonesia using the government's official poverty line. As is the case in many developing countries, Indonesia's poverty incidence is highest among rural socio-economic categories. Rural households account for 82 per cent of all poor people in Indonesia, but only 65 per cent of the total population.

Theoretical structure of the model

The analytical structure of the model includes the following major components:

- Household consumption demands, of each of the 10 broad household types, for 20 categories of consumer goods, are derived from the linear expenditure system.
- The household supplies of skilled and unskilled labor are assumed to be exogenous.
- The factor demand system is based on the assumption of CES production technology that relates the demand for each primary factor to industry outputs and prices of each of the primary factors. This reflects the assumption that factors of production may be substituted for one another in ways that depend on factor prices and on the elasticities of substitution between the factors.
- The distinction between skilled and unskilled labor, which are 'nested' within the sectoral production functions, is dealt with in each non-agricultural sector by allowing skilled and unskilled labor to enter a CES production function to produce 'effective labor'. Effective labor, variable capital and fixed capital then enter the production functions for domestic output.
- Leontief assumptions are used to represent the demand for intermediate goods. Each intermediate good in each sector is assumed to be demanded in fixed proportion to the gross output of the sector.
- Demands for imported and domestically produced versions of each good incorporate

Armington elasticities of substitution between the two.

- A set of equations that determine the incomes of the 10 household types from their (exogenous) ownership of factors of production reflect data derived from the official 2000 SAM, the (endogenous) rates of return to these factors, and any net transfers from elsewhere in the system.
- Rates of import tariffs and excise taxes across commodities, rates of business taxes, value added taxes and corporate income taxes across industries, and rates of personal income taxes across household types, reflect the structure of the Indonesian tax system, using data from the Indonesian Ministry of Finance (MOF 2008).
- A set of macroeconomic identities ensure that standard macroeconomic accounting conventions are observed.

The model's database

This sub-section provides a description of INDOSAM 2000: a disaggregated social accounting matrix (SAM) for Indonesia, with a 2000 base. This SAM is intended to serve as the database for *Wayang*, but it has other potential uses as well. At the time of this study the year 2000 was the latest for which it was possible to assemble the information required for the construction of a social accounting matrix for Indonesia.

Four data sources, all compiled by the Central Bureau of Statistics (CBS), were used to construct INDOSAM 2000: the 2000 input-output tables (subsequently referred to as IO 2000); the 2000 social accounting matrix (subsequently SAM 2000); the 1999 Susenas household income and expenditure survey (CBS 2000); and other, supplementary data sources used in the construction of specific tables.

The principal data source is the 2000 social accounting matrix, produced by CBS (2005). It contains 22 production sectors, which is insufficient for the purposes of this study. The SAM does not include the detail of tax payments and household sources of income that are also required for the study. The 2000 input output table specifies 66 production sectors.

For the purposes of the present study, modifications to the data contained in IO 2002 were needed for three reasons. One is that the table specifies only total intermediate goods and services transactions for each pair of producing and purchasing industries, at producer

prices. Unlike the 1990 table, these transactions are not divided into goods and services from domestic and imported sources. Second, the table includes a sector (number 66, labelled "unspecified sector"), which is included as a balancing item. Sector 66 does not describe a true sector of the economy and in any case the data for this sector indicates negative final demand, an economic impossibility. And third, the table obtained from CBS was not fully balanced. The major imbalances were that: for most industries defined in the table, the industry-specific elements of row 210 (total input) were not equal to those of row 600 (total output); and the elements of row 200 (total imports) plus row 600 (total output) were not equal to those of row 700 (total supply).

These problems were overcome as follows. First, the shares of imported intermediate goods and domestically produced intermediate goods for each cell of the table, as implied by the published 1990 IO table, were used to divide intermediate goods transactions into domestic and imported components, a distinction that is required by the Armington theoretical structure of intermediate good demand. Second, Sector 66 was aggregated with the much larger sector 65 (labelled "other services"), which eliminated the problem of negative final demands. And third, the revised table was balanced using the RAS adjustment method to ensure that all required accounting identities were observed.

The model's elasticities

All export demand elasticities are set equal to 20. The elasticities of supply of imports to Indonesia are assumed to be infinite (import prices are set exogenously) except for rice, where the assumed elasticity is 10. All production functions are assumed to be CES in primary factors with elasticities of substitution of 0.5, except for the paddy production industry where this elasticity is set at 0.25, reflecting the empirical observation of low elasticities of supply response in this industry. The Armington elasticities of substitution in demand between imports and domestically produced goods are set equal to 2, except for rice, where the assumed value is 6. The higher value for rice reflects the assumption that imported and domestically produced rice are closer substitutes than is the case for most other commodities.

Simulations

We first describe the policy shocks that are simulated, and then summarize the model closure characteristics.

The shocks

The effects of policy reform are simulated using the *Wayang* model of the Indonesian economy, combined with the LINKAGE model of the world economy (van der Mensbrugghe 2005). The simulations involve both unilateral agricultural and trade policy reform in Indonesia and reform by the rest of the world, so as to assess the relative importance of own-country versus rest-of-world policies on Indonesian households. They also compare agriculture-only reform with reform in all goods markets, in order to gauge the relative contribution of agricultural policies to the measured impacts on Indonesian households.

'Reform' here means the complete elimination of all tariffs, the tariff equivalent of any non-tariff barriers, export taxes and export subsidies, and domestic agricultural policies in so far as they alter producer or consumer prices of farm products in various countries. Three sets of policy reforms are considered below: unilateral reform in Indonesia (Simulation A), global reform excluding Indonesia (Simulation B), and their combination (i.e., global reform including Indonesia, Simulation C).

In all three sets of simulations, the Wayang model treats as exogenous: (i) all of Indonesia's rates of industry assistance (tariffs, tariff equivalent of non-tariff barriers and export subsidies), (ii) all of Indonesia's import prices, and (iii) all shifters in Indonesia's inverse export demand functions (equivalent to shifts in the prices at which Indonesia can export a given volume of exports).

Simulation A depicts reform in Indonesia alone. This simulation uses only the *Wayang* model and does not involve the LINKAGE model. Indonesia's assumed rates of industry assistance are set out in table 4, and the database of the *Wayang* model was amended to match these. Exogenous variables (i) are set to zero (changed exogenously by -100 percent) in this scenario in which all Indonesian tariffs, tariff equivalent of quantitative restrictions and all export subsidies are eliminated. Exogenous variables (ii) and (iii), import prices and

export demand shifters, do not change. Export prices are determined endogenously within *Wayang* by export demand equations for Indonesia that relate the export price of each commodity to its quantity of export.[6] The export quantities are endogenously determined within the *Wayang* model and export prices are determined simultaneously with them by movements *along* the export demand equations (recalling that export demand shifters are zero).

Simulation B depicts reform in the rest of the world (all countries except Indonesia). In this case exogenous variables (i) do not change but exogenous variables (ii) and (iii) do. The simulation takes the changes to import prices for Indonesia and the shifts to Indonesia's export demand equations that are generated by simulations from the LINKAGE model. These LINKAGE model simulations, conducted by van der Mensbrugghe, Valenzuela and Anderson (2009), estimate the changes to these import prices and export demand shifters that result from liberalization in all countries except Indonesia and these results are then applied as shocks to *Wayang*. These changes to border prices, derived from the LINKAGE model, are shown in table 5.

Simulation C combines simulations A and B to depict global reform including Indonesia. In this case exogenous variables (i), (ii) and (iii) all change. The non-linear approximation techniques used to solve the *Wayang* model mean that the results of Simulation C are not exactly the arithmetic sum of the results from Simulations A and B, but they are similar to this arithmetic sum.

Each of the above simulations is conducted twice: once where the reductions to protection for Indonesia and the rest of the world apply to all traded commodities (labeled Simulations A1, B1 and C1) and once where they apply only to agricultural and lightly processed food commodities (labeled Simulations A2, B2 and C2).

Model closure

Since the real consumption expenditure of each household is chosen as the basis for welfare measurement, and is the basis for the calculation of poverty incidence, the macroeconomic closure must be made compatible with both this measure and with the single-period horizon of the model. This is done by ensuring that the full economic effects of the shocks to be introduced are channeled into current-period household consumption and do not 'leak' in

[6] The assumption that each export demand elasticity is 20 means that export prices are 'close' to being exogenous.

other directions, with real-world intertemporal welfare implications not captured by the welfare measure. The choice of macroeconomic closure may thus be seen in part as a mechanism for minimizing inconsistencies between the use of a single-period model to analyze welfare results and the multi-period reality that the model imperfectly represents.

To prevent intertemporal and other welfare leakages from occurring, the simulations are conducted with balanced trade (exogenous balance on current account). This ensures that the potential benefits from the liberalization do not flow to foreigners, through a current account surplus, or that increases in domestic consumption are not achieved at the expense of borrowing from abroad, in the case of a current account deficit. For the same reason, real government spending and real investment demand for each good are each fixed exogenously. The government budget deficit is held fixed in nominal terms. This is achieved by endogenous across-the-board adjustments to the sales tax rate so as to restore the base level of the budgetary deficit. The combined effect of these features of the closure is that the full effects of changes in policy are channeled into household consumption and not into effects that are in fact relevant for economic welfare but which are ignored within the single-period focus of the model.

Results from liberalizing markets for all goods

While the emphasis in this study is on the effects on poverty and income inequality, an understanding of them requires looking first at the macroeconomic effects.

Macroeconomic effects

The macroeconomic effects of trade reform in all commodities are summarized in table 6. Real GDP rises in Indonesia under all three reform scenarios. The increases are small in the case of unilateral liberalization (Sim A1) and moderate when other countries liberalize as well (Sim B1 and C1). Under unilateral liberalization the domestic price level within Indonesia declines, measured as the GDP deflator and the CPI. Aggregate real household consumption rises marginally under unilateral reform (Sim A1) and rises more substantially when the rest of the world reforms (B1) and under global reform (C1), including Indonesia.

As the description of model closure above indicates, real investment, real inventories and real government spending (each deflated by their specific price deflators) and the real trade balance (measured in foreign exchange terms) are all held constant in these simulations. The nominal values of each of these categories thus change as the price levels of the components change. The nominal values of GDP and consumption change in line with the fact that the GDP deflator and the CPI both decline as Indonesia removes its tariffs**.** The same is true of investment and inventories.

However, nominal government spending increases. The reason is evident from the changes in factor prices. The real value of skilled labor increases by a proportion (5.7 percent) greater than the decline in the CPI (2.2 percent). Nominal skilled wages therefore rise (3.5 percent). Because government expenditure is heavily concentrated in the employment of skilled (educated) labor, nominal government spending must rise to maintain the real value of government spending. Consumption is the only component of expenditure on GDP whose real value is not fixed exogenously. The increase in nominal government spending therefore limits the amount by which real household consumption can increase in response to the decline in protection.

The reason for the rise in the real value of skilled wages is that, according to the rates of industry assistance for Indonesia used in these simulations (table 4), Indonesia's protective structure acts against the interests of industries that are intensive in the use of skilled labor. It is virtually neutral with regard to unskilled labor. The existence of this protection reduces the real value of skilled wages and its removal does the reverse.

The bottom panel of table 6 summarizes the changes in the real consumption expenditures of each of the 10 household groups. Under unilateral liberalization (Sim A1), both poorer rural household groups (Rural 1, 2 and 3) and the poorest urban household group (Urban 1) lose, and all other household groups gain. The changes in real factor prices and the sources of household incomes (table 2) provide the main explanation for these outcomes. Real unskilled wages remain virtually unchanged and the real return to agricultural land and capital decline in this simulation, thus harming poorer rural households. At the same time, real returns to skilled labor and non-agricultural capital rise, favoring richer households, especially those living in urban areas. In addition, reduced protection directly lowers the consumer prices of imported goods subject to protection.

These results necessarily reflect the structure of protection in Indonesia that is assumed in this study, as represented in the Distortions to Agricultural Incentives Project database (Anderson and Valenzuela 2008). According to these estimates, protection disfavors skilled

labor intensive industries overall, and favors agricultural industries intensive in the use of land and agricultural capital. Removing the protection harms agricultural land and capital and benefits skilled labor and non-agricultural capital. These factors are owned most intensively by the richest urban households and they are, in consequence, the largest beneficiaries of unilateral liberalization in Indonesia.

Liberalization in the rest of the world (Sim B1) produces international price changes that raise real GDP in Indonesia by about twice the increase resulting from Indonesia's unilateral liberalization, but the effects within Indonesia are qualitatively different. Liberalization in the rest of the world raises the real value of both skilled and unskilled wages in Indonesia, especially the former, along with the return to agricultural capital and (especially) agricultural land. The reason is that liberalization in the rest of the world raises agricultural prices relative to non-agricultural prices internationally, favoring Indonesia's agricultural sectors. These results will be important for our discussion of poverty, below. Real returns to non-agricultural capital decline, but all other factor returns increase. A key point is that rest-of-the-world liberalization benefits unskilled labor in Indonesia proportionately more than skilled labor. The increase in real consumption in Indonesia is ten times the increase resulting from unilateral liberalization, and real household expenditure increases in all ten socio-economic categories.

Global reform (Sim C1) is a combination of the previous two simulations and is dominated by rest-of-world liberalization. The results are qualitatively similar to those described for Simulation B1.

Effects on poverty incidence and inequality

The simulated effects on poverty incidence by socio-economic group broadly mimic the effects on the average household consumption of these groups, just discussed. The level of poverty incidence obviously depends on the poverty line used in the calculations, and this can also be true of the simulated changes in poverty incidence that result from particular economic shocks. The shifts in real expenditures resulting from particular economic shocks are not uniform across income groups because of differences in expenditure patterns. Different poverty lines act on different sections of the cumulative distribution of real expenditures and thus can produce different patterns of changes in poverty incidence from the same simulation.

We present effects on poverty incidence using three different poverty lines: the Indonesian government's national poverty line; the international $1 a day poverty line at purchasing power parity; and the international $2 a day poverty line at purchasing power parity.

In the case of each of these poverty lines, we use a calibration method, as follows. First, we begin with the *ex ante* distribution of expenditures of households contained in the model's data base. Second, the published level of poverty incidence using the poverty line concerned is used to find the value of the poverty line, measured in domestic Indonesian currency, which generates that particular level of poverty incidence from the data on household expenditures contained within the model's data base. These published levels of poverty incidence come from the Indonesian government's *Indonesian Statistical Yearbook* in the case of the national poverty line (CBS 2007) and the World Bank's *World Development Indicators*, in the case of the $1 and $2 a day poverty lines (World Bank 2008). This then becomes the base level of the poverty line used in subsequent calculations.

Third, the *ex post* levels of real expenditure for each household are simulated within the model**,** reflecting the effects of the shocks applied to the model. These calculations of real expenditures are performed using the household's individual consumer price index as the deflator, reflecting that particular household's consumption bundle. Fourth, these *ex post* real expenditures are then compared with the poverty line just described to obtain *ex post* levels of poverty incidence. Fifth, the changes in poverty incidence reported in table 7 (and also in table 10) are the *ex post* levels of poverty incidence minus the *ex ante* levels corresponding to each of the three poverty lines described above. A positive number thus indicates an increase in the simulated level of poverty incidence as a result of the shocks concerned.

In addition to effects on poverty incidence, we also report simulated effects on inequality in the distribution of household real expenditures, using the Gini coefficient as the measure. The Gini coefficient takes values between zero and one, with higher values reflecting greater inequality. These coefficients are estimated by constructing Lorenz curves from the distributions of *ex ante* and *ex post* real expenditures and then calculating the Gini coefficients corresponding to these distributions. These results are presented in tables 8 and 11.

From table 7(a), unilateral liberalization in Indonesia applied to all commodities (Simulation A1) raises poverty incidence in the poorest three rural household categories and lowers it among the richer rural categories and in all but the poorest urban category. Aggregate urban and rural poverty incidence both decline, but the decline is larger among

urban households. National poverty incidence necessarily declines. All these effects are quite small. Tables 7(b) and 7(c) show that these effects are not particularly sensitive to the poverty line being used except that, at the $2 a day poverty line, rural poverty incidence rises.

The effects of liberalization in the rest of the world (Simulation B1) are quite different. Poverty incidence in Indonesia declines significantly in this scenario. The decline occurs in all ten socio-economic groups but is largest in rural areas. At the national level, poverty incidence declines by 3.5 per cent (national poverty line). This pattern of results is not sensitive to the poverty line being used. Using the $1 a day and national poverty lines, rural and urban poverty incidence both decline significantly. The explanation for these outcomes is evident from the changes in real factor returns, described above. Rest-of-world liberalization raises the international prices of agricultural commodities relative to non-agricultural prices, and this produces an increase in the real value of unskilled wages and returns to agricultural capital and land within Indonesia. These effects benefit poor households, especially those in rural areas. Urban and especially rural poverty incidence both decline.

Finally, we can compare the combined effects of unilateral reform in Indonesia and liberalization elsewhere, summarized in the tables as the effects of global reform (Simulation C1). As in the case of Simulation B1, the real returns to unskilled and skilled labor rise significantly, along with the returns to agricultural land and capital. But the real return to non-agricultural capital declines marginally. Both rural and urban poverty decline significantly, especially rural poverty. The central result is that rest-of-world reform effects dominate unilateral liberalization impacts. The results seen here are basically those of the rest-of-world reform scenario (B1) tempered by the counteracting domestic liberalization (A1) effects.

The method used to estimate changes in poverty incidence is illustrated by Figure 1. This figure shows the *ex-ante* (initial) distribution of expenditures for Socio-economic group Rural 3 (medium-sized farmers with land 0.5 to 1 ha.), along with the simulated *ex-post* (new) distribution of expenditures that results from Simulation C1. These two curves thus show the cumulative distribution of expenditures per person at constant (year 2000) prices before and after the shock. That is, the change in nominal expenditures for each household is deflated by a household-specific index of consumer prices, reflecting that household's base-period (initial) expenditure pattern. For any level of expenditure (horizontal axis) each curve shows (on the vertical axis) the proportion of the population with expenditures less than or equal to

that amount. For any poverty line, poverty incidence can thus be read as the vertical value of the intersection between that poverty line (horizontal axis) and the cumulative distribution.

The initial level of poverty incidence for this socio-economic group, using the national poverty line for 2000, was 32.3 per cent, the intersection of the poverty line with the cumulative distribution marked 'Initial'. Simulation C1 (global reform in all commodities) shifts the entire distribution to the right, though not uniformly, producing the simulated cumulative distribution of expenditures at constant prices marked 'Simulation C1'. It is important to note that this is a shift in *real* expenditures, measured at 2000 prices. The new level of poverty incidence can therefore be read using the same poverty line as before. Poverty incidence declines to 26.8 percent, a decline of 5.5 percent. It is apparent from the diagram that poverty incidence declined for any poverty line that might have been chosen. In the case of this simulation, the conclusion that poverty incidence declined for this socio-economic group is therefore not dependent on the particular poverty line that was selected, although the magnitude of the decline will be affected by the choice of the poverty line.

Effects on inequality within Indonesia are summarized in table 8. Both unilateral and global liberalization in all commodities raise inequality within Indonesia. This effect is largest in the case of unilateral liberalization. It operates through the increased returns to skilled labor and non-agricultural capital, factors owned primarily by better-off urban households.

Results from liberalizing only agricultural markets

When liberalization is confined to agricultural and lightly processed food products only (Simulations A2, B2 and C2), unilateral liberalization in Indonesia (Simulation A2) lowers the return to unskilled labor, agricultural capital and land, and raises the return to skilled labor and non-agricultural capital (table 9). Rice and sugar dominate agricultural protection in Indonesia. They are unskilled labor- and land-intensive industries, relative to the rest of the economy. Reducing protection within Indonesia reduces the real incomes of owners of unskilled labor and agricultural land (tables 10(a) and 10(c)). Real incomes fall in most rural household categories and rise in urban categories, but reduced agricultural protection also lowers food prices. The net effects on real expenditures are very small. Most rural household categories are small net losers and all urban categories are net gainers.

It has been argued elsewhere that reduced protection of the rice industry alone reduces poverty incidence within Indonesia among both urban and rural households (Warr 2005). Rice differs from the rest of agriculture in two important respects. First, it is more intensive in the use of unskilled labor than the rest of agriculture. Second, rice is a staple food for most Indonesians and forms a high proportion of the expenditures of the poorest groups. On the one hand, reduced protection of rice reduces real unskilled wages, but on the other hand it reduces the consumer price of the staple food of the poor, rice. The latter effect dominates.

But when the reduced protection applies to all agricultural products, including sugar, the effect on poverty incidence is more ambiguous. Reduced protection still reduces unskilled wages but the poverty-reducing effect of reducing consumer prices is less strong for protected agriculture in general than for rice alone. Unilateral agricultural liberalization causes poverty incidence to rise in rural areas and to fall in urban areas. The net effect on national poverty incidence is a small decline using the national poverty line and a small increase using the $1 and $2 a day poverty lines.

Agricultural liberalization in the rest of the world (Simulation B2) raises the prices of agricultural commodities on the international market relative to non-agricultural commodities. The effect is to raise the return to unskilled labor within Indonesia and to lower the return to skilled labor. Poverty incidence declines in both rural and urban areas and this qualitative result holds regardless of the poverty line being used. When the world liberalizes, including Indonesia (Simulation C2), the quantitative effects of this rest-of-world liberalization again dominate the effects of domestic liberalization. The results from global agricultural liberalization are thus qualitatively similar to those of rest-of-world reform.

Inequality within Indonesia rises slightly under unilateral agricultural liberalization because unskilled wages decline relative to skilled wages. Within rural areas alone, there is no change in inequality because, although real wages decline, this effect is offset by reduced returns to agricultural capital and land. Rest-of-world and global agricultural reform reduce inequality within Indonesia because returns to unskilled labor, agricultural capital and land (owned by the poor, especially the rural poor) rise relative to other factor returns. These effects are summarized in table 11.

Comparing the results from liberalization in all commodities (Sims A1 to C1) with liberalization in agricultural products only (Sims A2 to C2), six key points emerge:

- Trade liberalization reduces poverty incidence within Indonesia, but the effects are large only when they apply at a global level and to all commodities;

- The effects of rest-of-world liberalization dominate those of unilateral liberalization, and rest-of-world liberalization is more strongly poverty reducing than liberalization within Indonesia alone;
- Unilateral across-the-board liberalization in Indonesia reduces food prices and raises the real return to skilled labor, while lowering the return to agriculture-specific factors of production, which produces small net reductions in poverty incidence overall but the effects on individual rural household categories are mixed;
- Liberalization in all commodities is more strongly poverty-reducing in Indonesia than liberalization in agricultural products alone, whether the liberalization occurs unilaterally in Indonesia or in the rest of the world or both;
- Unilateral liberalization confined to agricultural products produces benefits mainly for urban households and these operate through reduced food prices plus increased returns to skilled labor and non-agricultural capital; and
- Liberalization in all commodities raises inequality within Indonesia, whether the liberalization is unilateral or global, but especially the former, whereas liberalization in agricultural products alone raises inequality very slightly when it is unilateral and reduces it when it is global.

Conclusions

The comparative static nature of the analysis of this paper limits its capacity to capture the full economic gains available from liberalization. Dynamic effects are not captured and these could be significant sources of additional welfare gains and poverty alleviation from trade policy liberalization. Nevertheless, within this comparative static limitation, the analysis indicates that global reform of trade policies in all commodities is a significant potential source of poverty reduction for Indonesia. The poor of Indonesia – rural and urban – have a strong interest in global trade policy reform, whether Indonesia is part of the liberalization or not. When Indonesia liberalizes unilaterally, poverty incidence also declines, but the comparative static benefits are much smaller.

If liberalization is confined to agricultural products, the pattern of effects is similar, but the declines in poverty incidence within Indonesia are much more modest. Global reform in agricultural products generates significant reductions in both rural and urban poverty.

Indonesia's rural and urban poor have a strong interest in global reform of agricultural trade policy, but – according to the comparative static analysis of this study – the rural poor do not necessarily have an interest in unilateral agricultural liberalization because some rural socio-economic groups lose from it.

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Table 1: Cost shares of major factors of production, paddy and other industries, Indonesia, 2000

(per cent of total costs)

Cost components:	Paddy	Other agriculture	Non agriculture	All Industries
Unskilled labor	18.5	9.0	6.3	8.1
Skilled labor	3.1	6.6	7.1	7.0
Mobile agricultural capital	20.6	21.3	0.0	1.7
Mobile non-agricultural capital	0.0	0.0	25.3	23.2
Land	18.1	20.2	0.0	1.6
Non-land fixed capital	0.0	0.0	25.3	21.2
Intermediate inputs	39.7	42.9	36.0	36.9
Total	100.0	100.0	100.0	100.0

Source: Data base of *Wayang* model, based on *Indonesian Input-output Table*, Central Bureau of Statistics (CBS 2001) and agricultural cost survey data from the Ministry of Agriculture (2008).

Table 2: Sources of factor incomes of broad household groups, Indonesia, 2000

	Land	Skilled Labor	Unskilled Labor	Mobile agricultural capital	Mobile non-agricultural capital	Fixed capital and land	Total factor income
Rural 1	4.1	1.4	53.6	2.1	9.3	29.5	100.0
Rural 2	1.6	6.1	26.7	1.4	16.3	47.9	100.0
Rural 3	9.8	2.7	14.1	4.8	16.1	52.6	100.0
Rural 4	9.7	4.0	7.8	4.9	17.4	56.3	100.0
Rural 5	7.6	7.0	43.3	3.6	8.7	30.0	100.0
Rural 6	2.8	29.2	15.2	1.7	12.7	38.4	100.0
Rural 7	12.6	20.7	4.5	5.9	12.4	44.0	100.0
Urban 1	4.1	12.8	24.4	2.4	13.8	42.5	100.0
Urban 2	3.2	22.0	42.3	1.7	7.4	23.4	100.0
Urban 3	4.1	23.8	1.3	2.5	17.0	51.4	100.0

Source: Database of WAYANG model (see Warr *et al.* 1998), based on *Susenas* 1999 (see CBS 2000).

Table 3: Expenditure and poverty incidence by household group, Indonesia, 2000

Household group:	% of total population in this group	Mean per capita expenditure (Rp./month)	% of this group in poverty	% of all poor people in this group
Rural 1	8.0	6,358	39.8	13.9
Rural 2	14.8	3,608	34.9	22.4
Rural 3	7.1	7,584	32.3	9.9
Rural 4	9.0	6,618	27.8	10.9
Rural 5	16.0	3,891	23.8	16.5
Rural 6	4.9	12,795	28.0	5.9
Rural 7	5.0	16,060	10.5	2.3
Urban 1	20.4	4,210	15.2	13.4
Urban 2	6.1	17,813	11.2	2.9
Urban 3	8.7	14,353	5.0	1.9
Indonesia	100.0	12,084	23.1	100.0

Memo items:

Headcount poverty incidence national (%)	23.10
Headcount poverty incidence rural (%)	29.09
Headcount poverty incidence urban (%)	11.97
Gini coefficient national	0.335
Gini coefficient rural	0.291
Gini coefficient urban	0.356

Source: Database of WAYANG model (see Warr *et al.* 1998), based on *Susenas* 1999 (see CBS 2000).

Table 4: Industry assistance rates used in modeling, Indonesia, 2004

(percent)

Commodity	Tariff	Export subsidy	Output subsidy
Paddy rice	15.0	0.0	0.0
Wheat	0.8	0.0	0.0
Other grains	15.0	0.0	0.0
Vegetables and fruits	4.8	0.0	0.0
Oil seeds	4.7	-9.0	0.0
Sugar cane	0.0	0.0	0.0
Plant-based fibers	3.7	0.0	0.0
Other crops	4.5	-8.0	0.0
Cattle sheep etc	3.1	0.0	0.0
Other livestock	3.1	0.0	0.0
Raw milk	0.0	0.0	0.0
Wool	3.8	0.0	0.0
Other primary products	2.9	-0.6	0.3
Beef and sheep meat	4.8	0.0	0.0
Other meat products	4.5	0.0	0.0
Vegetable oils and fats	2.9	0.0	0.0
Dairy products	3.9	0.0	0.0
Processed rice	15.0	0.0	0.0
Refined sugar	18.3	0.0	0.0
Other food, beverages, tobacco	15.3	0.0	0.0
Textile and wearing apparel	8.0	-1.4	0.0
Other manufacturing	5.1	-1.2	0.1
Services	0.0	0.0	0.2

Source: Valenzuela and Anderson (2008), based on the estimates compiled by Anderson and Valenzuela (2008).

Table 5: Exogenous border price shocks due to liberalization in the rest of the world, Indonesia

(percent deviation from base)

	Export price shocks[a]		Import price shocks[b]	
	Reform of all goods	Agriculture - only reform	Reform of all goods	Agriculture - only reform
Paddy rice	0.0	0.0	4.3	2.7
Wheat	0.0	0.0	6.8	7.1
Other grains	3.1	1.4	-2.7	-2.8
Oil seeds	3.0	1.3	-1.8	-1.3
Sugar cane and beet	0.0	0.0	0.0	0.0
Plant-based fibers	3.1	1.4	7.6	8.7
Vegetables and fruits	3.1	1.4	2.6	1.9
Other crops	3.0	1.3	1.5	1.8
Cattle sheep etc	3.0	1.3	5.6	5.5
Other livestock	2.7	1.1	-1.9	-0.6
Raw milk	0.0	0.0	0.0	0.0
Wool	0.0	0.0	9.8	10.0
Beef and sheep meat	3.0	1.4	5.6	5.7
Other meat products	2.5	0.8	3.3	3.6
Vegetable oils and fats	2.5	0.9	0.4	1.1
Dairy products	2.7	1.1	8.6	8.8
Processed rice	3.0	1.3	3.7	2.8
Refined sugar	2.6	1.0	2.9	2.5
Other food, beverages, tobacco	2.4	0.9	-0.8	-0.7
Other primary products	2.1	0.6	1.3	0.8
Textile and wearing apparel	2.1	1.0	-0.3	0.4
Other manufacturing	1.9	0.6	0.4	0.4
Services	2.1	0.6	-0.2	0.2
Agriculture and food	2.5	1.0	3.0	3.2
Agriculture	3.0	1.3	4.1	4.5
Processed foods	2.5	0.9	1.7	1.8
Other manufacturing	2.0	0.6	0.4	0.4
Non tradables	2.1	0.6	-0.2	0.2
Total	2.1	0.7	0.5	0.6
Merchandise trade	2.1	0.7	0.7	0.8

[a] Simulated as shocks to the inverse export demand equations for Indonesia.
[b] Simulated as shocks to the exogenous import prices for Indonesia.
Source: Linkage model simulations (see van der Mensbrugghe, Valenzuela and Anderson 2009).

Table 6: Aggregate simulation results for Indonesia of prospective liberalization of all commodities

Macroeconomic aggregates (percent change from base)	Sim A1: Unilateral liberalization	Sim B1: Rest-of-world liberalization	Sim C1: Global liberalization
Real GDP, expenditure side (GDP deflator)	0.54	1.12	1.37
Real household consumption (CPI deflator)	0.54	5.21	5.78
Import volume index, duty-paid weights	11.95	12.54	27.09
Export volume index	9.84	4.59	15.56
GDP price index, expenditure side	-1.75	9.06	7.59
Consumer price index	-2.19	8.79	6.50
Nominal changes (Rp. billion):			
GDP	-17,923	150,926	133,071
Consumption	-14,854	129,693	113,574
Investment	-4,561	12,890	9,135
Inventory	-109	-1,580	-1,829
Government expenditure	1,600	9,922	12,191
Exports net of imports	0	0	0
Real return to factors (percent change from base, using CPI deflator)			
Unskilled Labor	0.2	7.1	8.5
Skilled Labor	5.7	1.8	8.1
Agriculture Capital	-5.6	11.9	9.0
Non-Agriculture Capital	3.1	-4.6	-1.5
Land	-2.9	21.0	19.1
Real household expenditures (percent change from base, using CPI deflator)			
Rural1	-0.8	3.9	3.0
Rural2	-1.1	5.9	4.7
Rural3	-0.1	6.8	6.8
Rural4	0.7	4.4	5.1
Rural5	1.0	5.5	6.7
Rural6	0.3	5.6	6.0
Rural7	1.1	5.2	6.3
Urban1	-0.1	4.6	4.5
Urban2	1.6	5.1	7.0
Urban3	1.9	5.5	7.4

Source: Authors' Indonesian CGE model simulations.

Table 7: Poverty effects for Indonesia of prospective liberalization of all commodities

(a) Using national poverty line

Group	*Ex ante* level of poverty incidence (% of group population)	Changes in poverty incidence (%), *ex post – ex ante*		
		Sim A1: Unilateral liberalization	Sim B1: Rest-of-world liberalization	Sim C1: Global liberalization
Rural1	39.81	0.81	-4.82	-3.52
Rural2	34.89	0.76	-5.71	-4.95
Rural3	32.29	0.09	-5.53	-5.49
Rural4	27.82	-0.44	-2.64	-4.17
Rural5	23.78	-0.82	-3.91	-4.60
Rural6	28.01	-0.13	-3.45	-3.85
Rural7	10.50	-0.77	-2.07	-2.35
Urban1	15.22	0.02	-2.31	-2.27
Urban2	11.16	-0.52	-2.35	-3.09
Urban3	5.00	-0.39	-1.03	-1.36
Urban households	11.98	-0.16	-1.99	-2.18
Rural households	29.09	-0.05	-4.26	-4.36
All households	23.10	-0.12	-3.49	-3.60

Table 7 (continued): Poverty effects for Indonesia of prospective liberalization of all commodities

(b) Using $1 a day poverty line

Group	*Ex ante* level of poverty incidence (% of group population)	Changes in poverty incidence (%), *ex post – ex ante*		
		Sim A1: Unilateral liberalization	Sim B1: Rest-of-world liberalization	Sim C1: Global liberalization
Rural1	2.40	0.11	-0.47	-0.39
Rural2	13.09	0.43	-3.46	-2.72
Rural3	8.74	0.06	-2.07	-2.06
Rural4	18.55	-0.67	-3.13	-3.48
Rural5	8.67	-0.54	-2.20	-2.73
Rural6	1.80	-0.03	-0.47	-0.51
Rural7	0.00	0.00	0.00	0.00
Urban1	7.08	0.00	-1.43	-1.40
Urban2	2.66	-0.18	-0.51	-0.68
Urban3	0.00	0.00	0.00	0.00
Urban households	4.56	-0.03	-0.91	-0.93
Rural households	9.09	-0.11	-2.09	-2.09
All households	7.50	-0.08	-1.68	-1.68

Table 7 (continued): Poverty effects for Indonesia of prospective liberalization of all commodities

(c) Using $2 a day poverty line

Group	*Ex ante* level of poverty incidence (% of group population)	Changes in poverty incidence (%), *ex post – ex ante*		
		Sim A1: Unilateral liberalization	Sim B1: Rest-of-world liberalization	Sim C1: Global liberalization
Rural1	48.79	2.03	-3.29	-2.87
Rural2	74.36	0.62	-5.05	-3.28
Rural3	66.73	0.28	-6.32	-6.30
Rural4	78.64	-0.26	-2.79	-3.49
Rural5	66.93	-0.63	-4.56	-5.84
Rural6	30.59	-0.72	-4.66	-4.81
Rural7	2.38	-0.19	-0.53	-0.59
Urban1	53.11	0.05	-4.04	-3.95
Urban2	31.43	-0.96	-2.96	-4.48
Urban3	6.79	-0.62	-1.39	-1.78
Urban households	37.87	-0.29	-3.19	-3.50
Rural households	60.27	0.16	-4.16	-4.13
All households	52.40	0.00	-3.82	-3.91

Source: Author's Indonesian CGE model simulations.

Table 8: Income inequality effects for Indonesia of prospective liberalization of all commodities

Group	*Ex ante* level of Gini coefficient	Change in Gini coefficient, *ex post – ex ante*		
		Sim A1: Unilateral liberalization	Sim B1: Rest-of-world liberalization	Sim C1: Global liberalization
Urban households	0.3559	0.0025	0.0019	0.0045
Rural households	0.2912	0.0011	0.0002	0.0013
All households	0.3351	0.0023	0.0006	0.0030

Source: Author's Indonesian CGE model simulations.

Table 9: Aggregate simulation results for Indonesia of prospective liberalization of only agricultural commodities

Macroeconomic aggregates (percent change from base)	Sim A2: Unilateral lib'n	Sim B2: Rest-of-world lib'n	Sim C2: Global lib'n
Real GDP, expenditure side (GDP deflator)	0.01	0.25	0.26
Real household consumption (CPI deflator)	0.00	1.07	1.08
Import volume index, duty-paid weights	0.51	0.57	1.17
Export volume index	0.42	-0.43	0.05
GDP price index, expenditure side	-0.17	1.46	1.25
Consumer price index	-0.28	1.55	1.20
Nominal change (Rp billion):			
GDP	-2,411	25,137	22,206
Consumption	-2,556	23,709	20,658
Investment	-1	2,319	2,322
Inventory	-81	-728	-840
Government expenditure	228	-162	65
Exports net of imports	0	0	0
Real return to factors (percent change from base, using CPI deflator)			
Unskilled Labor	-0.5	3.2	2.7
Skilled Labor	0.7	-2.5	-1.8
Agriculture Capital	-2.0	15.7	13.4
Non-Agriculture Capital	0.4	-1.6	-1.2
Land	-1.1	29.7	28.8
Real household expenditures (percent change from base, using CPI deflator)			
Rural1	0.0	1.1	1.2
Rural2	-0.4	2.1	1.7
Rural3	-0.3	2.3	2.0
Rural4	-0.1	1.4	1.3
Rural5	0.1	0.6	0.8
Rural6	-0.2	1.8	1.6
Rural7	0.0	1.1	1.1
Urban1	0.0	1.1	1.1
Urban2	0.2	0.8	1.0
Urban3	0.2	0.2	0.4

Source: Author's Indonesian CGE model simulations.

Table 10: Poverty effects for Indonesia of prospective liberalization of only agricultural commodities

(a) Using national poverty line

Group	*Ex ante* level of poverty incidence (% of group population)	Changes in poverty incidence (%), *ex post – ex ante*		
		Sim A2: Unilateral liberalization	Sim B2: Rest-of-world liberalization	Sim C2: Global liberalization
Rural1	39.81	0.00	-1.93	-2.00
Rural2	34.89	0.25	-1.73	-1.37
Rural3	32.29	0.17	-1.40	-1.25
Rural4	27.82	0.06	-0.78	-0.74
Rural5	23.78	-0.15	-0.39	-0.58
Rural6	28.01	0.11	-0.76	-0.70
Rural7	10.50	0.02	-0.73	-0.72
Urban1	15.22	-0.11	-0.47	-0.52
Urban2	11.16	-0.05	-0.16	-0.25
Urban3	5.00	-0.05	0.00	-0.06
Urban households	11.97	-0.08	-0.29	-0.35
Rural households	29.09	0.05	-1.11	-1.06
All households	23.10	-0.02	-0.85	-0.83

Table 10 (continued): Poverty effects for Indonesia of prospective liberalization of only agricultural commodities

(b) Using $1 a day poverty line

Group	*Ex ante* level of poverty incidence (% of group population)	Changes in poverty incidence (%), *ex post – ex ante*		
		Sim A2: Unilateral liberalization	Sim B2: Rest-of-world liberalization	Sim C2: Global liberalization
Rural1	2.40	0.00	-0.14	-0.15
Rural2	13.09	0.13	-0.81	-0.67
Rural3	8.74	0.11	-0.84	-0.77
Rural4	18.55	0.09	-0.96	-0.92
Rural5	8.67	-0.10	-0.23	-0.35
Rural6	1.80	0.01	-0.15	-0.14
Rural7	0.00	0.00	0.00	0.00
Urban1	7.08	-0.04	-0.30	-0.35
Urban2	2.66	-0.03	-0.05	-0.09
Urban3	0.00	0.00	0.00	0.00
Urban households	4.56	-0.03	-0.18	-0.22
Rural households	9.09	0.03	-0.50	-0.48
All households	7.50	0.01	-0.38	-0.39

Table 10 (continued): Poverty effects for Indonesia of prospective liberalization of only agricultural commodities

(c) Using $2 a day poverty line

Group	*Ex ante* level of poverty incidence (% of group population)	Changes in poverty incidence (%), *ex post – ex ante*		
		Sim A2: Unilateral liberalization	Sim B2: Rest-of-world liberalization	Sim C2: Global liberalization
Rural1	48.79	-0.01	-0.89	-0.92
Rural2	74.36	0.20	-1.27	-1.03
Rural3	66.73	0.41	-2.42	-2.21
Rural4	78.64	0.05	-0.56	-0.51
Rural5	66.93	-0.09	-0.39	-0.51
Rural6	30.59	0.46	-1.70	-1.58
Rural7	2.38	0.00	-0.17	-0.17
Urban1	53.11	-0.04	-1.04	-1.12
Urban2	31.43	-0.38	-0.60	-0.69
Urban3	6.79	-0.08	-0.01	-0.10
Urban households	37.87	-0.11	-0.71	-0.79
Rural households	60.27	0.11	-0.98	-0.92
All households	52.40	0.03	-0.89	-0.88

Source: Author's Indonesian CGE model simulations.

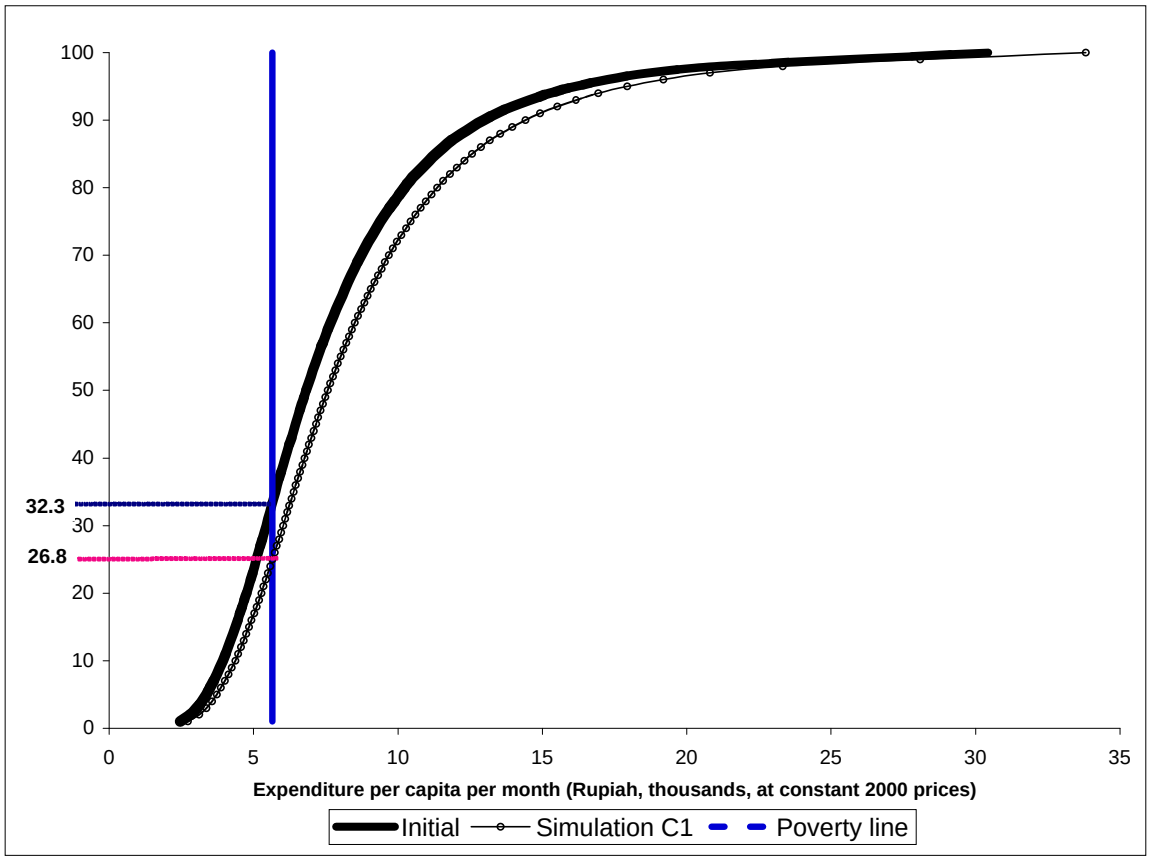
Table 11: Income inequality effects for Indonesia of prospective liberalization of only agricultural commodities

Group	*Ex ante* level of Gini coefficient	Change in Gini coefficient, *ex post – ex ante*		
		Sim A1: Unilateral liberalization	Sim B2: Rest-of-world liberalization	Sim C2: Global liberalization
Urban households	0.3559	0.0001	-0.0006	-0.0006
Rural households	0.2912	0.0000	0.0001	0.0000
All households	0.3351	0.0002	-0.0007	-0.0006

Source: Author's Indonesian CGE model simulations.

Figure 1: Initial and simulated levels of poverty incidence in Indonesia

(as illustrated by Socio-economic category Rural 3, Simulation C1)[a]



[a] The cumulative distributions of expenditures corresponding to Simulation C1 is calculated in real terms, using household-specific consumer price indices, at year 2000 prices, as the deflator for each household. This makes it possible to compare the initial (year 2000) distribution of expenditures and the distribution marked Simulation C1 with the poverty line for the year 2000. The initial and simulated (post-liberalization) levels of poverty incidence for this household category, using the national poverty line, resulting from Simulation C1 were 32.3 per cent and 26.8 per cent, respectively. See Table 7(a).

Source: Author's Indonesian CGE model simulations.