LIKELY IMPACT OF THE WTO "JULY PACKAGE" 2004 AGREEMENT ON TRADE LIBERALIZATION IN AGRICULTURE ON POVERTY IN INDONESIA: A COMPARATIVE STUDY BETWEEN A PARTIAL EQUILIBRIUM MODEL AND EXISTING CGE/GTAP BASED STUDIES[1]

Tulus Tambunan
Faculty of Economics, University of Trisakti, Indonesia

Abstract

The purpose of this study is to predict empirically the poverty impact in Indonesia of the reduction of agricultural subsidies in OECD countries agreed at the WTO meeting in July 2004 (known as the WTO July Package), and the focus of the study is on rice.

Methodologically, this study uses partial equilibrium techniques. It calculates the first-order effects with quantities constant and then tries to incorporate some second-round effects by allowing quantities to vary. Second round effects are estimated using econometric techniques: time series for production response, labor supply, demand systems for rural and urban consumptions. Some equations are estimated simultaneously.

The study shows three important findings. First, the supply response in Indonesian agriculture is weak, which means that Indonesian farmers would not benefit much from the higher prices for agriculture in the world market. Second, wages and employment have positive correlations with price increases. Third, for any given rise in poverty line due to increase the elasticity of percentage change in poverty rate to percentage change in poverty line (PL) is positive. This is more or less consistent with the estimated regression coefficients of the percentage change in poverty rate and the percentage change in PL in urban areas and rural areas, suggesting that for every 1% increase in PL, poverty rates in urban and rural areas will increase by 0.87% and 0.67%, respectively.

I. Background of the Study

Agriculture is the key sector for nearly all poverty analysis. In Indonesia, as in many other less developed or poor countries, the poor are predominantly rural; food accounts for a major share of all poor people's expenditure; agriculture is their major source of income; and farm incomes have large spillovers to others in the rural economy. The markets in this sector are among the most distorted in the world, with both developed and less developed countries maintaining high levels of protection. Trade liberalization in agriculture has thus the potential for considerable poverty alleviation, although particular groups of poor people may suffer from the liberalization. It is thus not surprise that the connection between trade liberalization in agriculture and poverty in less developed countries has been on the policy agenda for several years and has recently become a matter of intense public debate.

[1] Annual GTAP Conference, Addis Ababa, June, 2006.

Rich countries are under increasing pressure to end support to their agriculture. Agricultural subsidies and price supports allow OECD countries to sell their agricultural products on world markets at prices that are below the cost of production. Critics claim that these policies inflict harm on poor countries by depressing world commodity prices. Domestic support levels for agriculture are significant in OECD countries. For instance, total agricultural production in these countries in 2000 was valued at the farm gate at $632 billion, but to encourage this production, producers received support of $323 billion, over $300 per capita and nearly a $1 billion a day (Vanzetti and Peters, 2003). The major beneficiaries of this largesse are producers in the European Union (35% of OECD receipts), the United States (27%) and Japan. A third of every dollar received by OECD producers is attributed to assistance. Consumers contribute about half the cost, taxpayers the remainder. Most developing countries cannot afford substantial domestic support, and such measures in developed countries appear to increase global production forcing down world prices. This benefits net food importers in developing countries at the expense of net exporters. Thus, developing countries are divided on this issue (Vanzetti and Peters, 2003).

It is generally argued that these agricultural subsidy policies in OECD are likely to hurt the poorest residents of the poor countries because poor people are often farmers. Thus, eliminating support for rich country farmers will raise world prices and the incomes of the poor in less developed countries.

After many years of debates and discussions, at last, the WTO meeting in July 2004 has come to a general agreement on the reduction of agricultural subsidies in OECD countries, known as the WTO July Package. According to the July package, all OECD countries will make substantial reductions in distorting supports, and those with higher levels are to make deeper cuts from "bound" rates (the actual levels of support could be lower than the bound levels). The way to achieve this will include reductions both in overall current ceilings ("bound levels"), and in two components**,** so-called Amber Box and *de minimis* supports. The third component, called Blue Box supports, will be capped; at the moment the Blue Box has no limits. The fine print contains a number of details but also stresses that these have to meet the long-term objective of substantial reductions. For the overall level of support (Amber Box, *de minimis* and Blue Box combined), a "tiered formula" will be used. This will be designed so that higher levels of support (those in higher "tiers") will have steeper cuts. On top of that, in the first year, each OECD country's ceiling of permitted overall support will be cut by 20%.

II. Aim of the Study

Much of the literature that study the relationship between agricultural trade liberalization and poverty in poor or less developed countries focuses on the effects of national trade reforms, such as own tariff reductions. In contrast, the WTO negotiations at the Doha Round that resulted in the July Package were more concerned with the poverty effects on poor countries of trade reforms in OECD countries. This study

investigates the impact of reduction of agricultural subsidies by 20% in OECD countries. This is one aspect of the WTO July Package that is of special relevance for Indonesia for the following reason. At least theoretically, the reduction or elimination of agricultural subsidy in OECD countries means higher price competitiveness for Indonesian crops in both export markets (in OECD) and domestic market (against import).

This study focuses on rice only, as this commodity among many other has been the most protected one in the world market, on the one hand, and, among the most important farm crops in Indonesia, on the other hand. Based on FAO data, in 2004, rice was included in the top 10 most important Indonesian agricultural commodities, and Indonesia is also among important world production for rice. The majority of Indonesian farmers are found in this particular crop. So, as expected theoretically, the July Package may have significant impact on poverty in Indonesia through its effects on price and production of rice and hence employment and wages in this subsector of agriculture. Moreover, Indonesia has also become an importing country for many agricultural commodities including rice from other producing countries with lower prices than that of domestic production which gives a downward pressure on domestic prices and hence incomes of local farmers.

III. Conceptual Framework and Methodology

III.1. Conceptual Framework

The theoretical links that forms the basis of the methodology used in this study is simple: it is assumed that the reduction in subsidy by the OECD countries would result in more market access for the products from developing countries and in increase in the prices of the products. Since the developing countries have comparative advantage in agriculture, the increase in prices will be lower than the magnitude of subsidy and that should be factored in.

With the no-supply constraints assumption, more market access in OECD countries would increase the production volume (output) and export of the products in developing countries, and it further would change the relative demand of different factors of production, particularly labor. If labor is fully employed and wage is flexible, then the change in the demand for labor would result in the change of wage. This further would lead to the increase in household income in rural areas or agriculture in particular and thus rural poverty would be positively affected. If Indonesia is a net importer, the increase in prices of the liberalized products would also affect urban poverty through its impact on daily consumption expenditure of urban poor households.

Since agriculture is linked to many other domestic sectors both through backward and forward production linkages, the increase in production volume of the products in agriculture would increase outputs in other

sectors, and finally, through its multiplier effects, it would increase national income or gross domestic product (GDP) and reduce total poverty in Indonesia.

So, conceptually, this study outlines three (3) pathways through which a trade liberalization in agriculture can have a direct impact on poverty (McCulloch, *et al.* ,1996):

A. Price effect.

There are two important questions here. First, how much world prices will change as a result of that subsidy cut policy? Second, as world prices change, how much local prices will change? With respect to the first question, the effect of that policy on world prices depends, among other things, on the OECD supply and demand curves, as well as on the rest of the world supply and demand curves. The second question is a key dimension of trade and poverty question, namely price transmission from the border to households i.e. how much of the change in world price is transmitted to producers and consumers, cropping choices by farm households, labour markets participation decisions and inter-sectoral movement of labour (Hertel and Winters, 2005). It is generally hypothesized that, a subsidy reduction in agriculture in OECD countries will increase prices of agricultural commodities in the world market. If these higher prices are 100% translated into changes in prices actually faced by farm household or particularly rural poor, then the direct impact on poverty of that policy would depend on whether poor households are net consumers or net producers of the products: it would benefit net producers and hurt net consumers. The urban poor would also be affected by the increase in prices of the products. Now, the critical question here is that whether the price increases at the border arising from the trade liberalization policy are actually transmitted to the poor. This would depend on several factors, notably the structure of the distribution sector; the way in which institutions such as marketing organizations operate; the extent of actual market distortions, domestic policies that affect domestic prices (such as minimum price regulations), and whether the goods are traded at local, regional, or national levels.

B. Output effects.

A subsidy reduction in agriculture in OECD countries would also affect farm households or the poor through its impact on output in agriculture in developing countries. It is generally believed that the increase in prices of liberalized crops in the world market will increase the price competitiveness and hence production of the liberalized crops produced in developing countries.

C. Employment and Wage effects

Other key dimensions of trade and poverty relationship are labour market participation decisions and inter-sectoral movement of labour. Hertel and Winters (2005) emphasize that the majority of the poverty reduction in the cause of agricultural liberalization policies in OECD countries is due to factor price changes i.e. higher wages, and changes in employment. Such policies will bring about an increase in prices of agricultural commodities (see point A), giving a boost to the competitive agricultural producers in developing

countries. Further, this would result in increases in production (see point B) and hence demand for labour in agriculture in these countries. If the labour supply in agriculture is taken as fixed, as in standard trade theory, increases in demand for labour would result in increases in agricultural wages. On the other hand if the labour supply is perfectly flexible or the labour market is not yet clear, then the increases in demand for labour would result in increases in employment. Both increases in production and wages and/or employment will help in increasing the income of farm households and as a consequence this will help in poverty reduction in the developing country.

III.2 Methodology

Methodologically, this study uses partial equilibrium techniques with secondary data. It calculates the first-order effects with quantities constant and then tries to incorporate some second-round effects by allowing quantities to vary. Second round effects are estimated using econometric techniques – time series for production response, labor supply, and food demand for rural and urban consumptions. Some equations are estimated simultaneously. This study does not employ a CGE model, as there are already many studies analyzing the effect of trade liberalization on developing countries and some studies on Indonesia using a CGE model.

Specifically, the prediction of the poverty impact of the subsidy reduction in OECD countries on commodities that are the most important agriculture exports and/or imports of Indonesia comprises four steps.

a) The changes in the prices of imports and exports induced by the policy are assessed.
b) Responses of agricultural wages, employment and production to the price changes are estimated.
c) To estimate the poverty impacts of the policy, by simulating (calculating) the effects of the above estimated effects on poverty line or/and real expenditures of households.

Ad. (a):

One key dimension of trade and poverty relationship is price transmission from the border to households i.e. how much of the change in world price is transmitted to producers and consumers (Hertel and Winters, 2005). So, there are two basic questions. First, how the price will response to trade liberalization and how much of any price change gets passed through to the poor either as producers (farmers) as well as consumers? In the case of subsidy reduction of a crop, hypothetically, it would increase the crop's price in the world market (for instance in US market) by the full magnitude of the subsidies, *ceteris paribus*. Second, whether Indonesia is a net exporter or net importer of the liberalized commodities. If Indonesia is a net exporter, in the short-run, the subsidy reduction would increase the price competitiveness[2]of agricultural commodities from Indonesia and, theoretically, it would increase the Indonesian export of the commodities.

[2] The difference between the Indonesian price and the price in the policy implementing developed countries.

It would benefit Indonesian farmers and it would not harm the urban poor, or prices faced by the urban poor would not change in the short-run. However, in the long-run, since the agriculture is subject to diminishing returns to scale, any increase in production for exports would result in an increase in the cost of production and therefore the production would rise but the marginal production cost and prices would also rise. However, since Indonesia (as developing countries in general) has comparative advantage in agriculture that the increase in prices will be lower than the magnitude of subsidy. If Indonesia is a net importer, the subsidy reduction means higher local price for the commodities faced by domestic consumer (given that other factors do not change).

In the analysis, there are two different prices at the border to be considered, i.e. import price (Pm) in rupiah and export price (Px) in US dollar. With respect to import price, when subsidies on tradable crops are reduced in OECD (exporting) countries, it will generate higher prices for the crops faced by local consumers in the importing countries; in this case is Indonesia.

However, there are several steps of transmission between changes in domestic prices in exporting countries where the subsidy cut takes place, i.e. FOB price, and changes in local prices faced by consumers in importing countries. In fact, there are two price transmission mechanisms (PTM) involved: PTM I (or world PTM) = between FOB price in exporting countries and border price or import price at the border in importing countries with CIF price within the two. The CIF price is FOB price + a certain percentage for insurance and transport between exporting and importing countries. In the Indonesian case, for imported rice from, say, Thailand, CIF price = FOB price + (7.5% x FOB price). This percentage varies by different countries of origin because the distance is different, say between Indonesia-Thailand and Indonesia-USA. The border price = CIF price + a certain percentage for handling, transportation and marketing (up to wholesalers) costs. In Indonesia, for imported rice, since January 2000: border price = CIF price + Rp430 + 5% x CIF price.

PTM II (or domestic PTM), on the other hand, is domestic PTM, which is between the border price and local price. The extent of PTM II may be limited by a number of domestic factors including transport and other distribution costs, the extent of competition between traders and the functioning of markets, infrastructure condition, domestic taxes, regulations, distance between wholesalers and final destination, and many others. Some of these costs, such as transport costs, are inevitable; others represent direct economic inefficiency such as monopoly or monopsony power exercised by traders (Winters, *et al*, 2002).

Based on the above explanation, at its simplest, the local price of an importable liberalized agricultural commodity (Pm) received by consumers can be formulated as follows:

$$Pm = [Pw.(1+S)].r + C \qquad (1)$$

where Pw = world price in the pre-policy era (i.e. before the subsidy reduction); r = exchange rate (rupiah per US dollar); S = amount of subsidy, as a percentage of Pw, to be reduced; and C = all cost involved in the PTM II, and it can be in a percentage of Pw in rupiah (i.e. Pw.r). Total C is higher at retailers than at wholesalers as within these two marketing points there is a profit margin and marketing costs involved. In a percentage change, if variables r and C are constant, a subsidy reduction by 20% of the current world price (Pw) will induce the increase in import price by 20%.

With respect to export price, as discussed before, the subsidy reduction in OECD countries will increase the crop's price in the world market. It is generally expected that the world price increases will increase production and export of the crops in Indonesia. But, this will happen only with three assumptions. First, the new world price is higher than CIF price for Indonesian exported commodities, so Indonesian farmers have competitive price in the world market. Second, Indonesian farmers produce competitive commodities compared to other exporting countries. Third, the supply response in Indonesian agriculture is positive. But, subject to diminishing returns to scale, any increase in domestic production will result in an increase in the cost of production and therefore the marginal production cost and prices will also rise. Thus, if the supply response in Indonesian agriculture is positive, the supply will increase up to a level where the domestic price is the same as the world price. Beyond that level, Indonesian agricultural commodities are not competitive anymore.

However, as with the import price discussed before, there is PTM involved between local price received by farmers and border price (or FOB price). The PTM in this case can be complex, depending on the nature of the commodity and the distance from the border. For some commodities, the distribution channel is short, while for others it is long. For instance, study made by Soekartawi (2001) shows that many maize farmers also exported their products, but not directly. The channel from the farmer gate to the exporter is a long way via: traders in village → traders in *kecamatan* → wholesalers in *kabupaten/kota* → exporter. She found from her survey that the farmers received less than 50% of the border/FOB price.

The PTM of a commodity also varies by region. Most exporters in Indonesia are located in Jakarta and some other big cities such as Makassar, Surabaya, Medan, Bandung and Semarang. Farmers located close to these cities may have shorter distribution channels than those in relatively isolated rural areas far from the cities.

Based on the above explanation, it can be hypothesized that for a given export/FOB price, the longer the distribution channel or the more agents involved, the smaller proportion of the price received by the farmer. Thus based on this fact, the local export price received by farmers (Px) can be formulated as follows:

$$Px = Pw.(1+S) - C \qquad (2)$$

where other variables are already explained in equation (1).

It is of course difficult to predict the actual changes in the world import and export prices in the context of a single country model.

Ad.(b):

The policy - induce price changes would affect the welfare of farm households through the production, employment and wage effects. The most plentiful evidence on production effects in response to changes in prices in agriculture is based on aggregate time series data. Many of such supply response studies, whether for individual crops (e.g. Bond, 1983) or agriculture as a whole (e.g. Schiff and Montenegro, 1997), suggest that in aggregate agricultural producers are quite responsive to price incentives, when they have access to the necessary complementary inputs such as inputs or credit, and with complementary policies from government such as information and extension services (e.g. McKay, *et* al.1997).[3]So, to estimate the supply response in agriculture to the price change in Indonesia, this study would use aggregate time series data on farmer price, i.e. price received by farmer, and production volume (in tons), and by following the method generally suggested in the literature on agricultural supply response, the basic empirical equation to get the price elasticity for agriculture as a whole as is given in equation (3). This model can also be applied for individual crops by adding lagged harvest prices of alternative/competitive crops that the farmers could potentially grow as independent variables.

$$Q^S{}_A(t) = \alpha_0 + \alpha_1 FP_A\,(t-1) + \alpha_2 Q^S{}_A(t-1) \qquad (3)$$

where, $Q^S{}_A$ = production volume (tonnes) in agriculture; FP_A = average harvest price received by farmer (or, alternatively, it can be represented by agricultural terms of trade); and t = period. This specification of the agricultural output supply function includes a lagged value of price because of time lags involved in planting and harvesting. The function also includes a lagged value of output in order to capture an inertial output creation term or other determinant factors of output growth in agriculture. The coefficient α_1 illustrates short-term responsiveness to prices, and $\alpha_1/1-\alpha_2$ the long-term equilibrium response; α_2 indicates how fast the farmers will make the adjustment process; so the closer this lagged output coefficient is to unity, the slower this takes place, while rapid adjustment would be signaled by a value of this coefficient near to zero.[4]

[3] There are also many empirical studies at micro level showing the same result. For instance, using micro level panel data for farm households in Zambia , Deininger and Olinto (2000) show that for many households a major constraint on improvements in agricultural productivity following external liberalization was the absence of key productive assets (draft animals, implements). Similarly, based on a small panel of farm households in Mexico, López, Nash and Stanton (1995) find that those with low levels of capital inputs were, on average, less responsive to price incentives than those with higher levels. Farmers with little capital were also those who had more problems obtaining credit, were less likely to use purchased inputs, were less educated and farmed poorer quality land, any or all of which could account for their lower supply response. Also Heltberg and Tarp (2001) found similar results in Mozambique.

[4] In the literature on agricultural supply response, it is stated that price expectations play a very important role in determining production volume changes in agriculture. One approach suggested in the literature is that present expected price (P_t^e) is actual price in the last period plus (or minus) some proportion of the change in actual price between two periods ago and the last period:

However, $Q^S{}_A$ is not something over which farmers have complete control, as $Q^S{}_A$ for crops is a function of yield and area planted. Since, the farmers do not have control over yield so, as an alternative model of supply response, following Nerlovian supply response model, 'area planted' is used instead as the dependent variable, with a lagged yield regression estimated separately, as presented by equation 4. Again, this equation can be applied to individual crops by adding lagged harvest prices and yields of competitive crops.

$$AP(t) = \partial_0 + \partial_1 AP(t-1) + \partial_2 FP_A(t-1) + \partial_3 Y(t-1) \quad (4)$$

where AP = area planted and Y = yield.

An important mechanism by which foreign shocks such as this 20% subsidy cut in OECD countries are translated into poverty impacts in developing countries is through factor markets, especially the labour markets. The labour market effects consist of two effects: wage and employment changes (Winter 2002). If the labour supply in agriculture is taken as fixed (assuming no inter-sectoral movement of labour), as in standard trade theory, changes in demand for labour would result in changes in agricultural wages, and the latter would result in changes in farm households incomes. On the other hand if the labour supply is perfectly flexible or the labour market is not yet clear, then increases in demand for labour would result in increases in employment.

With respect to the wage effect, by using aggregate time series data on nominal wages in agriculture and rural food price index, the wage equation will be estimated and from which the agricultural wage-price elasticity can be calculated as follows:

$$W_A(t) = \beta_0 + \beta_1 RCPI(t-1) + \beta_2 W_A(t-1) \quad (5)$$

where W_A = nominal wage in agriculture; RCPI = rural consumption price index; and t = period. The agricultural wage function includes lagged values of price and wage with the following reasons: the lagged value of price, not the current price, because it needs time for wage to response to price changes; whereas, the lagged value of wage is in order to capture an inertial wage creation term or other determinant factors of wage changes in agriculture.

Further, by using the estimated wage-price elasticity and the estimated policy-induced price changes, the changes in nominal wage faced by agricultural laborers as a result of the policy would be calculated.

$P_t^e = P_{t-1} + \delta(P_{t-1} - P_{t-2})$; or;
if output ($Q^S{}_A$) is dependent on prices in the following ways:
$Q^S{}_A = \alpha P_{t-1} + \alpha\lambda P_{t-2} + \alpha\lambda^2 P_{t-3} + \alpha\lambda^3 P_{t-4} + \ldots\ldots$
where $0 < \lambda < 1$ then:
$Q^S{}_{A(t)} - \lambda Q^S{}_{A(t-1)} = \alpha P_{t-1}$ or $Q^S{}_{A(t)} = \alpha P_{t-1} + \lambda Q^S{}_{A(t-1)}$
and
$\Delta Q^S{}_{A(t)} = Q^S{}_{A(t)} - Q^S{}_{A(t-1)} = \alpha P_{t-1} + (\lambda - 1) Q^S{}_{A(t-1)}$

With respect to employment effect, to estimate the response of agricultural labor supply to changes in wages in the sector, the labor supply function in agriculture will be estimated from which the labor force-wage elasticity can be derived:

$$L^S_A = f_0 + f_1 W_A + f_2 \text{ RCPI} \quad (6)$$

where L^S_A = labor supply in agriculture (W_A and RCPI are already explained).. For simplicity, this study will be based on two assumptions. First, the labor market in agriculture is assumed to be always clear, which means that labor supply = labor demand. With this condition, data on L^S_A will simply be the annual data on labor force employed in the sector. Second, although the labor market of rural areas, which is strongly influenced by labor market in agriculture, is linked to labor market in urban areas, in this study the rural labor market is segregated from the urban labor market.

Since the labour market in agriculture is assumed to be always clear (i.e. $L = L^D_A = L^D_S$), wage does not only affect total workers employed in the sector through the supply-side but also through the demand-side. So, equation (6) will be solved simultaneously with equation on labour demand in agriculture, which is formulated as follows:

$$L^D_A = \gamma_0 + \gamma_1 W_A + \gamma_2 Q^S_A \quad (7)$$

where L^D_A = labor demand in agriculture (W_A and Q^S_A are already explained). Thus, equations (6) and (7) represent the structural equations of the agricultural labour market model, and W_A and L are the endogenous variables, while Q^S_A and RCPI are assumed to be exogenous.

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The empirical equation to be estimated in this study regarding the supply side of agriculture is already discussed before (see equations 3 and 4). With respect to the demand-side (the consumption effect), this study uses the consumption theory to explore how consumption changes in response to the price change. Such changes will be calculated by estimating the demand systems for rural (farm) households and urban households and applying predicted or observed price changes to it. Further, from the estimated demand system, the price elasticity of demand can be calculated.[5]So the study will have two empirical demand

[5] An example of this approach is Ravallion and van de Walle's (1991) study of Indonesian rice price reform. They use detailed data to estimate household demand equations and apply to them assumed income and price changes. Their findings show, inter alia, that the effects depend partly on how the government passes the budget shock implied by rice price changes onto consumers and on what poverty line is used. The very poor are net consumers of rice and so suffer from the price rises, whereas farmers just below the standard poverty line are net producers and hence benefit and show positive chances of escaping from poverty.

equations, one for rural household and one for urban household as they have different patterns of consumption. SUSENAS data on household consumption expenditure on food by region (rural vs. urban) would be used for estimating these equations.

$$Q_{®}^{D} = e_0 + e_1 FPI_{®} + e_2 Y_{®} \quad (8)$$

where, Q^D = consumption (food) demand; Y = income (from all sources, including labor income); FPI = food price index (the direct price), and ® is region for rural and urban. In this model no cross price or price of a close substitute is included since the demand function is for all food items (not for a particular food item such as rice). Food here includes cereals, tubers, fish, meat, eggs and milk, vegetables, legumes, fruits, oil and fats, beverage stuffs, spices, miscellaneous food items and prepared food and beverages. As SUSENAS does not provide time series data on income, so income here is presented by total consumption expenditure.

Next step is to make some simulation (calculation) to trace how the estimated price changes resulted from the Doha agreement (or the July Package 2004) affect the poor in Indonesia. For this purpose, the analysis uses the National Social and Economic Survey (SUSENAS) data of 2004. The SUSENAS is a cross-sectional survey of households; it contains annual data on households by expenditure groups, areas (i.e. rural and urban), provinces, and sector/main occupation. In this respect (i.e. consumption expenditures based measure of poverty), there are two basic questions. First, given the estimated price-elasticity of demand for food (equation 8), if the price of food increases by a certain percentage caused by the Doha agreement, how much it would cost to purchase the same amount of food that would produce the same level of welfare before the food price increases. Or, what are the money expenditures at the new prices necessary to achieve the same utility level as at the old prices? Second, how is the responsiveness of poverty rate to changes in real expenditure due to food price increases?

There are many broad issues in defining poverty, which is intrinsically a complex social construct. Even with a narrow definition of poverty based on a deficit of consumption expenditures, there are numerous thorny technical issues in setting an appropriate "poverty line" (PL).[6]In this study, for any given distribution of expenditures across households, the determinant of the poverty rate is the PL. It is expressed in rupiah: the amount of expenditures above which households are "not poor" and below which households are in (varying degrees of) poverty. Thus, the PL is defined as the money expenditures necessary to attain a level of welfare.

In order to estimate the poverty impact of an increase of price of food, two steps will be conducted. First, deflation of nominal to "real" expenditures to maintain comparability in welfare levels before and after the price changes. Second, estimation of changes in poverty rates as real expenditure changes.

[6] See e.g. Pradhan *et al*. (2000) and Ravallion (1994).

IV. Findings from Existing CGE/GTAP Based Studies.

It is generally suggested that liberalization on agricultural in developed countries (the Doha agreements) is likely to increase the prices of food grains and commercial crops in the world market.[7] However, the implications for the developing countries of increased agricultural prices are unclear and it is argued that the potential exporting countries could benefit and the net food importing countries may turn out to be the looser (Panagariya 2002). Most of literature that has been devoted to examining the *potential* impact of agricultural trade liberalization on developing countries use computable general equilibrium (CGE) models such as GTAP from different versions, and there are competing predictions of the impact of the Doha agreements based on simulation results of these models[8]Some studies foresee expansion of world trade, real output, wages and incomes in developing countries. For example, Beghin *et al*. (2002) estimate that the removal of all agricultural subsidies and trade barriers could increase rural value added in low- and middle-income countries by $60 billion per year, which, as they note, exceeds most targets for development assistance by some 20%. Chand and Mathew (2001) expect that the reduction of domestic support in OECD countries would raise international prices of agricultural commodities and would improve export prospects for India and other countries. Diao *et al.* (2002) state that in the short to medium term, some net agricultural importing countries suffer a welfare loss due to the adverse change in their terms of trade caused by reform. In the longer run, however, agricultural policy reform benefits almost all countries, and developing countries in particular, due to the change in the developing countries' investment pattern, growth in capital stock, and growth in total factor productivity. Hertel *et.al.* (2000) found that a 40% reduction in agricultural tariffs, export and production subsidies results in global welfare gains of around $70 billion per year. Impacts of liberalization on agricultural trade volumes are mixed-while reducing tariffs tends to increase import volumes, reductions in production and export subsidies tend to reduce volumes. With Brazil as their case study, Hertel and Winters's (2005) study shows that the reason for poverty reduction in this country is driven by increased agricultural production, which tends to be concentrated in regions with relatively higher poverty incidence. Delgado *et al*. (1998) believe that gains from liberalization will be substantial, given the importance and size of agriculture in developing countries and the likely multiplier effects.

On the other hand, some studies raise concerns about the potential negative impacts for the net food importing countries. For instance, Shapouri and Trueblood (2002) conclude that trade liberalization leading to a removal of domestic support in the developed countries can be expected to unambiguously raise world food prices, other policies held constant, and rising food prices would hurt consumers in developing

[7] See e.g. Panagariya (2002b) and Beghin *et al*. (2002).

[8] See for instance, McDougall *et al*. (1998), Diao *et al.* (2002), Hertel *et.al.* (2000), Beghin *at al*. (2002), OECD (2002), Trueblood and Shapouri (1999, 2002), Cororaton *et al*. (2005), Hertel and Winters's (2005), Ivanic's (2005), François *et al.* (2003), Fabiosa *et al.* (2003), Achterbosch *et al*. (2004), Annabi *et al*.'s (2005), Ashraf *et al*. (2005), and Hoekman, Ng, and Olarreaga (2002). Some of these studies, however, have not focused explicitly on poverty but rather on developing countries as a whole.

countries, especially in the short run (assuming no protection in developing countries). Rising prices, however, would send signals to expand output for domestic producers, which may be beneficial in the long run in terms of productivity and rural incomes. Regionally, Sub-Saharan Africa will gain the most because of its low food-import dependency and high share of agriculture in total exports. Cororaton *et al*. (2005) found that the Doha accord will slightly increase poverty for all household categories in the Philippines, as consumer prices rise more on average than household nominal incomes, especially in rural areas and among the unemployed, self-employed and rural low-educated. These household categories include the poorest and most populous households in the Philippines.

By using the latest GTAP data, household survey data from 15 developing countries and a modified version of the GTAP model that includes AIDADS consumer preferences, and using post-simulation techniques based on the household survey data to assess poverty impacts, results from Ivanic's (2005) study suggest that the effects of the core Doha scenario on poverty in the 15 countries would be mixed, with substantial reductions in some cases, while some countries are unaffected, and others show small poverty increases. Introducing reciprocal (i.e. deeper) cuts in bound tariffs in the developing countries improves the poverty outcome overall. This suggests that the core Doha scenario is less poverty friendly than the reforms that are not undertaken in this scenario. The reason for this, according to the study, is the heavy emphasis of Doha on cuts to export subsidies and domestic support, both of which tend to raise poverty in this sample of countries. On the other hand, the most poverty friendly reform measure, namely cuts in developing country tariffs, is nearly absent from the core Doha scenario.

In Annabi *et al*.'s (2005) study, the Doha agreement is found to have negative implications for the overall macro economy, household welfare and poverty in Bangladesh, as terms of trade deteriorate and consumer prices rise more than nominal incomes. Agricultural and light manufacturing sectors expand in response to rising world export prices and demand, increasing the relative returns to agricultural capital and unskilled labour. While nominal income consequently increases more for rural households, particularly landowners, consumer prices also increase more for rural households given their high consumption of agricultural goods. More importantly, consumer prices increase more for the poorest household categories, for whom agricultural (food) consumption is proportionately higher. The net effect is greater welfare losses and poverty increases among the poorest households. The greatest beneficiary of the Doha agreement appears to be rural large farmers who capitalise on rising returns to agricultural capital (primarily land). These results hold whether developing countries are provided special and differential treatment or not.

A recent study from Ashraf *et al*. (2005) examines the impact of rich-country agricultural support policies on the poor in less developed countries by using a cross-country regression framework They find some evidence that OECD support polices are positively correlated with average incomes in food-importing countries and negatively correlated with average incomes in food-exporting countries. Using the national

employment and household consumption and expenditure surveys from Mexico for the period 1991-2000, they examine the implications of a reduction in the price corn on Mexico's corn farmers, and they find that the poorest corn farmers in Mexico are net consumers of corn and have been largely unaffected by changes in the price of corn. Middle-income corn farmers saw their real income from corn farming fall by more than fifty percent. The real income of the largest corn farmers increased by 40%. This finding may suggest that liberalization on agriculture in rich countries will have positive effects on food exporting countries and negative effects on food importing countries.

Francois *et al*. (2003) explored the impact of multilateral liberalization, with emphasis on the EU and developing countries. First they developed a realistic "baseline" that takes into account events such as the entry of China into the WTO and the enlargement of the EU, allowing them to focus on those effects that are specifically attributable to further trade liberalization in the Doha Round. They then employ a global applied general equilibrium model, featuring capital accumulation and imperfect competition. Their Doha scenarios include agriculture, manufactures, and services liberalization, and trade facilitation. Their simulation findings show that agricultural liberalization offers a mixed set of results. Liberalization of domestic support in the OECD, on the other hand, is generally positive for the OECD, though with negative consequences for sub-Saharan Africa. Significant, though limited, liberalization yields positive results globally, and regionally for Europe, Africa, and most of Asia. However, on net agricultural liberalization is a mixed bag, with gains in most areas from elimination of domestic support, but with more mixed results from the elimination of border measures. Static results are consistently positive if constant returns to scale (CRS) are assumed, but induced

changes in investment, combined with the imperfect competition features of the model, point to negative effects over the longer-run. They argue that in order to understand these unexpected results it is important to distinguish the standard perfect competition and CRS case. As shown in this study, for almost all regions the explanation of the negative welfare results under imperfect competition is straightforward: Due to trade liberalization in agriculture their agricultural sectors expand, because they gain by getting better access to OECD markets. However, the agricultural sectors are all perfectly competitive sectors with constant returns to scale. The expanding agricultural sectors draw resources from industrial sectors. As a consequence, the industrial sectors have to contract, which has negative implications for welfare because they cannot achieve cost effective scales of production. Therefore, according to this study, the unexpected negative welfare effects are due in part to the presence of scale economies in some parts of the economy.

Antimiani *et al*.(2001?) simulate possible liberalization scenarios. The analysis is based on the GTAP model with the related version 6.0 database. Scenarios are run on a 2013 baseline, built by taking into account a number of events that have affected (and will further affect) world agricultural markets up to that period, focusing on the effects that are specifically attributable to further trade liberalization in the Doha Round. The policy strategies analyzed are two hypothetical liberalization scenarios in terms of market access

and export competition, plus a free agricultural trade benchmark scenario. The results show that agricultural liberalization (i.e. the degree of tariff and export subsidy reduction in agricultural products) is positively related to the potential gains in terms of economic welfare; the more tariff reduction scenarios imply substantial cuts, the more market price changes reflect comparative advantages. Geographically, the simulations show that trade policy reform would imply mostly market prices decreases in the major economies of Asia, in the Mediterranean region, in Sub Saharan Africa, and in Europe; whereas in Oceania, and throughout North, Central and South America, market prices would increase in most countries. With few exceptions in Japan and South Korea, most price changes range up to a maximum of 15%, but remain below 10% in most instances.

Looking at individual countries, there are few negative signs, more frequent among developing countries, and especially in Sub Saharan Africa and among the least developed countries. Here, the negative sign of total welfare change arises mostly from small or even negative allocation effects, coupled with negative terms of trade effect. This is also the case of other countries such as Venezuela, the Philippines and the Rest of North Africa. The large emerging agricultural economies such as China, India, Brazil and Argentina would mostly gain, either due to wide allocation effects more than offsetting negative terms in the terms of trade, as in the case of China and India, or to large favourable terms of trade effects, as it is the case for the Latin American countries. The changes in the terms of trade shown before, appear as a direct consequence of a more competitive international environment, in which comparative advantages in the different agricultural production sectors play an increased role in shaping agricultural trade and prices This being the case, losses may easily arise in countries with less diversified economies, where there are fewer possibilities of recovering international competitiveness in different production sectors when the support to those activities which are now protected is reduced. In other words, this result tells that relatively poor economies may have less comparative advantages to resort to if protection is reduced in agriculture, as they have fewer activities other than their present agricultural sectors.

On Indonesia case, Achterbosch *et al*. (2004) identify the possible impact of a realistic global liberalisation scenario in the spirit of the 'July 2004 package' on the Indonesian economy. Given the prevailing quite liberal trade regime in Indonesia the expected overall impacts on national income, trade and production are positive, but rather limited. Domestic support reduction by OECD is estimated to have small negative impacts on the net importing Indonesian economy through higher import prices. However, higher world sugar prices that would result from some reforms in OECD countries would support expansion of the sugar sector in Indonesia.

Hertel *et al*. (2003b) explore how national poverty rates in some of the poorest countries in the world are likely to be affected by global trade liberalization. Their analysis of the structure of poverty is based on national household surveys from 14 developing countries (including Indonesia) (Table 1). While they

consider both spending and earnings effects of trade liberalization, their study focuses on the earnings effects on five strata, i.e. agriculture-specialized households, self-employed non-agriculture specialized households, households specialized in wage labor, those relying on transfer payments for 95% or more of their income, and those with diversified sources of income. Together, the first four types of specialized households account for an average of 56% of the poor in the 14 countries examined. Thus a majority of the poor have specialized earnings patterns and are likely to be disproportionately affected by trade liberalization. The same is not true of the non-poor, where a majority of the households are diversified, and are therefore less vulnerable to sector-specific commodity price changes. They also find from the national household surveys from these 14 sample countries that the poor are over-represented among the agriculture-specialized households.

Table 1. Impact of Per Capita Earnings and Spending Effects on Poverty (Change in Number of Poor, Relative to Total Population, in Percent)

Country	Total	Agr	Nagr	Labor	Transf	Diverse
Bangladesh	-0.5	-0.5	-0.7	-0.3	-0.2	-0.6
Brazil	-1.1	-0.9	-1.8	-0.9	-1.0	-1.2
Chile	-0.1	-0.2	-0.1	-0.1	0.0	-0.1
Columbia	-0.3	-0.3	-0.2	-0.7	-0.2	-0.6
Indonesia	-1.5	-1.4	-1.6	-1.9	-1.3	-1.5
Malawi	-1.0	-0.7	-0.4	-2.9	-0.5	-1.5
Mexico	0.3	0.2	0.2	0.4	0.2	0.3
Peru	0.3	0.6	0.2	0.4	0.1	0.3
Philippines	-0.5	-0.4	-0.4	-0.2	-0.4	-0.5
Thailand	-1.6	-3.7	-2.5	-1.8	-1.4	-1.4
Uganda	-0.6	-0.4	-0.7	-0.6	-0.2	-0.6
Venezuela	0.0	0.0	0.0	0.0	0.0	0.0
Vietnam	-15.1	-7.2	-16.8	-9.7	-4.2	-16.3
Zambia	-0.3	0.0	-0.3	-0.5	0.0	-0.5

Hertel *et al*. (2003b)

After examined the structure of poverty across the sample 14 countries, and ascertained the likely changes in relative prices following trade liberalization, they assessed the implications for poverty in a way that facilitates comparison across countries, attempting to isolate the different structural features driving the differential changes in poverty, by stratum, as well as nationally. In assessing the likely change in poverty, they use a micro-simulation model. Specifically, they divided each of the five strata into one hundred household groups, organized by income level. Each group represents 1% of the population in the stratum. For each of these groups they performed a welfare calculation, based on an econometrically estimated utility function describing their consumption behavior and our survey-based estimates of their endowments (e.g., skilled labor, agricultural profits, etc.). As can be seen (Table 1), as generally expected, poverty is reduced in all of the countries, except Mexico, Peru and Venezuela. The percentage reduction in poverty varies across

strata, because the distribution of income varies. Overall, the findings have emphasized the differential short run impacts of multilateral trade liberalization on poverty across countries, across strata, and within strata, thereby highlighting the links between the structure of poverty and the national impacts of trade liberalization.

V. Price Effects

V.1 World Price Effects

Simulation Results from ATPSM

The price effect of the *July Package* agreement is estimated by using the Agricultural Trade Policy Simulation Model (ATPSM). It is a trade policy simulation model capable of detailed analysis of agricultural trade policy issues. The model can be used for quantifying the economic effects at the global and regional level of recent changes in agricultural trade policies. ATPSM is a deterministic, comparative static, partial equilibrium model. This means that there are no stochastic shocks or other uncertainties, and there is no specific time dimension to the implementation of the policy measures or to the maturing of their economic effects. The comparative static nature of the model does not imply that the policies take effect instantaneously. Rather, the model is comparing two states at a similar point in time, one with the policy change, the other without. Finally, whereas the model aims at estimating far-reaching details of the agricultural economy, it does not deal with the repercussions of trade barrier reductions on other parts of the national economy.

The model analyses the effects of price and trade policy changes on supply and demand using a system of simultaneous equations that are characterised by a number of data and behavioural relationships designed to simulate the real world. The model solution gives estimates of the changes in trade volumes, prices and welfare indicators associated with changes in the trade policy environment. A feature of the model is its handling of a two tier tariff structure whereupon imports within a quota level attract a relatively low tariff, and out-of-quota imports face a higher tariffs. Rents associated with these quotas are explicitly modelled within ATPSM.[9]

The equation system for each country can be represented as follows:

$$\hat{D}_{i,r} = \eta_{i,i,r}\left[\hat{P}_{wi} + \left(1 + \hat{t}_{c\,i,r}\right)\right] + \sum_{\substack{j=1 \\ j \neq i}}^{j} \eta_{i,j,r}\left[\hat{P}_{wj} + \left(1 + \hat{t}_{c\,j,r}\right)\right]; \qquad (9)$$

[9] Given limitations in the data and the abstract nature of such models, the user should interpret the results with caution. However, the model has detailed commodity and country coverage and for the comparison of various policy scenarios, it can be very helpful in indicating the relative magnitudes of the effects of policy changes on welfare, trade and prices. See further Vanzetti, and Graham (2002), or handbook on the UNCTAD ATPSM in UNCTAD website..

$$\hat{S}_{i,r} = \varepsilon_{i,i,r}\left[\hat{P}_{wi} + \left(1 + \hat{t}_{p_{i,r}}\right)\right] + \sum_{\substack{j=1 \\ j \neq i}}^{J} \varepsilon_{i,j,r}\left[\hat{P}_{wj} + \left(1 + \hat{t}_{p_{j,r}}\right)\right]; \quad (10)$$

$$\Delta X_{i,r} = X_{i,r}\hat{S}_{i,r} \quad (11)$$

$$\Delta M_{i,r} = D_{i,r}\hat{D}_{i,r} - S_{i,r}\hat{S}_{i,r} + \Delta X_{i,r} \quad (12)$$

where, *D, S, X,* and *M* denote demand, supply, exports and imports respectively; *Pw* denotes world price; *tc* denotes tariff on the domestic consumption goods and *tp* the tariff on domestic production goods; ε denotes supply elasticity and η demand elasticity;. ^ denotes relative changes and Δ absolute changes; i and j are commodity indexes; and r is a country index.

A market equilibrium requires that, globally, the sum of the change in exports equals the total change in imports for each commodity:

$$\sum_{r=1}^{N}(\Delta X_r - \Delta M_r) = 0. \quad (13)$$

In the model, these equations are transformed into matrix notation and the equation system solved for world prices by matrix inversion.

The model is relevant for this study especially with respect to world and hence domestic price changes due to agricultural trade policy changes. These changes may be tariff cuts, introduction of or increases in market access preferences and/or modification of quotas. The principle of ATPSM is that trade policy modifications induce price changes that alter supply, demand, exports and imports. The model calculates a market clearing world price where the global sum of net import changes equals zero. The model estimates all effects in terms of changes from a reference period.

The price effects of agricultural trade policy changes can be observed from equations 9 and 10. These equations show that domestic prices are all functions of the world market price, the border protection such as tariffs, subsidies, and quotas, and of the domestic support measures. There is no independent behaviour of domestic prices. Domestic prices have the character of border wholesale prices. An exception is the farm (supply) price that might be affected by extra farm price support (for example deficiency payments) over and above the market access support. Thus, with this model, domestic price data is not required and transaction costs (such as wholesale and retail margins) are not taken into account. All protection measures are expressed in tariff equivalents. In the ATPSM database, a country is often an importer and exporter of the one (aggregated) good, so the relationship between world and domestic prices is complicated by the existence of two-way trade of the one (aggregated) good. To accommodate heterogeneous goods with one price, the approach adopted by this model is to estimate composite tariffs for determining the domestic consumption

and production price.[10]To derive a composite price products are divided into three groups: imports; exports; and production supplied to the domestic market (*Sd*). First, a domestic market price wedge (td) is computed as the weighted average of two tariffs, the export tariff (tx) and import tariff (tm), where the weights are exports (X) and imports (M):

$$t_d = (X\ t_x + M\ t_m)/(M + X) \tag{14}$$

Then, a consumer price wedge is computed as the weighted average of the import tariff (tm) and the domestic market price wedge (td), where the weights are imports (M) and domestic supply (Sd):

$$t_c = (M\ t_m + S_d\ t_d) / D \tag{15}$$

Similarly, a producer price wedge is computed as the weighted average of the export tariff (tm) and the domestic market price wedge (td), where the weights are exports (X) and domestic supply (Sd) plus the domestic support tariff (tp):

$$t_s = (X\ t_x + S_d\ t_d) / S + t_p \tag{16}$$

The consumer and producer price wedges are added to the border price to give domestic prices. These calculations are applied both to the baseline and the final tariffs. A feature of this structure is that if there are no exports, domestic producer prices are determined by the tariff plus the domestic support. If there are no imports the export subsidy effectively determines the producer price. Finally, if there is two-way trade the share of total production or

Many scenarios can be applied in this model, including a 20% cut in subsidy on agricultural commodities in developed countries. Subsidies on agricultural commodities received by farmers can be included in the category of domestic supports. The simulated impact of the policy reform (i.e. the 20% subsidy cut) on prices of each commodity covered by the model is shown in Table 2. The changes of prices are correlated with the 20% subsidy removed and are also a broad indicator of how price-taking countries are likely to be affected. As can be seen, the price changes, however, vary by commodity, depending on initial price level; initial market structure (i.e. whether developed countries are the major exporters or importers of the particular commodity); initial protection rate (i.e. whether the commodity was initially highly or less protected/subsidized); and the world market condition after the policy reform, i.e. whether it is over-supply or over-demand.

[10] This is in contrast with other trade models that determine domestic demand with a nested import demand structure, which requires knowledge of import elasticities between all foreign goods, so called Armington elasticities. These elasticities are notorious for their importance in determining trade model outcomes but for which little detailed quantitative assessment has been done.

Table 2: Changes in world prices as the result of a 20% subsidy reduction on agricultural commodities in developed countries (%), Estimations by ATPSM

No	Commodity	Price changes	No	Commodity	Price changes
1	Bovine meat	0.65	19	Bananas	0..70
2	Sheep meat	0.24	20	Other tropical fruits	0.00
3	Pig meat	-0.05	21	Sugar	1.29
4	Poultry	0.01	22	Coffee green	0.00
5	Milk, fresh	40.29	23	Coffee roasted	0.00
6	Milk, conc.	-4.86	24	Coffee extracts	0.00
7	Butter	-1.94	25	Cocoa beans	0.00
8	Cheese	-13.21	26	Cocoa powder	0.00
9	Wheat	2.01	27	Cocoa butter	0.00
10	Rice	0.31	28	Chocolate	0.00
11	Barley	8.98	29	Tea	0.00
12	Maize	-3.16	30	Tobacco leaves	13.01
13	Sorghum	0.32	31	Cigars	0.00
14	Pulses	7.86	32	Cigarettes	0.00
15	Tomatoes	0.84	33	Other mfr tobacco	0.00
16	Roots & Tubers	0.00	34	Oilseeds	0.42
17	Apples	0.06	35	Cotton linters	23.48
18	Citrus fruits	5.24	36	Vegetable oils	-0.30

Source: ATPSM simulation with data 2000

As explained in the theoretical part of this paper, a subsidy reduction on agricultural commodities in developed countries would induce changes in both world prices as well as domestic prices of the commodities in other countries, either as exporting or importing countries. The model does categorize domestic prices into producer and consumer prices, but, unfortunately, no distinction between domestic export and import prices, as formulated in equations 1 and 2. With this model, Table 3 shows the estimation on how much the world price changes arising from the 20% subsidy cut (as shown in Table 2) will be transmitted to domestic producers as well as consumers. Of course, in realty, this would depend on many factors, notably the nature of domestic distribution, not between the border and the producers but also between the producers and consumers; the way in which institutions such as marketing organizations operate; and whether the particular commodities are traded at local, regional, national or international levels. But this model does not take into account all these factors, including also all transaction costs (such as wholesale and retail margins); and also all protection measures in the model are expressed in tariff equivalents.

Although the use of a simulation model such as ATPSM seems reasonable for the task at hand, but the validity as well as the importance of the results shown above may be questionable, since this model has the following limitations: (i) Intersectoral effects not captured in ATPSM: overstates degree of response since expanding agricultural sector is not modeled as pulling capital and labor away from other sectors, driving up their returns; (ii) the model does not contain bilateral tariff data; (iii) domestic prices are not independent of world prices, partly because all commodities are assumed to be tradable; (iv) no allowance for market power. Paradoxically, correcting these limitations might dampen the percentage changes reported in Tables 2 and 3. Thus, it can be concluded that the 20% subsidy reduction in OECD countries is unlikely to make much of a difference to Indonesia.

Table 3: Increases in domestic producer and consumer prices as the result of a 20% subsidy reduction on agricultural commodities in developed countries (%), Estimations by ATPSM

No	Commodity	Domestic Price increases		No	Commodity	Domestic Price increases	
		Producer	Consumer			Producer	Consumer
1	Bovine meat	0.65	0.65	19	Bananas	0.70	0.70
2	Sheep meat	0.24	0.24	20	Other tropical fruits	0.00	0.00
3	Pig meat	-0.05	-0.05	21	Sugar	1.29	1.29
4	Poultry	0.01	0.01	22	Coffee green	0.00	0.00
5	Milk, fresh	40.29	40.29	23	Coffee roasted	0.00	0.00
6	Milk, conc.	-4.86	-04.86	24	Coffee extracts	0.00	0.00
7	Butter	-1.94	-01.94	25	Cocoa beans	0.00	0.00
8	Cheese	-13.21	-13.21	26	Cocoa powder	0.00	0.00
9	Wheat	2.01	2.01	27	Cocoa butter	0.00	0.00
10	Rice	0.31	0.31	28	Chocolate	0.00	0.00
11	Barley	8.98	8.98	29	Tea	0.00	0.00
12	Maize	-3.16	-3.16	30	Tobacco leaves	13.01	13.01
13	Sorghum	0.32	0.32	31	Cigars	0.00	0.00
14	Pulses	7.86	7.86	32	Cigarettes	0.00	0.00
15	Tomatoes	0.84	0.84	33	Other mfr tobacco	0.00	0.00
16	Roots & Tubers	0.00	0.00	34	Oilseeds	0.42	00.42
17	Apples	0.06	0.06	35	Cotton linters	23.48	23.48
18	Citrus fruits	5.24	5.24	36	Vegetable oils	-0.30	-0.30

Source: ATPSM simulation with data 2000

Estimations from Recent Selected Studies Using GTAP Models

In the last couple of years, many authors have tried to estimate the global price effects of Doha agreement, mainly using CGE models. Among these, is from Hertel, *et al*. (2004) using GTAP version 5 data estimated the impact of trade liberalization by OECD countries in agriculture on producer and consumer prices. They made a distinction between short- and long-run effects. In the short-run, only labourers are mobile across sector, while in the long-run capital is also mobile across sector and land across users within the agricultural sector. In their experiment, they remove the tariffs on imports of agriculture. Agricultural tariffs are derived from the AMAD data 1998, and agricultural export subsidies from WTO data 1998. The results for staple grand (including rice and wheat) and other food with respect to changes in producer and consumer prices are show in Table 4.

Table 4: Estimated Changes in World Prices Resulted from Removing Tariff on Agricultural Imports in OECD Countries.

Commodity	Producer Price		Consumer Price	
	Short-run	Long-run	Short-run	Long-run
Staple grain	3.4	7.1	3.1	6.8
Other food	5.0	6.3	4.5	6.2

Source: Hertel, *at al*. (2004).

Most recently, by using GTAP version 6 data, Hertel and Ivanic (2005) made a more realistic estimation of world price changes of agriculture of the Doha scenario. The scenario represents an aggressive interpretation of the July Package for the Doha Development Agenda, including tiered formulae for

reductions in tariffs and domestic support and full elimination of agricultural export subsidies. The model includes: demand for goods for final consumption, intermediate use and government consumption, demands for factor inputs, supplies of factors and goods, and international trade in goods and services. The model employs the simplistic but robust assumptions of perfect competition and constant returns to scale in production activities. Bilateral international trade flows are handled using the Armington assumption by which products are exogenously differentiated by origin. This means that in their model there is not a single "world price" for a given product. Rather the price varies with the origin of the product. For example, rice exported from Thailand is differentiated from rice produced and exported from the USA. This is a useful approach for two main reasons, as explained by Hertel and Ivanic. First, even at the level of rice, or processed sugar, commodities are heterogeneous. For example, processed sugar trade includes high fructose corn syrup as well as processed cane and processed beet sugar. The category of rice includes many different varieties, some of which substitute only imperfectly for one another. For instance rice from Thailand consists of various sorts, called Thai rice 15%, 25% and 50% broken. Second, closely related reason for adopting this product differentiation assumption is that it permits them to explain, within the model, why an individual country is both an exporter and an importer of a given product. For example the USA is an exporter of high quality beef, while it imports low quality beef for use in fast food.

The estimated changes in import and export prices of selected agricultural commodities at the world market as well as for selected countries, including Indonesia are presented, respectively, in Tables 5 and 6. As can be seen, the Doha agreement has only a modest impact on world prices of primary agricultural commodities; though it varies by commodity, depending on many factors, including the 'protection' rate before liberalization and market condition (i.e. demand as well as supply responses to new prices). Among these primary commodities, import and export price indexes for rice have the highest percentage of changes at the world market, but they are relatively very small in Indonesia. This may suggest that if Indonesia is a net importer of rice, with 1.1% of change, Indonesian rice consumers will be less hurt than for instance rice consumer in Mexico (18.1%) or in the Philippines (5.9%) by the increase in import price of rice resulted from the Doha agreement. But, on the other hand, in case that Indonesia is a net exporter of rice, with 0.9% change, Indonesian rice farmers will be much less benefited than their Mexican counterparts (4.5%) from the Doha agreement. Of course, the extent of the benefit at last will depend on the supply sensitive to price changes in the particular country. It is possible that despite the export price changes at the border in Indonesia is smaller that that in Mexico, Indonesian farmers gain more benefits from the Doha agreement because their production response is stronger that that in Mexico.

Table 5. Doha Agreement: Percentage Change in Import Prices

	World	Bangladesh	Brazil	Cameroon	China	Indonesia	Mexico	Mozambique	Philippines	Russia	Vietnam
Import price index	0.2	0.5	0.1	0.4	0.3	0.4	0.2	0.5	0.3	0.2	0.2
Primary agriculture	2.0	2.8	1.7	1.8	3.3	3.9	4.4	1.4	1.9	0.5	2.6
Paddy rice	8.0	0.2	2.8	1.0	1.8	1.1	18.1	4.3	5.9	2.4	1.4
Wheat	2.1	1.5	2.0	3.2	1.3	2.0	1.6	1.7	1.5	0.2	1.4
Cereal grains	4.5	1.3	2.5	5.0	6.6	1.6	2.4	1.8	1.9	11.0	1.2
Fruits and vegetables	0.9	0.4	1.7	-0.1	0.8	1.0	1.1	1.1	0.9	0.4	1.1
Oil seeds	4.2	2.7	2.5	1.8	4.8	4.9	5.3	2.3	4.2	1.6	3.1
Raw sugar	1.2	1.6	1.1	0.3	3.9	1.7	1.8	1.6	1.6	1.7	1.6
Plant fibers	6.7	5.3	2.6	1.1	5.9	7.7	18.5	1.3	8.1	0.1	11.4
Other crops	0.4	0.1	-0.2	-0.3	1.1	0.2	0.6	0.9	0.6	-0.2	0.1
Cattle	0.5	0.1	1.1	-0.1	1.8	2.3	1.3	1.9	2.3	-1.1	1.2
Animal products	0.6	0.4	0.5	-0.1	0.8	-0.7	1.0	1.4	0.1	0.0	-1.4
Raw milk	1.3	1.7	1.4	1.0	1.2	1.0	1.3	1.0	1.0	0.9	0.8
Wool	2.1	1.4	0.5	0.9	2.4	0.5	1.9	0.4	1.1	0.0	1.5

Source: Hertel and Ivanic (2005)

Table 6. Doha Agreement: Percentage Changes in Export Prices

	World	Bangladesh	Brazil	Cameroon	China	Indonesia	Mexico	Mozambique	Philippines	Russia	Vietnam
Terms of trade		-0.3	2.4	-0.4	0.1	0.2	-0.5	-0.6	0.0	-0.4	-1.3
Export price index	0.2	0.2	2.4	-0.1	0.3	0.6	-0.4	-0.1	0.2	-0.1	-1.1
Primary agriculture	2.1	0.6	5.1	-0.1	1.2	0.2	0.1	0.4	-0.1	-0.2	-1.1
Paddy rice	8.6	0.2	5.9	0.0	1.5	0.9	4.5	0.3	0.0	0.2	-1.0
Wheat	2.2	0.4	4.2	0.4	0.9	0.7	-0.2	0.5	0.5	-0.2	0.6
Cereal grains	4.7	0.3	6.0	-0.1	1.3	0.6	-0.2	0.1	0.2	-0.1	-2.0
Fruits and vegetables	1.1	0.1	5.0	-0.2	1.2	0.8	0.1	0.1	-0.2	-0.4	-1.1
Oil seeds	4.5	0.6	5.0	0.1	1.9	1.4	1.6	0.8	1.5	0.3	1.4
Raw sugar	0.9	0.3	5.4	-0.2	1.1	0.9	0.0	1.2	0.7	-0.3	-1.5
Plant fibers	7.2	1.0	5.6	1.0	1.2	4.8	1.5	1.1	3.5	0.5	2.8
Other crops	0.4	0.1	4.8	-0.3	0.6	0.1	0.0	0.1	0.0	-0.7	-1.2
Cattle	0.7	0.2	9.8	-0.2	1.8	1.1	0.2	0.2	0.5	-0.3	-1.6
Animal products	0.6	0.3	6.7	-0.1	1.3	1.1	0.1	0.1	0.1	-0.5	-1.5
Raw milk	1.3	0.2	6.3	-0.1	1.5	2.0	-0.1	0.5	0.3	-0.4	-0.6
Wool	2.2	0.1	3.1	-0.1	1.8	0.9	0.5	0.4	0.3	0.0	0.4

Source: Hertel and Ivanic (2005)

V.2 Local Price Effects

Begins with the question of price transmission, namely how much of the world price changes is transmitted to farmers and consumers? With a majority of the poor in most LDCs located in rural areas and often poorly served by transportation and communication infrastructure, it is important to ask whether the Doha agreement will really have an impact on these households.

For the case of Mexico, Nicita (2005) shows that indeed world prices are differentially transmitted to the regions of the country, depending on their distance from the border and the nature of the commodity in

question. He begins his analysis by examining the extent of transmission from international prices to domestic prices at the border. Here, he finds that for manufactured goods, about two-thirds of the international price change passes through to the domestic market, whereas the comparable figure for agriculture is just one-quarter. His econometric estimates also show that the transmission of world market price changes diminishes with distance from the border. In addition, urban areas are more sensitive to border prices changes, when compared to rural areas. Therefore, he concludes that in the more remote, rural regions of Mexico, very little of the international price changes will be felt, particularly in the case of agricultural products. As a consequence, the impact of the Doha agreement are negligible in rural Mexico, except in the North, near the US border, where rural households see some small gains. Urban consumers face higher food prices and a small decline in unskilled wages as the privileged Mexican position in the US market is eroded by MFN tariff cuts. Thus the urban poor experience small losses.

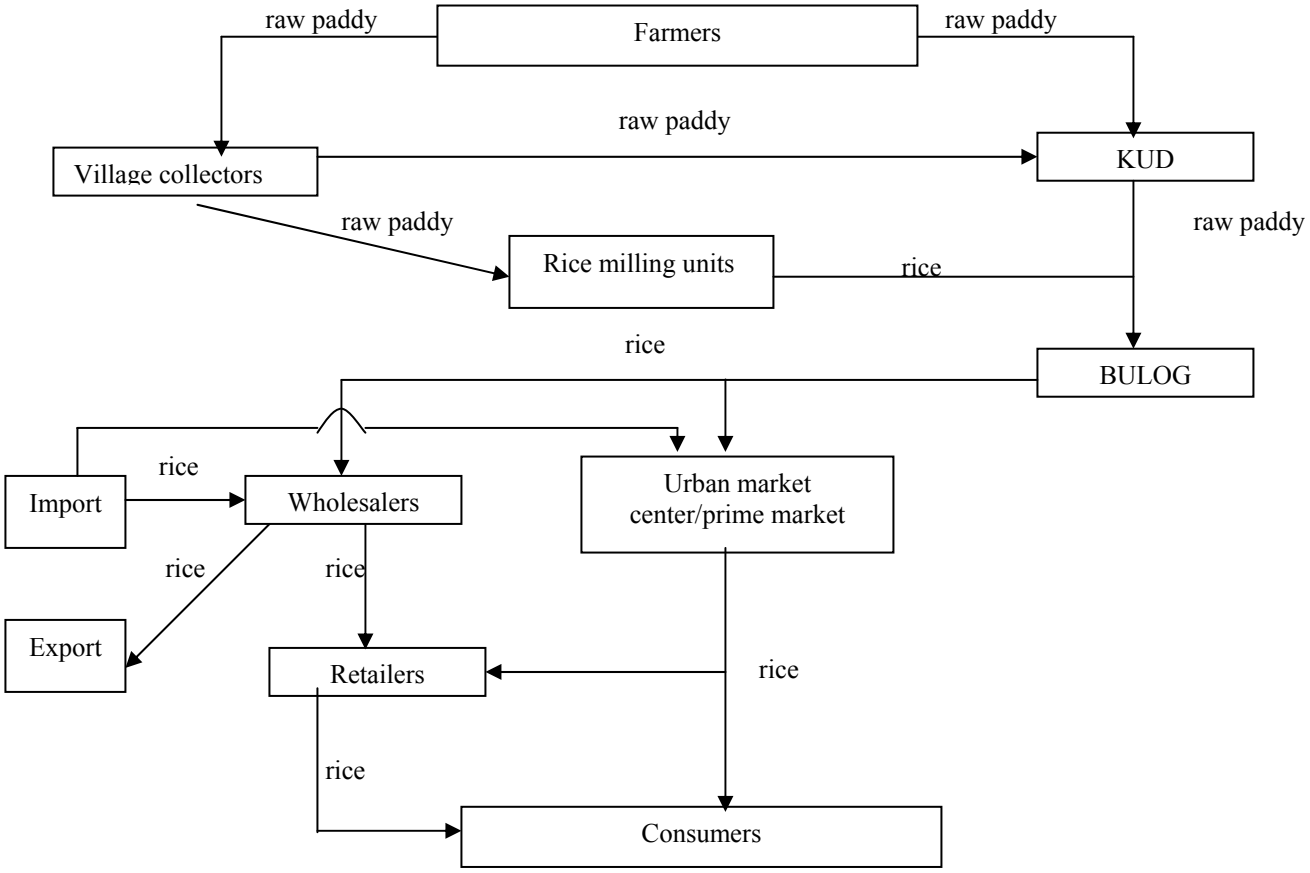
For the Indonesian case, information from empirical studies and official data on price transmission mechanism (PTM) in agriculture is available only for certain commodities and it shows that PTM varies by commodity and region. For rice, the marketing system varies between regions or groups of regions. For instance, say, Case I, in many areas in Indonesia Arifin (2004) and Natawidjaja (2000) find that there are two channels: private and government, and the private channel is longer than the government channel with many players started by village collectors, rice milling enterprises, wholesalers and ended by retailers (Diagram 1). About 90% of total production of *gabah* (i.e. unhulled paddy separated from the stalks; or just say raw paddy) for the market[11] is distributed/marketed through this channel. The government channel, on the other hand, is shorter, with BULOG, the national logistic agency for rice, included as a player in the distribution line. Case II, in his study in 7 districts (*Kabupaten*) in Java, Saliem (2004) comes with evidence of the importance of trade between islands and provinces in the system (Diagram 2).

In the rice marketing system in Indonesia, BULOG plays a crucial role. The main task of BULOG is twofold: (i) to determine or maintain minimum price of raw paddy per kg. for farmers in order to encourage them to increase or to maintain maximum production and also at the same time to guarantee a reasonable income or a minimum profit of about 30% of total production costs for them, and (ii) to maintain a reasonable maximum price for consumers. However, in reality, the market price really paid by consumers is not always the same as what the government wish to maintain, depending on actual development of various costs items, from production costs at farm gate, rice milling costs, transportation costs and market margins taken by distribution/marketing agencies.(Arifin, *at al*., 2001). Total cost varies by region, so the price actually paid by consumers is, say, Jakarta is different than in the eastern part of the country. Consumers who are located close to urban/premium market centers pay lower price than those who must buy rice from local

[11] Many rice farmers sold their paddy or rice to market only in a very small proportion of their total production. For instance, based on his observations on farmers in three rice production centers in East Java, West Java, and Lampung (West Sumatera), Arifin (2004) found that about 90% of their total production is for their own consumption.

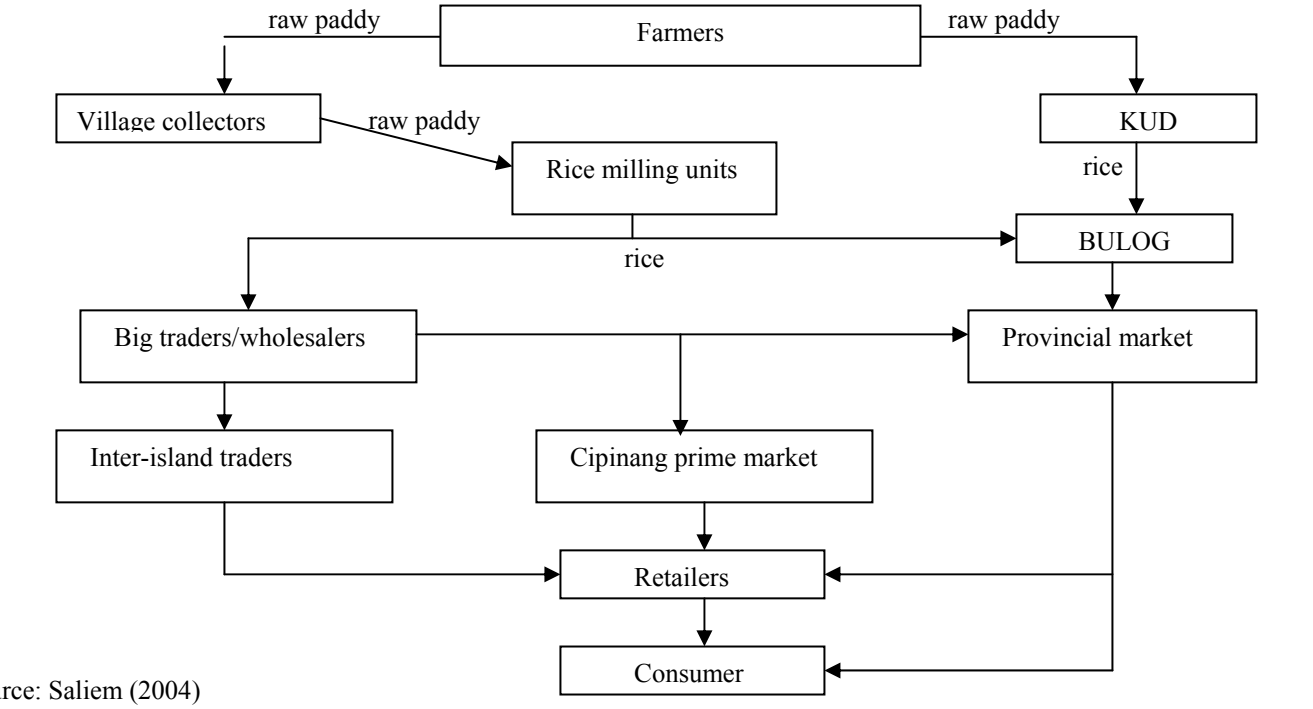
retailers. Some illustrations, Tables 7 and 8 show marketing margins of rice in 7 *Kabupaten* in Java), and in 2 *Kabupaten* in West Sumatera.

Diagram 1: Rice Distribution/Marketing Channels in Indonesia, Case I



Note: KUD = Village Unit Cooperative; BULOG = National Logistic Agency for Rice.
Sources: Arifin (2004), Natawidjaja (2000)

Diagram 2: Rice Marketing Channels in Indonesia, Case II



Source: Saliem (2004)

Table 7: Marketing Margin Analysis of Rice in 7 *Kabupaten* in Java (Rp/kg)

Description	7 *Kabupaten*							Average	Proportion (%)
	1	2	3	4	5	6	7		
Farmers									
- selling price (raw paddy)	1,100	1,100	1,100	1,050	1,100	1,050	1,050	1,079	-
- selling price (rice equivalent)	1,897	1,897	1,900	1,909	1,897	1,850	1,900	1,893	81.84
Village collectors									
-buying price	1,897	1,897	1,900	1,909	1,897	1,850	1,900	1,893	-
-marketing cost	62	51	65	49	55	55	50	55	2.38
-selling price	2,031	2,002	2,000	1,983	2,041	2,000	2,000	2,008	-
-profit margin	73	54	35	25	90	95	50	60	2.59
Rice milling units									
-buying price	2,031	2,002	2,000	1,983	2,041	2,000	2,000	2,008	-
-marketing cost	16	13	10	15	11	14	11	13	0.56
-manufacturing cost	98	95	100	104	100	95	90	97	4.19
-selling price	2,164	2,127	2,122	2,120	2,158	2,117	2,107	2,131	-
-profit margin	18	17	12	18	6	8	6	12	0.59
Wholesalers									
-buying price	2,164	2,127	2,122	2,120	2,158	2,117	2,107	2,131	-
-marketing cost	52	41	32	47	35	44	36	41	1.77
-selling price	2,250	2,200	2,175	2,200	2,200	2,175	2,150	2,193	-
-profit margin	34	32	21	33	6	14	7	21	0.91
Retailers									
-buying price	2,250	2,200	2,175	2,200	2,200	2,175	2,150	2,193	-
-marketing cost	35	75	67	50	45	75	80	61	2.64
-selling price to consumers	65	75	58	50	55	50	70	60	2.53
-profit margin	2,350	2,350	2,300	2,300	2,300	2,300	2,300	2,313	100.0
Total									
-manufacturing	98	95	100	104	100	95	90	97	4.19
-transportation	165	180	174	161	146	188	177	170	7.35
-profit margin	191	179	126	126	157	167	131	154	6.66
-marketing cost	453	453	400	391	403	450	400	422	18.16

Source: Saliem (20040

Table 8: Marketing Margin Analysis of Rice in 2 *Kabupaten* in West Sumatera (Rp/kg)

Description	Padang		Solok	
	Rp/kg	%	Rp/kg	%
Farmer				
-selling price (raw paddy)	1,330	-	1,380	
-selling price (rice equivalent)	2,715	83.54	2,825	81.88
Rice milling units/village collectors				
-buying price	2,715	83.54	2,825	81.88
-total cost	185	5.69	235	6.81
-profit margin	50	1.54	65	1.88
-selling price	2,950	90.76	3,125	90.57
Wholesalers				
-buying price	2,950	90.76	3,125	90.57
-total cost	133	4.09	113	3.27
-profit margin	67	2.06	87	2.52
-selling price	3,150	96.92	3,325	96.37
Retailers				
-buying price	3,150	96.92	3,325	93.37
-total cost	40	1.23	40	1.17
-profit margin	60	1.85	85	2.46
-selling price to consumers	3,250	100.00	3,450	100.00

Source: Djulin (2004)

Also, the actual price received by farmers is often not the same as the determined minimum price, though the difference varies overtime. Sometimes, when the import price for rice declines, the government has to determine a new minimum price because it is competitive. For instance, in 1995 the FOB price for Thai 25% broken in Bangkok was US$ 332/ton, and in mid. 2001, it was US$ 145 per ton. With the current exchange rate of Rp11,000 per one US$ in that time, the import price at border was much lower than the farm minimum price of Rp 1,500 per kg of raw paddy.

After examined PTMs of rice, now three questions should be answered. First, how is the correlation between prices actually received by farmers and those actually paid by consumers? Second, how much consumers in Indonesia will pay for the imported rice? Third, how much the market price actually received by rice farmers will be affected by the import prices of rice?. For the first question, Table 9 shows prices development on average per year of rice and maize (as a comparison) at farm, wholesalers and consumer levels for the period 1974-2001 (no time series data available for the other two commodities). As can be seen, during that three decades, trend of price for rice at wholesalers level ranges between 7.10%-14.81% per year, at consumer level between 9.53%-20.13% per year, and at farmer level between 8.27%-18.60% per year. Trend of price for maize at wholesalers level ranges between 9.05%-20.09%, at consumer level between 9.03%-20.40%, and at farmer level between 8.51%-16.38% per year. This table also shows that degree of price fluctuations, shown by coefficients of variance, varies not only by year but also by commodity. Further, Table 10 shows the estimated correlation coefficients among the three price levels for the two commodities.

Table 9: Development of Prices at Wholesaler, Farmer and Consumer Levels for Rice and maize in Indonesia, 1974-2001 (Rp/kg)

	Average			Trend (% per year)			Coefficient of variance (%)		
	1974-80	1981-90	1991-01	1974-80	1981-90	1991-01	1974-80	1981-90	1991-01
Rice									
- wholesale price	142.85	330.56	769.70	13.84	14.81	7.10	30.09	36.71	59.24
-farm-gate price	81.89	200.32	648.44	14.79	8.27	18.60	33.93	26.07	54.89
-consumer price	148.04	395.31	1433.13	13.16	9.53	20.13	30.25	26.71	61.86
Maize									
- wholesale price	86.50	212.35	642.85	20.09	9.05	19.55	45.15	23.86	50.13
-farm-gate price	42.98	168.17	568.17	13.81	12.24	15.86	26.03	31.70	50.83
-consumer price	101.01	259.68	903.75	15.87	9.03	20.40	40.06	25.72	57.15

Source: Saliem, *et al*. (2004).

Table 10: Correlation Coefficients of Prices at Wholesaler, Farmer and Consumer Levels for Rice and Maize in Indonesia, 1974-2001 (Rp/kg)

	Rice			Maize		
	1974-80	1981-90	1991-01	1974-80	1981-90	1991-01
Wholesale and farmer prices	0.9952	0.9174	0.9892	0.2016	0.9594	0.9576
Wholesale and consumer prices	0.9987	0.9902	0.9874	0.8503	0.9511	0.9909
Farmer and consumer prices	0.9975	0.9902	0.9874	0.2834	0.9928	0.9668

Source: Saliem, *et al*. (2004).

For the second question, may be the historical data on different prices for imported rice from Thailand in Indonesia shown in Table 11 can give some idea about the PTM from FOB price up to local price at the prime market level in Jakarta. As can be seen, the different between the border price and the prime market price in Jakarta varies by month or year. For instance, in April 1999 the different (or the nominal protection rate) was 13.75% of the border price; in May 1999 it was higher at 20.77%; and in February 2000 it was negative at 0.89%.

Thus, if exchange rate of the rupiah against the US dollar, and the other cost components, i.e. the 7.5% for the insurance and transportations, the 5% for handling cost etc., and the new component: Rp 430 are constant, a 1% change in import price (FOB) of rice will be 100% transmitted to the border price, but, it can be less or more than 1% at the prime market or at the retail level (i.e. price actually paid by consumer), depending on the dynamism of the nominal protection rate. Also, the prime market price varies by city. This makes price actually paid by consumers also different in different cities.

In the last few years, several studies have been done to examine the behavior of price movement for rice in big cities in Indonesia in relation to price changes of rice in world market. Among these studies, is one from Darwanto (2001) using data for 1969-2000. As shown in Table 12, his results show that there is a positive and significant correlation between import price (FOB) and domestic price. The estimated regression coefficient of the relationship between the two variables may suggest that for every 1% increase in FOB import price, *ceteris paribus*, only about 76% of it will be transmitted to the change in domestic price.

But, his study deals mainly with prime market price, not with price actually paid by consumer. As said before, price actually paid by consumer can be higher or lower (but normally higher) than the percentage increase of import price at border. Table 13 may give more insight about this issue. As can be seen, during the period

reviewed, the development of prices for rice and maize in world market shows a declining trend, while, that of local prices actually paid by consumers shows an increasing trend. Next, Table 14 shows that the estimated correlation coefficients between world market price and local price actually paid by consumers for the two commodities are smaller (and negative for the period 1991-2001) than those between local price actually paid by consumer and exchange rate.

Table 11: PTM for Imported Rice from Thailand in Indonesia

Period	Price in Bangkok; FOB in US$/ton (25% broken)	Exch. rate (Rp/US$)	FOB (Rp/kg)	CIF (Rp/kg)**	Border Price (Rp/kg)***	Price at the prime market in Jakarta
Apr-99	215.00	8640	1857.60	1996.92	2096.77	2385
May-99	219.00	8059	1764.92	1897.29	1992.15	2406
Jun-99	223.00	7542	1681.87	1808.01	1898.41	2413
Jul-99	225.00	6779	1525.28	1639.67	1721.65	2300
Aug-99	229.00	7409	1696.66	1823.91	1915.11	2292
Sep-99	218.00	8232	1794.58	1929.17	2025.63	2215
Oct-99	204.00	7471	1524.08	1638.39	1720.31	2200
Nov-99	202.00	7060	1426.12	1533.08	1609.73	2200
Dec-99	210.00	7192	1510.32	1623.59	1704.77	2219
Jan-00	210.00	7239	1520.19	1634.20	2145.91	2250
Feb-00	219.00	7420	1624.98	1749.85	2264.20	2244
Mar-00	213.00	7440	1584.72	1703.57	2218.75	1963
Apr-00	194.00	7654	1484.88	1596.24	2106.05	1875
May-00	185.00	8349	1544.57	1660.41	2173.43	1910
Jun-00	183.00	8619	1577.28	1695.57	2210.35	1950
Jul-00	175.00	9202	1610.35	1731.13	2247.68	1950
Aus-00	175.00	8475	1483.13	1594.36	2104.08	2000
Sep-00	167.50	8624	1444.52	1552.86	2060.50	1894
Oct-00	160.00	8864	1418.28	1524.65	2030.88	1800
Nov-00	160.00	8864	1418.28	1524.61	2030.84	1800
Dec-00	160.00	9430	1508.85	1622.02	2133.12	1800
2000*	173.56	9500	1648.82	1772.48	2291.10	1953
2001	152.76	9900	1512.32	1625.74	2137.03	2696
2002	175.13	8440	1478.10	1588.96	2098.41	3234
2003	181.55	7965	1446.05	1554.50	2062.23	3175
2004	225.43	8790	1981.53	2130.15	2666.66	3302
2005	267.18	9330	2492..79	2679.75	3243.74	3609

Note:*= average;** = FOB price + 7.5% for insurance and transportation;***= CIF price + 5% for handling/transportation/ marketing costs up to wholesalers. Since 2000 the border price is calculated as follows: CIF price + Rp430 + 5%.
Source: BULOG.

Table 12: Behavior of Local Price Movement of Rice in Big Cities in Indonesia, 1969-2000

Variable	Unit	Coefficient	t-value
Constant		-104138	-430.4240
Import volume	1000ton	-0.2374	-3.0509
Import price (FOB)	Rp/kg	0.7567	3.8543
Procurement by BULOG	% of production	48.2175	1.2228
Year		52.2445	2.4629
R^2		0.9845	

Source: Darwanto (2001).

Table 13: Development of World Prices, Exchange Rate and Domestic Consumer Prices for Rice and Maize in Indonesia, 1974-2001 (Rp/kg)

	Average			Trend (% per year)			Coefficient of variance (%)		
	1974-80	1981-90	1991-01	1974-80	1981-90	1991-01	1974-80	1981-90	1991-01
Rice									
- World price (US$/ton,FOB)	335.99	238.32	246.55	1.85	0.98	-3.56	24.94	16.08	23.48
-Rp/US$	497.98	1388.25	5050.37	6.98	13.30	32.50	21.58	32.21	71.96
-Consumer price (Rp/kg)	148.04	395.31	1433.13	13.16	9.53	20.13	30.25	26.71	61.86
Maize									
- World price (US$/ton,FOB)	217.34	123.12	138.55	6.18	1.01	-2.60	43.84	15.45	26.84
-Rp/US$	497.98	1388.25	5050.37	6.98	13.30	32.50	21.58	32.21	71.96
-Consumer price (Rp/kg)	101.01	259.68	903.75	15.87	9.03	20.40	40.06	25.72	57.15

Source: Saliem, *et al*. (2004).

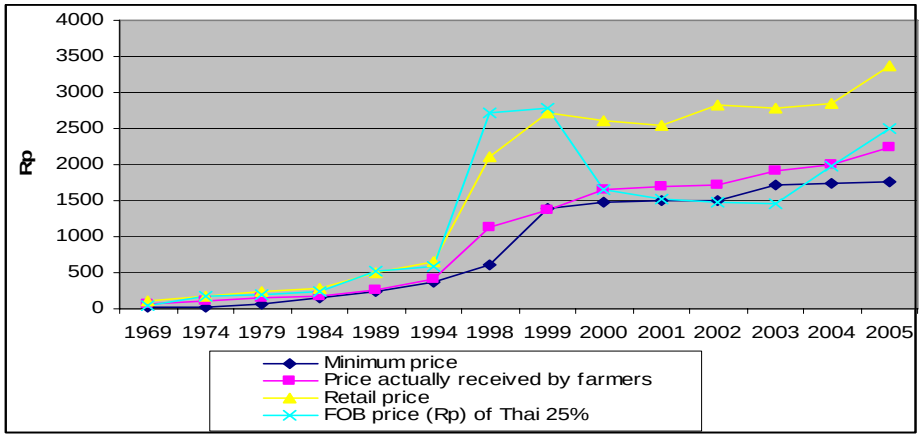
Table 14: Correlation Coefficients of World Prices, Exchange Rate and Consumer Prices for Rice and Maize in Indonesia, 1974-2001 (Rp/kg)

	Rice			Maize		
	1974-80	1981-90	1991-01	1974-80	1981-90	1991-01
World and domestic prices	0.2727	0.4495	-0.6064	0.2190	0.1036	-0.6168
World prices and exchange rate	0.3874	0.2785	-0.5923	0.3074	-0.0085	-0.6660
Domestic consumer prices and exchange rate	0.9111	0.9574	0.9475	0.9277	0.9608	0.9475

Source: Saliem, *et al*. (2004).

With respect to the third question, Figure 1 shows that long-term movement of price actually received by farmers shows the same direction as those of import price (FOB) of rice (Thai 25%) and government determined minimum price. Indeed, a simple regression, as shown in Table 15 indicates that the regression coefficient with respect to the relationship between the current market price actually received by farmers and the FOB import price is positive and statistically significant. However, the power of responsiveness to the import price is less strong as compared to the minimum price.

Figure 1: Long-Term Movement of Market Price Actually Received by Farmers, the Minimum Price and the FOB Import Price of Rice (Thai 25%) (in Rupiah per kg.)



Source: BULOG, BI and BPS

Table 15: Behavior of Movement of Price Actually Received by Farmers in Indonesia, 1969-2005

Variable	Coefficient	t-value
Constant	29.403	0.463
Import price (FOB)	0.120	2.007
Minimum Price	0.981	12.210
R^2	0.967	

VI. Output, Wage and Employment Effects.

VI.1 Output Effects

Table 16 and Figure 2 present a long-term trend of output growth in agriculture in Indonesia from the 1980s up to 2004. As can be seen, total workers absorbed by the sector as well as total arable land also increased during that period. The growth of labour in agriculture happened mainly in Java, as Java is still the centers for main important food crops, especially rice, whereas the expansion of arable land took place mainly in other islands, especially for plantations.

Table 16: Agricultural Output and Its Main Important Determinant Factors, 1981-2004

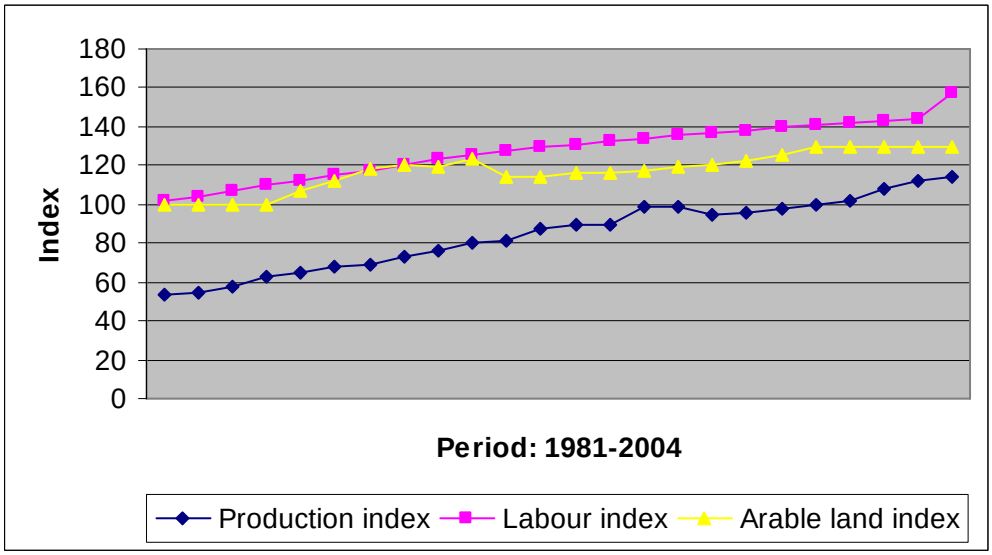
Year	Agricultural production index (2000=100)	Total labour in agriculture (000 men)	Total Arable Land (000 ha)	Irrigated land	
				000 ha	% of total arable land
1981	54	35633	26000	4300	0.165
1982	55	36535	26000	4300	0.165
1983	57.6	37448	26000	4300	0.165
1984	62.6	38371	25934	4300	0.166
1985	64.5	39304	27829	4300	0.155
1986	67.9	40246	29070	4300	0.148
1987	68.8	41197	30644	4300	0.140
1988	72.7	42155	31418	4300	0.137
1989	76.6	43118	31142	4387	0.141
1990	80	44086	31973	4410	0.138
1991	80.9	44696	29797	4432	0.149
1992	87.7	45285	29551	4500	0.152
1993	89.2	45856	30216	4597	0.152
1994	90	46406	30171	4581	0.152
1995	98.3	46937	30387	4687	0.154
1996	99	47449	30986	4760	0.154
1997	94.8	47940	31245	4772	0.153
1998	95.4	48414	31745	4783	0.151
1999	97.4	48869	32746	4800	0.147
2000	100	49309	33600	4815	0.143
2001	101.6	49642	33600	4815	0.143
2002	107.8	49957	33700	4815	0.143
2003	111.7	50254	33710	4815	0.143
2004	114.6	55024	33800	4815	0.143

Source: BPS and FAO

It is generally argued that land and capital are two most important constraints for the sustainable increase of agricultural production, meaning that the supply response of agriculture to price changes will be limited, as more production also needs more of these two production factors. Figure 3 may support this view, showing that the rate of increase of total agricultural production is much lower than that of average price received by farmers.

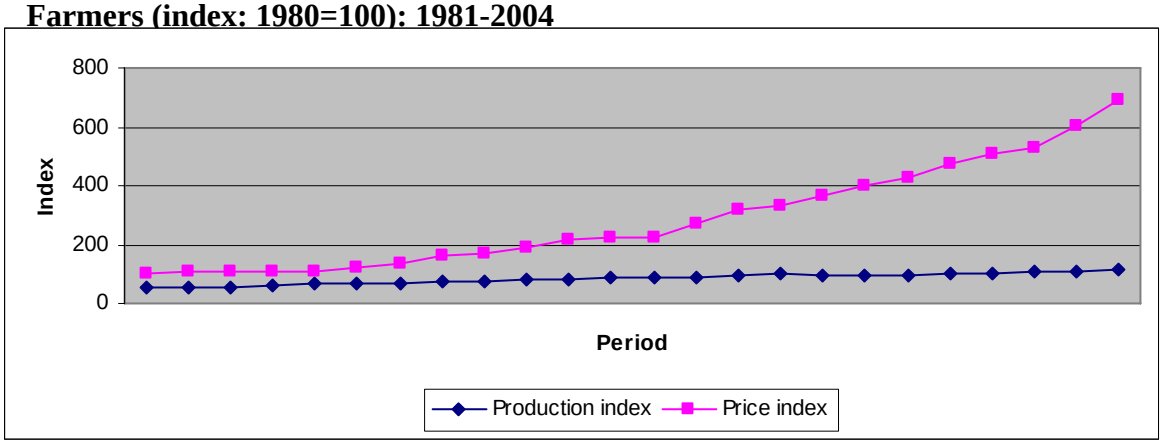
Indonesia produces a diverse set of agricultural commodities. Food crop production is dominated by rice, but also includes several secondary food crops, especially cassava and maize. Non-food crops include rubber, palm oil, coffee, tea, cacao, sugar cane, coconut and numerous other species. By commodity, this study focuses only on rice, cassava, maize and sugar cane, as these commodities among many other have been the most protected ones, on one hand, and, among the most important commodities in Indonesia, especially for domestic market, on the other hand.

Figure 2: Agricultural Production (metric tons), Labour (men) and Arable Land (000 ha) (index: 1980=100): 1981-2004



Source: BPS and FAO

Figure 3: Total Agricultural Production (metric tonnes) and Average Harvest Price Received by Farmers (index: 1980=100): 1981-2004



Source: BPS and FAO

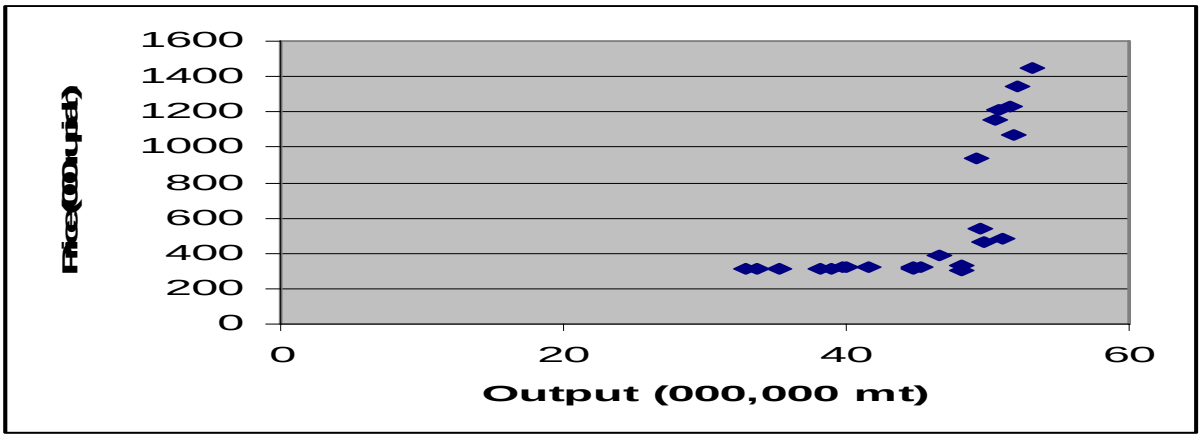
So, in examining empirically the extent of supply response of agricultural production to price changes, by using 2OLS regression technique, equations (3) for total agriculture (A) as well as for rice ® and (4) for the same crop with maize (M), sugar (S) and cassava © as alternative/substitution crops have been estimated in log linear functional forms. The results are shown in Table 17 and Figure 4 shows a scatter diagram of price-output of rice

Table 17: 2OLS Regression results on Output in Agriculture

Regression estimated equations	R^2	Adjusted R^2	Breusch-Godfrey Test (α=5%)		F statistics (probability)
			F-statistic (probability)	Obs. R^2 (probability)	
Eq.3a: Q^S_A= 8.2 + 0.01FP_A(t-1) + 0.9 Q^S_A(t-1) * (1.7) (1.1) (10.2) ** (4.9) (0.01) (0.1)	0.98	0.975	0.001 (0.98)	0.001 (0.97)	408.71 (0.00)
Eq.3b:Q^S_R=15.4 -0.01FP_R(t-1) + 0.1FP_S(t-1) -0.004FP_M(t-1) + (2.5) (-1.1) (0.8) (-0.7 (6.2) (0.01) (0.1) (0.01) 0.03FP_C(t-1) + 0.6 Q^S_R(t-1) (1.8) (4.4) (0.02) (0.2)	0.96	0.94	0.49 (0.49)	0.70 (0.40)	71.03 (0.00)
Eq.4:AP_R (t) =-2287415.0 + 0.5AP_R(t-1) + 875.9FP_R(t-1) – (-0.4) (1.3) (0.2) (6179118.0) (0.4) (3860.3) 615.3 FP_M(t-1) – 13674.2 FP_S(t-1) +2247.7 FP_C (t-1) + (-0.3) (-0.5) (0.5) (2491.9) (28043.5) (4715.3) 170.2Y_R(t-1)+88.4Y_M(t-1)+168.7Y_S(t-1)-40.8Y_C(t-1) (1.3) (0.5) (0.8) (-1.4) (133.7) (174.7) (205.7) (28.9)	0.72 0.82	0.63 0.76	2.02 (0.18) 3.05 (0.10)	2.61 (0.11) 3.72 (0.05)	8.29 (0.001) 14.62 (0.00)

Notes: * *t* –value (α = 5%); ** std. error.

Figure 4: Raw Rice, production (000,000 mt) and producer price (000 rupiah): 1981-2004

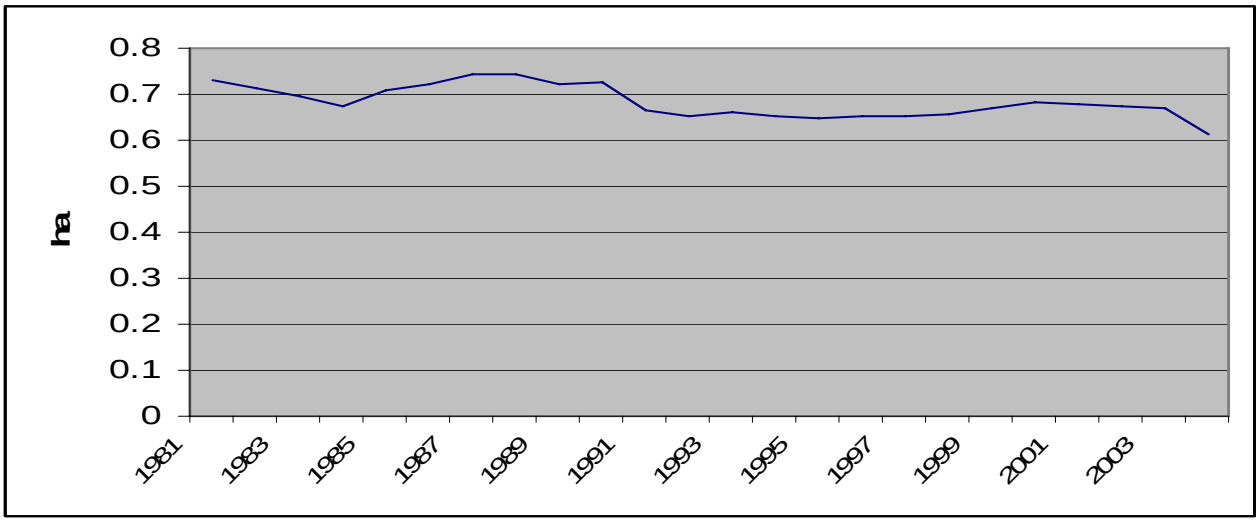


Source: BPS and FAO

With respect to total agricultural output, the lagged price coefficient is positive, as generally expected, but, statistically, it is not significant from zero (α = 5%); whereas the lagged output coefficient is positive and significant. The proportion of the total variation of total production in agriculture accounted for by these two explanatory variables, as illustrated by R^2 is high. The Breusch-Godfrey serial correlation LM test shows that the significance of the observed R^2 is high than 5%, meaning there is no autocorrelation problem in this question. With respect to rice for both output and area planted, although values of adjusted R^2 suggest that more than 60% of the varieties in the dependent variable are explained by the explanatory variables, and the values of *F-statistic* suggest that all the independent variables together influence the dependent variable, in general, the findings are not as theoretically expected.

In overall, one important indication comes out from these estimations is that in Indonesia, the supply response in agriculture with respect to price signal is very weak. It is generally stated in the literature on supply response in agriculture that in aggregate, agricultural producers are quite responsive to price incentives, only when they have access to the necessary complementary inputs such as land, technology, labour and other inputs, and supported by friendly macroeconomic environment and government sponsored facilities especially in marketing, distribution, technology and information.[12]In Indonesia, high production costs attributed to high prices for inputs especially fertilizers, lack of information especially on market opportunities, lack of infrastructure, market distortions caused by unattended discrimination macroeconomic policies against the sector, and land constraint have always been the main problems faced by farmers. As illustrated in Figure 5, on average, during the period 1981-2004, the land-labour ratio in agriculture in Indonesia declined from about 0.7 ha to 0.6 ha per person. Whereas, based on NAC data, Table 18 indicates that Indonesian agriculture is dominated by small farmers. In 2003 (the latest census) around 75% of total farmers cultivate land with sizes less than one hectare. This proportion has increased from around 70% in 1984 and 1993. Meanwhile, the proportion of the marginal farmers who owned land with sizes less than 0.1 hectare has increased substantially from 7% in 1993 to 17% in 2003. These marginal farmers and agricultural laborers with the lowest income among all agricultural household groups have been identified as containing the majority of poor in rural areas in Indonesia (Mason and Baptist, 1996).

Figure 5: The land-labour ratio in agriculture in Indonesia, 1981-2004



Source: BPS

Table 18. Distribution of Agricultural Households by Cultivated Land Holding Size: 1983, 1993, 2003 (%)

Size (ha)	1983	1993	2003
<0.1	8.5	7.0	17.2
0.1-0.49	37.7	40.7	39.2
0.50-0.99	24.1	22.4	18.4
≥1.0	29.7	29.9	25.2

Source: BPS (NAC 1983, 1993, 2003)

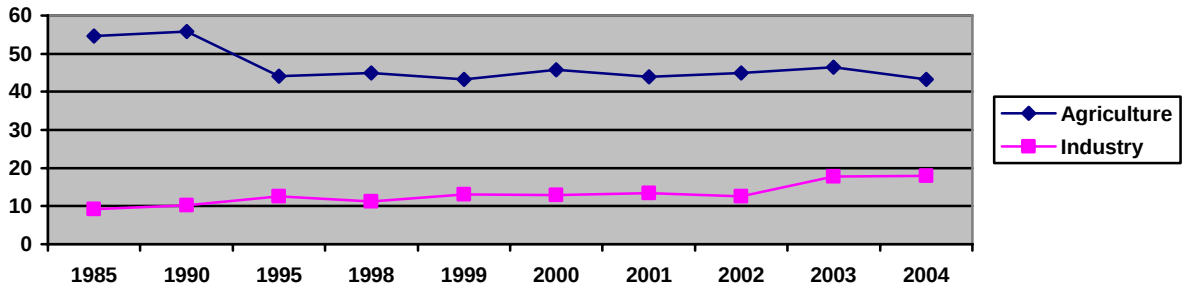
[12] See some studies mentioned before.

It is obvious that continued conversion of agricultural land, especially surrounding big cities like Jakarta, Bandung, Semarang, Surabaya, and Makassar, in the last 30 years as a consequence of population growth, rapid urbanization, and industrialization, has been the most responsible for the declining average size of land per farmer in Indonesia. Although every year new land is opened for agriculture, the rate of land conversion is higher than the rate of new added land. Recent official data from the Department of Agriculture, in the period 1999-2002, about 563,159 hectares of rice field, or on average 187,720 hectares per year, has been converted to other purposes .All these problems may explain the founded insignificant effects of price changes on output changes in the sector.

VI.2 Wage and Employment Effects

There are two main channels through which the performance of agriculture or world trade liberalization in agriculture affects poverty, namely employment changes induced by output changes and wage changes in the sector. That is why agricultural employment and wage effects are also important to be considered in analyzing the impact of the trade reform policy in agriculture on poverty. Moreover, until early 1990s agriculture absorbed more than 50% of total labor force in the country. Although its employment share started to fall under 50% since 1993, agriculture is still the biggest employment-generating sector in Indonesia (Figure 6).

Figure 6: Employment Shares in Agriculture and Industry (%): 1985-2004



Source: BPS (SI)

Another important reason is that, the majority of workforce in Indonesia still finds employment in rural areas. In 1990, about 75% of Indonesian total workforce worked in rural areas and declined to around 60% in 2003. The large part of rural workers was found in the agricultural sector, although the proportion has declined substantially during the pre-1997-1998 economic crisis period from 75% in 1990 to 60% in 1995. After the onset the crisis, however, the role of this sector in providing employment opportunities in rural areas regained its importance. In 2003, the proportion of rural workforce absorbed by the agricultural sector has increased again to 68%.

Consistent with the employment data, a large fraction of Indonesian households particularly in rural areas, derive their income from agriculture, either as a sole income source or in combination with other sources. Based on the Intercensal Population Survey (SUPAS) data in 1995, almost 25% and 23% of all households, respectively, have derived their incomes wholly and partly from the sector. In rural areas, 72.6% of total households derived at least part of their incomes from the sector.

Further, the agricultural sector has the highest poverty incidence compared to other sectors and contributes the largest proportion of the poor in the country. In 1996 the rate was almost 69% of total poverty in the country, and it declined slightly to 64.3% in 2004, and most of them are wage-paid laborers/casual employees, which increased slightly during the period 2002-2004.

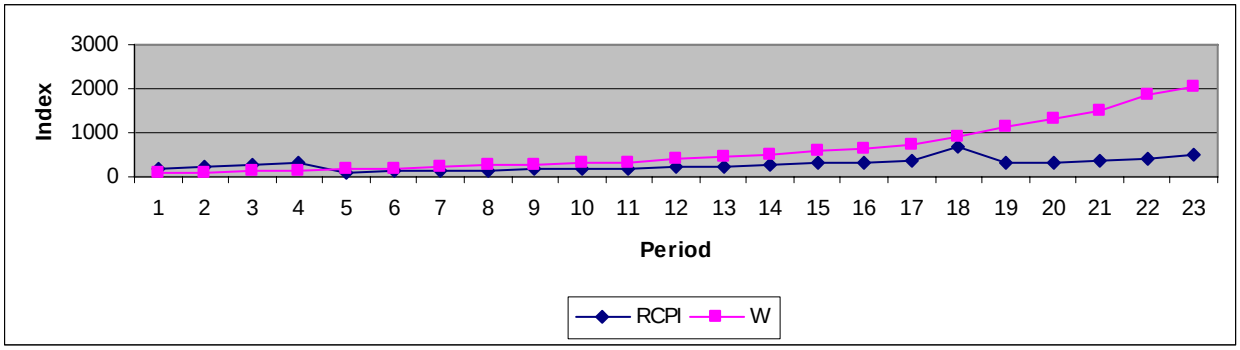
First, in dealing with wage effect, Table 19 presents the regression result of equation 5 on the relationship between current agricultural nominal wage (W_A) as dependent variable and rural consumption price index (RCPI) and agricultural nominal wage, in one-year lag, as the explanatory variables. As can be seen, the correlation coefficient of RCPI is positive, as generally expected, and statistically significant, suggesting that the wage in agriculture is price sensitive. With this result, it can be expected that, *ceteris paribus*, domestic consumption price increases as a result of the OECD policy will reduce poverty through wage increases received by agricultural labourers.

Figure 7 illustrates the long-term trends of growth in both average nominal wage in agriculture and rural inflation, measured by rural consumption price index, for the 1981-2003 period.

Table 19: 2OLS Regression results on Wage in Agriculture

Regression estimated equations	R^2	Adjusted R^2	Breusch-Godfrey Test (α=5%)		F statistics (probability)
			F-statistic (probability)	Obs. R^2 (probability)	
Eq.5 $W_A(t) = -33.7 + 0.19\ RCPI(t-1) + 1.13W_A(t-1)$ (-1.6) (2.04) (48.2) (20.7) (0.1) (0.02)	0.995	0.995	3.69 (0.07)	3.74 (0.053)	2084.4 (0.00)

Figure 7: Long-term Trends of Growth in Rural Consumption Price Index (RCPI) and Average Agricultural Nominal Wage Index (W_A): 1981-2003

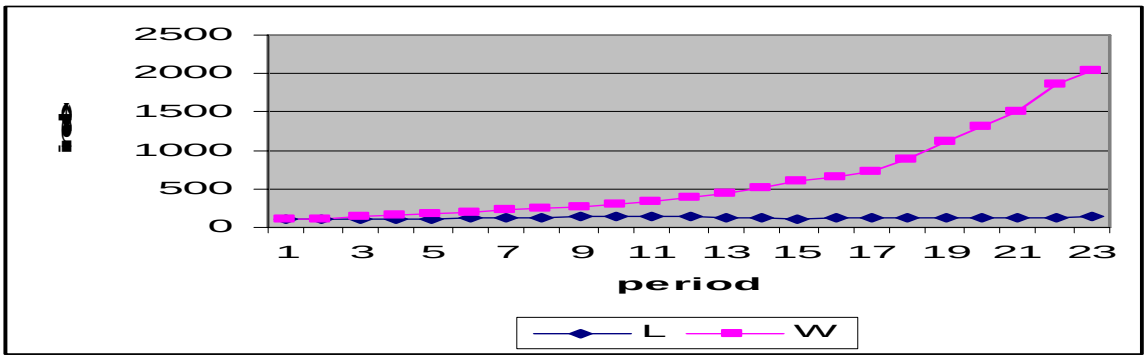


Source: BPS

Further, Figures 8 and 9 show long-term trends of growth combination in, respectively, nominal wage-employment and output-employment in agriculture. Since 1990s, the nominal wage in agriculture increased rapidly from around 598 rupiah per worker per half-day in 1981 to more than 12,000 rupiah in 2003. The growth rate of employment is relatively low and stable, from about 35.6 million workers in the beginning of the period studied to around 50.3 million workers in 2003. The output also has grown steadily during the same period with a relative

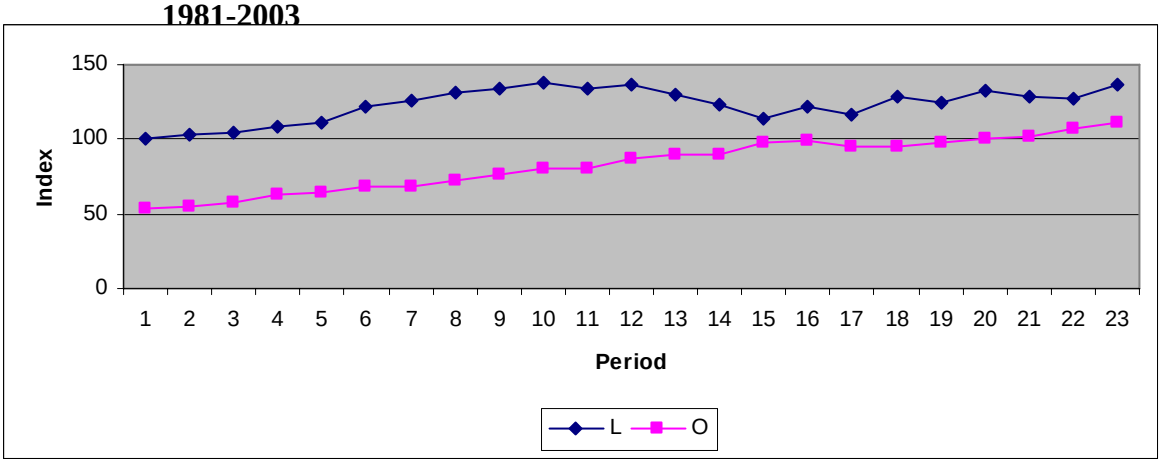
low rate of growth. With 2000 as the base year, the output index increased from 55 in 1981 to 101.6 in 2001 and to 111.7 in 2003.

Figure 8: Long-term Trends of Growth in Average Nominal Wage (W) and Employment (L) in Agriculture: 1981-2003



Source: BPS

Figure 9: Long-term Trends of Growth in Output (0) and Employment (L) in Agriculture: 1981-2003



Source: BPS

With respect to employment effect, since the labour market in agriculture is assumed to be always clear, i.e. that labour demand (L^D_A) is always equal to labour supply (L^D_S), equation (6) on the supply side of the agricultural labour market cannot be estimated as a single, independent, equation in which it is assumed that the only endogenous variable (i.e. L^S_A) is the dependent variable and that the explanatory variables, i.e. wage (W_A) and output (Q_A) are truly exogenous. In a single equation system, it is implicitly assumed that the only relationship between the variables in an equation (or in this case, between L^S_A and W_A and Q_A) is that described by the equation itself. So, in this analysis, wage is assumed not only affect total workers employed in the sector through the supply-side but also through the demand-side. Equation (6) must be then solved simultaneously with equation (7) on the labour demand in agriculture.[13]These two equations represent the structural equations of the agricultural labour market model in a very simple formulation, RCPI and Q^S_A are assumed to be exogenous variables, while

[13] These two equations are also solve simultaneously with equations 3 and 5, since labor demand in agriculture depends also on output in the sector and labor supply on wage.

L^S_A, L^D_A, and W_A are the endogenous variables. With the assumption that the labour market in agriculture always clears, both demand for and supply of labour are represented by the symbol (L_A).

The analysis follows the following steps. First, the structural equations are estimated to get some idea about the partial correlation between the labour supply and wage with the latter as an exogenous variable, and, then, by expressing the endogenous variables as functions of the exogenous variables and the disturbances, the reduced forms of the two equations are obtained, and estimated. The regression results are presented in Table 20. The sign of wage coefficient in the labor supply appears as generally expected and it is significant; whereas in the labor demand, it is not as expected and also not, statistically, significant. However, the two equations still have autocorrelation problem, even after conducting improvement with "Cochrane-Orcutt Procedure". In the reduced form, the employment and wage equations show much better results with respect to autocorrelation problem, and the estimated coefficients with respect to output supply are well as expected and statistically significant at a 5 per cent significant level. The agricultural labour supply equation implied by the reduced-form parameters is therefore:

$L^S_A = 33211.9 + 38.2W_A + 1.2RCPI$

Overall, the findings may suggest that in agriculture, both labor supply as well as wage are very responsive to output changes, but not to price changes.

Table 20: OLS Regression results on Labor Demand and Supply in Agriculture

Regression estimated equations	R^2	Adjusted R^2	Breusch-Godfrey Test (α=5%)		F statistics (probability)
			F-statistic (probability)	Obs. R^2 (probability)	
I. The Structural Equations					
I.1 Labor Supply:					
Eq.6: $L^S_A = 33530.6 + 32.7W_A - 0.06RCPI$	0.93	0.92	7.19	8.36	71.1
(27.0) (3.7) (-0.23)			(0.02)	(0.02)	(0.00)
(1240.9) (8.9) (0.3)					
I.2 Labor Demand:					
Eq.7: $L^D_A = 21676.9 - 0.6W_A + 276.5Q^S_A$	0.98	0.97	3.35	6.2	396.7
(18.11) (-1.10) (15.8)			(0.06)	(0.04)	(0.00)
(1196.6) (0.54) (17.5)					
II. The Reduced forms					
II.1 Employment:					
$L_A = 22573.2 + 263.7Q^S_A - 0.8RCPI$	0.97	0.97	0.5	1.5	6756.5
(27.0) (29.97) (-0.5)			(0.6)	(0.5)	(0.00)
(836.1) (12.6) (1.7)					
II.2 Wage:					
$W_A = -278.5 + 6.9Q^S_A + 0.01RCPI$	0.98	0.97	0.19	0.58	196.5
(-3.3) (4.9) (1.6)			(0.83)	(0.75)	(0.00)
(84.7) (1.4) (0.01)					

VII Consumption Effects

As explained before, with respect to the (food) consumption effects of the trade policy reform policy, this study estimates two demand equations, one for rural household and one for urban household as they have different

patterns of consumption (see equation 8). It was discussed before that, because of the problem of simultaneity, the OLS estimation method will normally yield biased and inconsistent estimator for the demand equation parameters even when that equation is identified. There are, however, two not uncommon situations where the application of OLS is quite appropriate (Thomas, 1985). The first such exception is when price is a predetermined variable. Since price is no longer endogenous, its presence on the right-hand side of the demand equation no longer gives rise to OLS bias. This is, however, more applied for public utilities such as gas and electricity where price tends to be set independently of market conditions by public regulation. The second case where OLS may be more safely applied is where supply itself is predetermined and the supply equation can be replaced by the simple statement:

$Q^{S}_{®} = Q_{0®}$ = predetermined

This case might well be a valid specification for perishable agricultural commodities, as the supply of such commodities is subject to exogenous weather variations and is virtually totally inelastic with respect to current price because of time lags involved in planting and harvesting.

Adding a demand equation such as (8) to the above supply statement and making the market clearing assumption (justified here by the perishable nature of the commodity) results in a model in which the only endogenous variable is price (FPI). Following an obvious procedure, the demand equation (8) can be rewritten with the endogenous own-price as the dependent variable:

$$FPI_{®} = -(e_0/e_1) + (1/e_1)Q_{0®} - (e_2/e_1)Y_{®} - \xi/e_1 \qquad (8')$$

Since all the explanatory variables in (18') are either exogenous, i.e. $Y_{®}$ or predetermined, i.e. $Q_{0®}$, they can be considered as independent of the disturbance, $-\xi/e_1$. Hence, the application of OLS to equation (8) will yield unbiased and consistent estimator of its parameters.

In this analysis, the demand equations for both rural and urban are estimated in the double-logarithmic form since this form became the most popular functional form largely because the regression coefficients can be interpreted as the elasticities. In addition, the variation in the dependent variables was usually better explained after the variables were transformed into the logarithmic form. The regression results are shown in Tables 21.

Table 21: OLS Regression results on Demand on Food in Rural and Urban Areas

Regression estimated equations	R^2	Adjusted R^2	Breusch-Godfrey Test (α=5%)		F statistics (probability)
			F-statistic (probability)	Obs. R^2 (probability)	
Rural					
Eq.8a $Q_{®}^{D} = 11.34 - 0.002FPI® + 0.001Y®$	0.64	0.56	0.113	0.36	8.69
(25.7) (-4.13) (3.97)			(0.895)	(0.837)	(0.01)
(0.4) (0.1E-03) (3.19E-05)					
Urban					
Eq.8b. $Q_{(u)}^{D} = 179.6 - 0.73FPI_{(U)} + 0.002Y_{(U)}$	0.95	0.94	4.7	6.997	99.34
(3.6) (-2.6) (11.27)			(0.05)	(0.03)	(0.000)
(50.1) (0.3) (0.2E-04)					

VIII. Poverty Impact: SUSENAS Expenditure Data Simulation

In Indonesia, poverty is considered a rural or agrarian phenomenon due to the large share of agriculture in the economy. As shown before, agriculture is still the biggest employment-generating sector in Indonesia, and the vast majority of poor families in Indonesia are in agricultural work.

There are two main channels through which the trade liberalization policy on agriculture in OECD countries (or the Doha agreement) affects the welfare of farms and hence the poverty rate in Indonesia, *ceteris paribus*, other sectors are not affected by the policy, namely through consumption and income sides. With respect to the consumption side, if the farm does not produce or he is a net consumer of the liberalized crops, the increase in prices of these crops will reduce their purchasing power, given that their nominal income is constant. With respect to the income side, which consists of two components, i.e. from selling output (as a producer) or selling service (as wage laborer), an increase in price of a crop will benefit net sellers/producers of the liberalized crop and wage workers whose wages will also increase (see the estimated equation 5).

As explained before, to estimate the poverty impact of the July Package through changes in prices of food, this study uses data SUSENAS 2004 on household consumption expenditure, as an alternative indicator that can portray the welfare condition of a society. Based on SUSENAS 2004 and from other previous years, Table 22 shows the changes in the consumption pattern during the period 1999-2004. Based on the Engel's Law, the table suggests that the welfare condition in Indonesia has improved, as the share of food expenditure to total expenditure declined from 62.94% in 1999 to 54.59% in 2004. Accordingly, the share of non-food in total expenditure increased from 37.06% to 45.42% during the same period.

Table 22. Structure of Consumption Expenditure, 1999-2004 (%).

Commodity Group	1999	2002	2003	2004
Food				
- Cereals	16.78	12.47	10.36	9.44
- Tubers	0.78	0.64	0.65	0.76
- Fish	5.58	5.17	5.37	5.06
- Meat	2.29	2.86	2.90	2.85
- Eggs & Milk	2.91	3.28	3.04	3.05
- Vegetables	6.23	4.73	4.80	4.33
- Legumes	2.33	2.02	1.90	1.75
- Fruits	2.07	2.84	2.97	2.61
- Oil and Fats	3.04	2.25	2.23	2.31
- Beverage stuffs	3.12	2.71	2.52	2.48
- Spices	1.65	1.55	1.46	1.43
- Miscellaneous food items	1.29	1.37	1.24	1.23
- Prepared food	9.48	9.70	9.81	10.28
- Alcoholic beverages	0.05	0.08	0.08	0.08
- Tobacco and betel	5.33	6.80	7.56	6.89
Total of Food	**62.94**	**58.47**	**56.89**	**54.59**
Non Food				

- Housing and household facility	15.92	17.80	19.15	20.65
- Goods and services	6.75	7.50	8.13	8.44
- Education	2.32	2.47	2.59	2.99
- Healthy	1.67	2.10	1.87	2.05
- Clothing, footwear, and headgear	5.23	5.18	5.49	5.11
- Durable goods	2.87	4.10	3.56	4.15
- Taxes and insurance	0.85	0.80	0.77	0.83
- Parties and ceremony	1.45	1.57	1.55	1.19
Total of Non Food	**37.06**	**41.53**	**43.11**	**45.42**

Source: SUSENAS, Module Consumption, 1999-2004.

Table 23 shows distribution of population by monthly per capita nominal expenditure group based on SUSENAS 2004. If, for example, those whose expenditures are less than Rp 60.000 per month are considered as the (extreme) poor, then, the percentage of poverty in rural areas is higher than in urban areas. SUSENAS data on consumption expenditure can also be used to estimate income distribution; even that expenditure data are more reliable than income data to measure the level of income inequality. While, Table 24 presents trends in expenditure distribution in Indonesia during the period 1999-2004. The table shows that in 2004 the expenditure share of 40% population with the lowest expenditure was 20.80%, a slightly decline from 21.66% in 1999. This means that the income distribution in Indonesia during the whole period, according to the World Bank criteria, was relatively fair.[14]

Table 23. Distribution of Population by Monthly per Capita Nominal Expenditure Group, 2004 (men and %)

Expenditure group (Rp)		Urban	Rural	National
1	Less than 60,000	85 444 (0.09)	1 474 589 (1.20)	1 560 033 (0.72)
2	60,000-79,999	669 598 (0.71)	6 820 233 (5.54)	7 489 831 (3.45)
3	80,000-99,999	1 778 237 (1.89)	15 142 993 (12.29)	16 921 230 (7.80)
4	100,000-149,999	12 366 384 (13.18)	37 918 328 (30.78)	50 284 712 (23.17)
5	150,000-199,999	17 647 615 (18.80)	28 956 675 (23.50)	46 604 290 (21.47)
6	200,000-299,999	26 104 618 (27.81)	23 440 371 (19.02)	49 544 989 (22.82)
7	300,000-499,999	22 360 205 (23.82)	8 042 806 (6.53)	30 403 011 (14.01)
8	500,000 and over	12 847 151 (13.69)	1 414 205 (1.15)	14 261 356 (6.57)
Total		93 859 252 (100.00)	123 210 200 (100.00)	217 069 452 (100.00)

Source: SUSENAS, Module Consumption, 2004.

Table 24. Selected Indicators of Consumption Expenditure, Indonesia 1999, 2002, 2003 and 2004

Selected Indicators	1999	2002	2003	2004
- 40 % of population with lowest expenditure	21,66	20,92	20,57	20,80
- 40 % of population with moderate expenditure	37,77	36,89	37,10	37,13
- 20 % of population with highest expenditure	40,57	42,19	42,33	42,07

[14] According to the World Bank criteria if the percentage of income accrue to the 40% of the lowest income population is less than 12%, the level of inequality is categorized as high; if that group receives between 12%-17% of total income, the level of income inequality is categorized as moderate; and if that group has command over 17% or more, the level of inequality is considered as low.

Index Gini	0,31	0,33	0,32	0,32

Source: SUSENAS, Module Consumption, 1999-2004.

For any given distribution of expenditures across households, the determinant of the poverty rate is the poverty line (PL). The PL is defined as the money expenditures (in rupiah) necessary to attain a level of welfare: the amount of expenditures above which households are "not poor" and below which households are in (varying degrees of) poverty. Table 25 presents the official estimation of poverty rate in Indonesia from 1976 (the first year that the official data on poverty rate was issued) up to 2004. However, the poverty rates in Table 25 are estimated by comparing individual nominal expenditure to given nominal PL. To estimate the impact of an increase in food price on poverty though expenditure, nominal expenditure should be deflated. The basic thought here is the standard microeconomic theory of consumer choice with individual welfare maximization. The consumer choice problem is to choose a consumption basket for given expenditures and prices so as to maximize their utility.

Table 25. Official estimated data on the Poverty Rate in Indonesia: 1976-2004

Year	Nominal Poverty Line (000Rp/capita/month)		Poor People (%)		
	Urban	Rural	Urban	Rural	National
1976	4.522	2.849	38.8	40.4	40.1
1978	4.969	2.981	30.8	33.4	33.3
1980	6.831	4.449	29.0	28.4	28.6
1981	9.777	5.877	28.1	26.5	26.9
1984	13.731	7.746	23.1	21.2	21.6
1987	17.381	10.294	20.1	16.1	17.4
1990	20.614	13.295	16.8	14.3	15.1
1993	27.905	18.244	13.4	13.8	13.7
1996	42.032	31.366	9.7	12.3	11.3
1998	96.959	72.780	21.9	25.7	16.7
1999	92.409	74.272	19.4	26.0	23.5
2000	91.632	73.648	14.6	22.4	19.1
2001	100.011	80.382	9.8	24.8	18.4
2002	109.0	87.732	14.5	21.1	18.2
2003	118.8	95.7	13.57	20.23	17.4
2004	128.7	104.3	12.6	20.04	16.7

Source: BPS calculation based on SUSENAS (various years) and other BPS data.

As shown in Table 26, for the per capita expenditure group of less than Rp 60,000, which can be considered as the poorest, the food share is above 70% in both rural and urban areas. By comparing data from February 1996 and 1999 SUSENAS surveys, Suryahadi *et al*. (2000) found that during the crisis period when inflation in the price of food from February 1996 to February 1999 was 160%, based on the CPI the real expenditures were only 1.3% lower in February 1999 than in February 1996. When they constructed a price index using the CPI series but with weights for prices based on the actual consumption basket of the poorest 30% of households, they found that the inflation in that consumption basket was 136% and median real expenditures fell almost 11%.

If nominal expenditures and PL are deflated by the consumer price index (CPI), as the standard approach, the impact of an increase in the price of food on real expenditure is smaller than it should be because the share of food in the CPI basket (which is around 40%) is much lower than in actual consumption expenditure based on SUSENAS data, and certainly understates the importance of food for the poor. So, this study uses a deflator that

reflects the actual food share of 70% of the poorest population. Table 27 shows the nominal expenditures and the associated real expenditures for each expenditure group in 2004 using this deflator. This deflator captures the expenditure changes of the poorest, but overstate the real expenditures declines of richer households (as the food share in their consumption is lower). Deflating the 2004 nominal PLs for urban and rural given in Table 25 by the same deflator yields the following PLs in real rupiah: Rp 54 534 and Rp 44 195, respectively.

Table 26. Percentage of Average per Capita Monthly Expenditure by Commodity Group and Monthly per Capita Nominal Expenditure Group, 2004.

Expenditure group	Urban		Rural		National	
	Food	Non-food	Food	Non-food	Food	Non-food
1	72.00	28.00	74.08	25.92	73.96	26.04
2	65.52	34.48	70.37	29.63	69.94	30.06
3	63.80	36.20	68.49	31.51	68.00	32.00
4	63.89	36.11	67.51	32.49	66.61	33.39
5	61.15	38.85	65.71	34.29	63.97	36.03
6	56.82	43.18	62.95	37.05	59.67	40.33
7	49.53	50.47	55.42	44.58	51.02	48.98
8	36.12	63.88	38.01	61.99	36.28	63.72
Per capita average	48.61	51.39	63.06	36.94	54.58	45.52

Source: SUSENAS, Module Consumption, 2004.

Table 27. Average per Capita Monthly Nominal and Real Expenditure by Expenditure Group, 2004 (Rp)

Expenditure group (nominal)	Urban		Rural		National	
	Nominal	Real	Nominal	Real	Nominal	Real
1	52977	22447.88	52562	22272.03	52585	22281.78
2	72210	30597.46	72081	30542.8	72092	30547.46
3	91148	38622.03	90689	38427.54	90737	38447.88
4	126841	53746.19	125296	53091.53	125676	53252.54
5	175084	74188.14	172751	73199.58	173634	73573.73
6	246239	104338.6	238915	101235.2	242774	102870.3
6	380736	161328.8	358792	152030.5	374931	158869.1
8	789838	334677.1	665335	281921.6	777492	329445.8
Average	319220	135262.7	171435	72641.95	235337	99719.07

Source: SUSENAS, Module Consumption, 2004.

Now, suppose the change in import price of rice at the border caused by the implementation of the Doha agreement is 1.1% as estimated by Hertel and Ivanic (2005). As discussed before, if other domestic price determinant factors such as the exchange rate, costs between the FOB price and the border price such as insurance, transportations, handling cost etc, the nominal protection rate that determines the price at prime market, and retail trade margin that determines the local price actually paid by consumers, are all constant, then the increase of 1.1% will be 100% transmitted to the local price changes actually paid by consumers.

With the assumption that no substitution takes place between different food items (i.e. rice with others) and prices of other food items and non-food are constant, then based on the estimated price elasticities of food demand in urban and rural areas (see Table 21), food demand in urban and rural areas will decline at 0.803% and 0.0022%,

respectively. Relatively to the pre-price increases condition, then total real expenditure in urban and rural areas will decline at the same percentages, respectively (Table 28). With the new lower real expenditures, many urban households in the fourth group of expenditure and rural households in the third group of expenditure (see Table 27), who were just above the PL (i.e. Rp 54,534 in urban and Rp 44,195 in rural) before the price increases fall into the poverty as their new real expenditures per capita are now below the same PL. The results in the increase of urban and rural poverty rates by roughly 0.9% and 0.7% respectively, and by 1.5% at the national level from the poverty rates in 2004 (see Table 25).

Table 28. Average per Capita Monthly New Real Expenditure after 1.1% increase in import price for rice by Expenditure Group, 2004 (Rp)

Expenditure class (nominal)	Urban		Rural	
	Old real expenditure	New Real expenditure	Old real expenditure	New real expenditure
1	22447.88	22267.62	22272.03	22271.54
2	30597.46	30351.76	30542.8	30542.128
3	38622.03	38311.9	38427.54	38426.695
4	53746.19	53314.61	53091.53	53090.362
5	74188.14	73592.41	73199.58	73197.97
6	104338.6	103500.8	101235.2	101232.97
7	161328.8	160033.3	152030.5	152027.16
8	334677.1	331989.6	281921.6	281915.4
Average	135262.7	134176.5	72641.95	72640.35

Source: SUSENAS, Module Consumption, 2004.

The poverty rate can also be estimated through the change in the PL as the price of food increases.[15] Let assume that other prices are constant, and the increase in import price of rice is 100% transmitted to the increase in local price actually paid by consumers. Based on this assumption, with the increase in import price for rice at 1.1%, the PL will also increase at the same percentage. Table 29 presents different scenarios on poverty change in Indonesia by different percentage increase in PL/import price for rice. The elasticity of percentage change in poverty rate to percentage change in PL is positive ranging from minimum 0.75 to maximum 1.1 in urban areas and minimum 0.64 to maximum 1.1 in rural areas. This is more or less consistent with the estimated regression coefficients of the percentage change in poverty rate and the percentage change in PL based on time series data presented in Table 25 in urban areas (Figure 10) and rural areas (Figure 11). The estimated regression coefficients suggest that for every 1% increase in PL, poverty rates in urban and rural areas will increase by 0.87% and 0.67%, respectively.

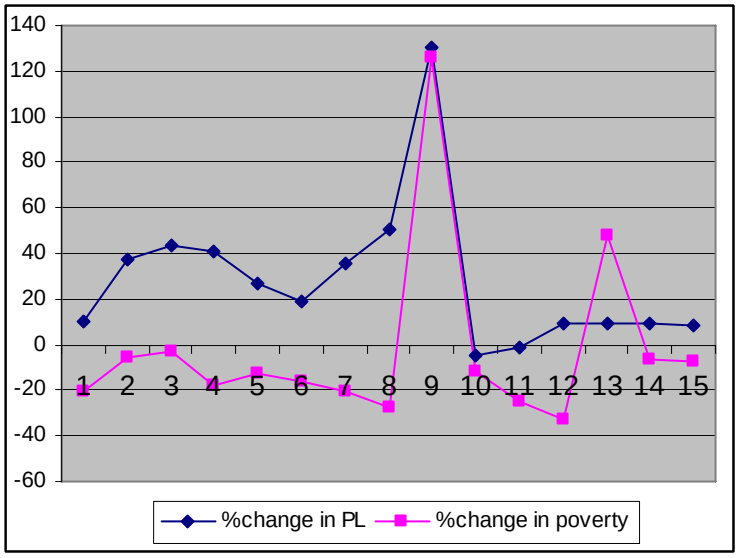
[15] The PL is set as a food poverty line (FPL) plus a non-food allowance (NFA). In Indonesia, the FPL is defined as the level of minimum expenditures necessary to reach 2,100 calories at the consumption pattern of a reference group, i.e. quantities of commodities in the basket, and prices of the same commodities. The reference group is defined on the basis of real expenditures. So, the FPL is the expenditures of those households who, if they spent all their expenditures on food could just afford to attain 2,100 calories. The NFA is set as the actual non-food expenditures of those households whose total expenditures are equal to the FPL (even though the FPL is not the actual food expenditures, but is scaled up to reach a predetermined caloric intake).

Table 29: Different Scenarios on Poverty Increases in Indonesia by Different Percentages of increase in PL (%).

Increase in PL from real PL 2004	Poverty rate (%)		
	Urban	Rural	National
No change	12.6	20.04	16.7
1.1%	12.71	20.18	16.95
5%	13.3	21.1	17.73
10%	13.7	21.7	18.24
15%	14.6	22.3	18.97
20%	14.5	23.1	19.38
25%	15.1	23.6	19.93

Source: SUSENAS 2004

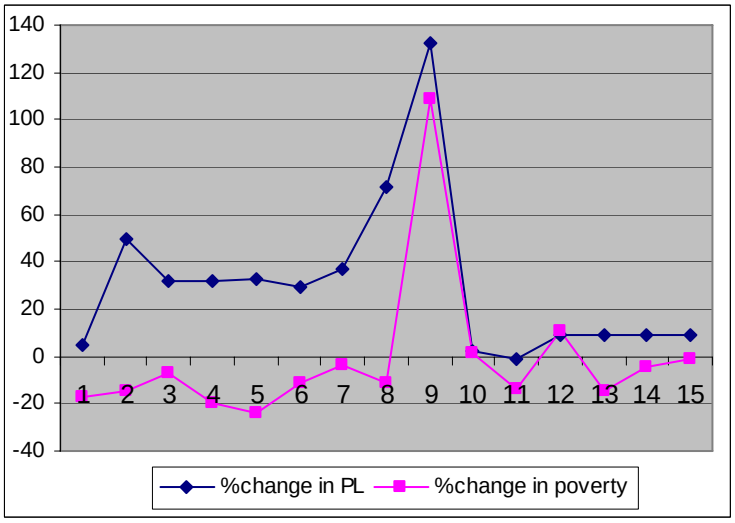
Figure 10: Long-term Behavior of Changes in PL and Poverty Rate in Urban Areas: 1976-2004



%Δ in urban poverty rate = -26.855 + 0.874% Δ in urban PL $R^2 = 0.525$
t-value: (-2.731) (3.789) F = 14.355

Source: BPS

Figure 11: Long-term Behavior of Changes in PL and Poverty Rate in Rural Areas: 1976-2004



%Δ in rural poverty rate = -22.048 + 0.674% Δ in urban PL $R^2 = 0.536$
t-value: (-2.798) (3.873) F = 15.002

Source: BPS

IX Summary

Agriculture is the key sector for nearly all poverty analyses. In Indonesia, as in many other less developed or poor countries, the poor are predominantly rural; food accounts for a major share of all poor people's expenditure; agriculture is their major source of income; and farm incomes have large spillovers to others in the rural economy. The markets in this sector are among the most distorted in the world, with both developed and less developed countries maintaining high levels of protection. Reforms, both unilateral and multilateral, have thus the potential for considerable poverty alleviation, although particular groups of poor people may suffer from market liberalization. Much of the literature that study the relationship between agricultural trade liberalization and poverty in less developed countries focuses on the effects of national trade reforms, such as own tariff reductions. In contrast, the WTO negotiations at the Doha Round were more concerned with the poverty effects on low-income countries of trade reforms, such as the reduction of agricultural subsidies in Organization for Economic Cooperation and Development (OECD) countries.

The purpose of this study is to predict empirically the poverty impact in Indonesia of the reduction of agricultural subsidies in OECD countries agreed at the WTO meeting in July 2004 (known as the WTO July Package), and the focus of the study is on rice.

Based on a partial equilibrium approach, the study shows three important findings. First, the supply response in Indonesian agriculture is weak, which means that Indonesian farmers would not benefit much from the higher prices for agriculture in the world market. Second, wages and employment have positive correlations with price increases. Third, for any given rise in poverty line due to increase the elasticity of percentage change in poverty rate to percentage change in poverty line (PL) is positive. This is more or less consistent with the estimated regression coefficients of the percentage change in poverty rate and the percentage change in PL in urban areas and rural areas, suggesting that for every 1% increase in PL, poverty rates in urban and rural areas will increase by less than 1%.

References

Achterbosch, T.J., B. Hutabarat, N. Syafa'at, and F.W. van Tongeren (2004) Indonesian Interests in the Agricultural Negotiations under the Doha Development Agenda, ICASERD Working Paper, Bogor

Annabi, Nabil, Bazlul Khondker, Selim Raihan, John Cockburn, and Bernard Decaluwe (2005), "Implications of WTO Agreements and Domestic Trade Policy Reforms for Poverty in Bangladesh: Short vs. Long Run Impacts", in Thomas W. Hertel and L. Alan Winters (eds.), *Putting Development Back into the Doha Agenda: Poverty Impacts of a WTO Agreement*, the World Bank, Washington, DC.

APEC (1997), *The Impact of Trade Liberalization in APEC*, Economic Committee of APEC, APEC Secretary, Singapore.

APEC (1999), *The Impact of Trade Liberalization on Labor Markets in the Asia Pacific Region*, Report by the Network for Economic Development Management, Human Resource Development Working Group, APEC Secretary, Singapore.

Anderson, Kym, Betina Dimaranan, Tom Hertel and Will Martin (1997), "Economic Growth and Policy Reform in the APEC Region: Trade and Welfare Implications by 2005", *Asia Pacific Economic Review* 3(1): 1-18.

Anderson, Kym and Will Martin (2005a), " Agricultural Trade Reform and the Doha Development Agenda", World Bank Policy Research Working Paper 3607, May 2005, Washington, D.C.; The World Bank.

Anderson, Kym and Will Martin (eds.)(2005b), *Agricultural Trade Reform and the Doha Development Agenda*, Washington DC: The World Bank.

Anderson, K., W. Martin and D. van der Mensbrugghe (2005), 'Would Multilateral Trade Reform Benefit Sub-Saharan Africa?" Policy Research Working Paper No. xxxx, World Bank, Washington DC, May.

Antimiani Alessandro, Piero Conforti and Luca Salvatici (2001?), "Alternative Scenarios and Strategic Interactions Between Developed and Developing Countries in the Agricultural Trade Negotiations of the Doha Round: A Reappraisal", Rome: Istituto Nazionale di Economia Agraria and Food and Agriculture Organization of the United Nations, Commodities and Trade Division Viale delle Terme di Caracalla

Arifin, Bustanul, A. Munir, E. Sri Hartatai and Didik J. Rachbini (2001), "Food Security and Markets in Indonesia: State and Market Interaction in Rice Trade", Quezon City: MODE Inc.

Arifin, Bustanul (2004), *Analisis Ekonomi Pertanian Indonesia*, Jakarta: KOMPAS.

Ashraf, Nava, Margaret McMillan, and Alix Peterson Zwane (2005), "My Policies or Yours: Have OECD Agricultural Policies Affected Incomes in Developing Countries? NBER Working Paper 11289, April, National Bureau of Economic Research, 1050 Massachusetts Avenue Cambridge, MA 02138

Bannister, G. and K. Thugge (2001), "International Trade and Poverty Alleviation," IMF Working Paper 01/54 (www.imf.org).

Barrett, C.B. and Dorosh, P.A. (1996), "Farmers' welfare and changing food prices: nonparametric evidence from rice in Madagascar", *American Journal of Agricultural Economics*, 78.

Beghin, J.C.; Roland-Holst, D. and Van der Mensbrugghe, D. (2002), "Global Agricultural Trade and the Doha Round: What are the Stakes for North and South", paper presented at the OECD - World Bank Forum on Agricultural Trade Reform, Adjustment, and Poverty, Paris, May 23-24.

Binswanger, Hans P. and Ruttan, V.W. Ruttan (1978). Induced Innovation: Technology, institutions, Development: The Johns Hopkins University Press.

Binswanger, Hans P. and von Brown, J. (1993), 'Technological change and commercialization in agriculture,' in Lipton, M. and van der Gaag, J.(eds). *Including the poor*. World Bank, Washington D. C.

Bora, Bijit and Mari Pangestu (eds.) (1996), *Priority Issues in Trade and Investment Liberalization: Implication form the Asia Pacific Region*, Pacific Economic Cooperation Council (PECC) Secretariat, Singapore.

Bond, M. (1983), "Agricultural Responses to Prices in Sub-Saharan African Countries", *IMF Staff Papers*, 30(4).

Borlaug, Norman (2000a), 'The Green Revolution Revisited and The Road Ahead', paper presented at the Thirtieth Anniversary Lecture at The Norwegian Nobel Institute, September, Oslo.

Borlaug, Norman (2000b), 'We Need Biotech to Feed the World', *Wall Street Journal*, 6 December.

Bourguignon, F. and Morrison, C. (1998), 'Inequality and development: the role of dualism'. *Journal of Development Economics*, 57(2):233-257.

Capalbo, Susan M. (1988), "Measuring Components of Aggregate Productivity Growth in U.S. Agriculture", *Western Journal of Agricultural Economics*, 13: 53-62.

Cororaton, Caesar B., John Cockburn, and Erwin Corong1 (2005), "Doha Scenarios, Trade Reforms, and Poverty in the Philippines: A CGE Analysis", Thomas W. Hertel and L. Alan Winters (eds.), *Putting Development Back into the Doha Agenda: Poverty Impacts of a WTO Agreement*, the World Bank, Washington, DC.

Darwanto, Dwidjono Hadi (2001), "Perilaku Harga Beras dan Gabah di Indonesia", in Suryana, Achmad and Sudi Mardianto (ed.), *Bunga Rampai Ekonomi Beras*, Tim Pengkajian Kebijakan Perberasan Nasional, Jakarta: LPEM-FEUI.

Datt, Gaurav and Martin Ravallion (1998), 'Farm Productivity and Rural Poverty in India', FCND Discussion Paper No. 42, March Food Consumption and Nutrition Division International Food Policy Research Institute, Washington, D.C.: World Bank.

Deaton, A. (1997), *The Analysis of Household Surveys: A Microeconometric Approach to Development Policy*, Baltimore and London: John Hopkins University Press for the World Bank.

Deininger, K. and P. Olinto (2000), "Asset Distribution, Inequality, and Growth", World Bank Policy Research Working Paper No. 2375.

Delgado, Christopher L. *et al*. (1998). *Agricultural Growth Linkages in Sub-Saharan Africa*. Washington, D.C.: International Food Policy Research Institute, Research Report No. 107.

Delgado, Christopher .L., and N. Minot (2000), 'Agriculture in Tanzania Since 1986: Follower or Leader of Growth', A World Bank Country Study, Development Research Group, March, Washington, D.C.: The World Bank.

Diao, Xinshen, Agapi Somwaru, and Terry Roe (2002), "A Global Analysis of Agricultural Reform in WTO Member Countries", in Economic Research Service/USDA, *Agricultural Policy Reform—The Road Ahead*/AER 802.

Djulin, Adimesra (2004), "Analisis Sistem Distribusi Gabah/Beras di Sumatera Barat", in Handewi P. Saliem, Saptana and Edi Basuno (eds.), *Prospek Usaha Dan Pemasaran Beberapa Komoditas Pertanian*, Monographs Series No.24, Bogor: Pusat Penelitian dan Pengembangan Sosial Ekonomi Pertanian. Badan Penelitian dan Pengembangan Pertanian.

Dollar, David and Aart Kraay (2002), 'Growth is Good for the Poor', *Journal of Economic Growth*. 7:195 225.

Dollar, David and Aart Kraay (2001), "Trade, Growth, and Poverty", Working Paper, June, Development Research Group, World Bank, Washington, D.C.

Dorward, A. (2001), 'Seasonal finance for staple crop production: problems and potential for rural livelihoods in sub Saharan Africa', Working paper, DFID Policy Research Programme Project 'Diverse income sources and seasonal finance for smallholder agriculture: applying a livelihoods approach in South Africa', Wye: Imperial College.

Dorward, A., Jonathan Kydd, Jamie Morrison, and Ian Urey (2002), 'A Policy Agenda for Pro-Poor Agricultural Growth', paper presented at the Agricultural Economics Society Conference, Aberystwyth, 8th - 10th April.

Erwidodo and Feridhanusetyawan, Tubagus (1997), "Indonesia's Agriculture: Facing the APEC and WTO", *The Indonesian Quarterly*, XXV(3): 233-50.

Fabiosa, J.; Beghin, J.; de Cara S.; Fang, C.; Isik, M. and Matthey H. (2003), "Agricultural markets liberalisation and the Doha round", Proceedings of the 25th International Conference of Agricultural Economists (IAAE). 22 August, Durban, South Africa

François, J.; H.; van Meijl, H. and van Tongeren, F. (2003),. "Trade Liberalisation and Developing Countries under the Doha Round.", Tinbergen Institute Discussion Paper 2003-060/2, University of Rotterdam: The Netherlands.

Fan, S., and P. Hazell (1999), 'Are Returns to Public Investment Lower in Less-Favored Rural Areas? An Empirical Analysis of India', EPTD Discussion Paper No. 43. Washington, D.C.: International Food Policy Research Institute.

Feridhanusetyawan, Tubagus (1997), "Trade Liberalization in the Asia Pacific: A Global CGE Approach", *The Indonesian Quarterly*, XXV(4): 402-18.

Feridhanusetyawan, Tubagus and Mari Pangestu (2003), "Indonesian Trade Liberalisation: Estimating the Gains", *Bulletin of Indonesian Economic Studies*, 39(1): 51-74.

Foster, James, J. Greer, and Erik Thorbecke (1984), "A Class of Decomposable Poverty Measures", *Econometrica*, 52.

Fuglie, Keith O. (2004), 'Productivity Growth in Indonesian Agriculture, 1961-2000', *Bulletin of Indonesian Economic Studies*, 40(2): 209-25.

Gaiha, R. (1995), 'Does agricultural growth matter to poverty alleviation?, *Development and Change*, 26 (2): 285–304.

Gorter, de, H. (1999). "Market access, export subsidies and domestic support measures: issues and suggestions for new rules", paper presented at The Conference on Agriculture and the New Trade Agenda in the WTO 2000 Negotiations, Geneva, October 1-2.

Gordon, Ann, Junior Davis, Andrew Long and Kate Meadows (2000), 'The Role of Natural Resources in the Livelihoods of the Urban Poor', Policy Series 9, Social Sciences Department, Natural Resources Institute University of Greenwich.

Hayami, Y. and Ruttan, V. (1985), *Agricultural Development, an Alternative Perspective*, Revised version, The John Hopkins University Press.

Heltberg, Rasmus and Finn Tarp (2001), "Agriculture Supply Response and Poverty in Mozambique", WIDER Discussion Paper 2001/114 Helsinki, Finland.

Hertel, Thomas W and Maros Ivanic (2005), "Assessing the World Market Impacts of Multilateral Trade Reforms", in Thomas W. Hertel and L. Alan Winters (eds.), *Putting Development Back into the Doha Agenda: Poverty Impacts of a WTO Agreement*, World Bank, Washington, D.C. (forthcoming).

Hertel, Thomas W. and L. Alan Winters (eds.)(2005), *Putting Development Back into the Doha Agenda: Poverty Impacts of a WTO Agreement*, the The World Bank, Washington, D.C.

Hertel, Thomas W., Ivanic, Maros, Preckel, P. V., Cranfield, J. A. L., and Martin, W. (2003a). Short- versus long-run implications of trade liberalization for poverty in three developing countries. American Journal of Agricultural Economics, 85(5).

Hertel, Thomas W., Maros Ivanic, Paul V. Preckel and John A.L. Cranfield (2003b), "Trade Liberalization and the Structure of Poverty in Developing Countries", paper prepared for the "Conference on Globalization, Agricultural Development and Rural Livelihoods", Cornell University, Ithaca, N.Y., April 11-12.

Hertel, T. W., Ivanic, M., Preckel, P. V., and Cranfield, J. A. (2004). "The earnings effects of multilateral trade liberalization: Implications for poverty in Developing Countries", GTAP Working Paper No.16, March, Global Trade Analysis Project.

Hoekman, B., F., Ng, and M. Olarreaga (2002), "Reducing agricultural tariffs versus domestic support: What's more important for developing countries?" World Bank Policy Research Paper 2918, Washington, D.C.

Irz, X. and T. Roe (2000), 'Can the world feed itself? Some insights from growth theory', Agrekon, 39(4).

Islam, Tariq Saiful (1982), "Input Substitution and productivity Change in Canadian Agriculture", PhD Thesis, Department of Rural Economics, University of Alberta (unpublished).

Ivanic, Maros (2005), " The Effects of a Prospective Multilateral Trade Reform on Poverty in Developing Countries", in Thomas W. Hertel and L. Alan Winters (eds.), *Putting Development Back into the Doha Agenda: Poverty Impacts of a WTO Agreement*, The World Bank, Washington, D.C.

Johnston, B. F. and J. W. Mellor (1961), 'The role of agriculture in economic development', *The American Economic Review* 51(4): 566-593.

Kanwar, S. (2000), 'Does the dog wag the tail or the tail the dog? Co-integration of Indian agriculture with non agriculture', *Journal of Policy Modeling* 22(5): 533-556.

Levinsohn, J.; S. Berry, and J. Friedman (1999), "Impacts of the Indonesian Economic Crisis: Price Changes and the Poor", NBER Working Paper No. 7194.

Lipton, Michael and Longhurst, Richard (1989), *New Seeds and Poor People*, London: Unwin Hyman.

Lipton, M., and M. Ravallion (1995), 'Poverty and policy', in J. Behrman and T. N. Srinivasan (eds.), *Handbook of developmenteconomics*, 3: 2551-657, Amsterdam: North Holland.

Lopez, R.; J. Nash and J. Stanton (1995), "Adjustment and Poverty in Mexican Agriculture: How Farmers' Wealth Affects Supply Response", World Bank Policy Research Working Paper 1494.

Levine, Ross and Renelt, David (1992), "A Sensitivity Analysis of Cross-Country Growth Regressions," *American Economic Review,* 82(4).

Matsuyama, K. (1992), 'Agricultural Productivity, Comparative Advantage and Economic Growth,' *Journal of Economic Theory* 58: 317-34.

McCulloch, Neil, L Alan Winters, and Xavier Cirera (1996), *Trade Liberalization and Poverty: A Handbook*, International Development (DfID), London: Centre for Economic Policy Research

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

McKay, A.; O. Morrissey and C. Vaillant (1997), "Trade liberalisation and agricultural supply response: Issues and some lessons", *European Journal of Development Research*, 9(2).

Mellor, J.W. (1995), *Agriculture on the road to industrialization.* Baltimore: Johns Hopkins Univ. Press.

Mellor, J. W. (2000), *Faster More Equitable Growth: The Relation between Growth in Agriculture and Poverty Reduction*, CAER, Cambridge, MA.: Harvard University.

Mittal, Anuradha and Peter Rosset (2000), 'There is Food for All: Access is the Problem', *The Wall Street Journal*, 21 December.

Natawidjaja, Ronnie S. (2000), "Pengembangan Sistem Intelejen Pasar Sebagai Usaha Monitoring Kelancaran Arus Distribusi Bahan Makanan Pokok Dalam Menunjang Penyediaan Kebutuhan Pangan Masyarakat Yang Efektif dan Efisien", Laporan Tahunan Riset Unggulan Terpadu (RUT)-Menristek, DRN dan LIPPI, Jakarta.

Niazi, Tarique (2004), 'Rural Poverty and the Green Revolution: The Lessons from Pakistan', *Journal of Peasant Studies*, 31(2): 242-60.

Nicita , Alessandro (2005), "Multilateral Trade Liberalization and Mexican Households: The Effect of the Doha Development Agenda", in Thomas W. Hertel and L. Alan Winters (eds) *Putting Development Back into the Doha Agenda: Poverty Impacts of a WTOAgreement*, the World Bank, Washington, D.C. forthcoming

OECD (2002), "The medium-term impacts of trade liberalization in OECD countries on the food security of non-member countries," COM/AGR/TD/WP(2001)74/FINAL.

Pakpahan, Agus, Memed Gunawan, Achmad Djauhari, Sahat M. Pasaribu, Aladin Nasution, and Supena Friyatno (1992), *Cassava Marketing in Indonesia*, Monograph Series No.2, Bogor: Center for Agro-Socioeconomic Research. Agency for Agricultural Research and Development.

Panagariya, A. (2002a), "Trade and food security: Conceptualizing the linkages." Paper prepared for presentation at the Conference on Trade, Agricultural Development, and Food Security: The Impact of Recent Economic and Trade Policy Reform, Food and Agricultural Organization, Rome, July 11-12.

Panagariya, A. (2002b), "Developing Countries at Doha Round: A Political Economy Analysis", Department of Economics, University of Maryland, USA. Mimeo.

Panagariya, A. (2004), "Comments on subsidies and trade barriers," Copenhagen Consensus Opponent Note.

Pradhan, Menno, Asep Suryahadi, Sudarno Sumarto, and Lant Pritchett (2000), "Measurement of Poverty in Indonesia: 1996, 1999 and Beyond", SMERU Working Paper, Jakarta

Rangarajan, C. (1982), *Agricultural Growth and Industrial Performance in India*, Washington, D.C.: IFPRI.

Ravallion, Martin (1994), *Poverty Comparisons, Fundamentals of Pure and Applied Economics*, Vol.56, Harwood Academic Press, Chur, Switzerland.

Ravallion, Martin and D. Van de Walle (1991), "The Impact on Poverty of Food Pricing Reforms: A Welfare Analysis for Indonesia", *Journal of Policy Modeling* 13.

Ravallion, Martin and Datt, G. (1996a), 'How important to India's poor is the sectoral composition of economic growth?' *World Bank Economic Review*, 10(1): 1-25.

Ravallion, Martin, and Gaurav Datt (1996b), 'Why Have Some Indian States Done Better Than Others at Reducing Rural Poverty?' Policy Research Working Paper 1594, April, Policy Research Department, Poverty and Human Resource Division, Washington, D.C.: The World Bank

Ravallion, Martin and G. Datt (1999), 'When is growth pro-poor? Evidence from the diverse experience of India's states', World Bank Policy Research Working Paper Series No. 2263, Washington, D.C.: World Bank.

Ravallion, M. and Shaohua Chen (2004), 'Learning from Success. Understanding China's (uneven) progress against poverty', *finance and development*, December:16-19.

Sahn, D. E. and A. Sarris (1991), "Structural Adjustment and the Welfare of Rural Smallholders: A Comparative Analysis from Sub-Saharan Africa", *The World Bank Economic Review*, 5.

Saith, Ashwani (1981), 'Production, prices and poverty in rural India', *Journal of Development Studies*, 19(2): 196-214.

Saith, Ashwani (1990), 'Development strategies and the rural poor', *The Journal of Peasant Studies* ,17: 171-244.

Saliem, Handewi P. (2004), "Analisis Marjin Pemasaran: Salah Satu Pendekatan Dalam Sistem Distribusi Pangan", in Handewi P. Saliem, Saptana and Edi Basuno (eds.), *Prospek Usaha Dan Pemasaran Beberapa Komoditas Pertanian*, Monographs Series No.24, Bogor: Pusat Penelitian dan Pengembangan Sosial Ekonomi Pertanian. Badan Penelitian dan Pengembangan Pertanian.

Saliem, Handewi P., Sri Hastuti Suhartini, Adreng Purwoto, and Gatoet Sroe Hardono (2004), *Dampak Liberalisasi Perdagangan Terhadap Kinerja Ketahanan Pangan Nasional*, Bogor: PPPSE, Badan Penelitian dan Pengembangan Pertanian, Departemen Pertanian.

Sarris, A. H. (2001), 'The role of agriculture in economic development and poverty reduction: an empirical and conceptual Foundation', paper prepared for the Rural Development Department of the World Bank Rural Action Plan 2001-2006, Washington, D.C.: World Bank.

Schiff, M. and Montenegro, C.E. (1997), "Aggregate Agricultural Supply Response in Developing Countries: A Survey of Selected Issues", *Economic Development and Cultural Change*, 45(2).

Shah, Mahendar and Maurice Strong (2000), *Food in the 21st Century: From Science to Sustainable Agriculture*, Washington, D.C.: World Bank.

Sharma, Devinder (2000), 'Green Revolution Turns Sour', *New Scientist*, 8 July.

Shapouri, Shahla and Michael Trueblood (2002), "Impacts of Agricultural Policy Reform on Low-Income Countries", in Economic Research Service/USDA, *Agricultural Policy Reform—The Road Ahead*/AER 802 .

Singh, I.J. (1990), *The Great Ascent: The Rural Poor in South Asia*, Baltimore: Johns Hopkins University Press for the World Bank.

Singh, Himmat (2001), *Green Revolution Reconsidered: The Rural World of Contemporary Punjab*, New Delhi: Oxford University Press.

Srinivasan, T.N. (2000), *Eight lectures on India's economic reforms*, Oxford University Press.

Stringer, Randy, Erwidodo, Tubagus Feridhanusetyawan and Kym Anderson (eds.)(2002), *Indonesia in a Reforming World Economy: Effects on Agriculture, Trade and the Environment*, Center for International Economic Studies, University of Adelaide, Adelaide.

Soekartawi (2001), *Agribisnis. Teori dan Aplikasinya*, Jakarta: PT. Raja Grafindo Persada.

Sumarto, Sudarno, and Asep Suryahadi (2004), 'The Role of Agricultural Growth in Poverty Reduction in Indonesia', mimeo, February, Jakarta: The SMERU Research Institute.

.

Suryahadi, Asep, Sudarno Sumarto, Yusuf Suharso, and Lant Pritchett (2000), "The Evolution of Poverty during the Crisis in Indonesia, 1996 to 1999 (Using Full Susenas Sample)", SMERU Working Paper, March, Jakarta.

Thirtle, C., and X. Irz (2001), 'Relationship between changes in agricultural productivity and the incidence of poverty in developing countries', paper prepared for DFID, London: Imperial College.

Thomas, R.L. (1985), *Introductory Econometric*, New York: Longman Group UK Limited.

Timmer, C. P.eter (1988), 'The Agricultural transformation', in H. Chenery and T. N. Srinivasan (eds.), *The Handbook of Development Economics*, Vol I, Amsterdam: Elsevier Science.

Timmer, C. Peter (1997), 'How Well Do the Poor Connect to the Growth Process?' CAER Discussion paper No. 17, Cambridge, MA: Harvard Institute for International Development.

Timmer, C. Peter (2004), 'The Road to Pro-Poor Growth: The Indonesian Experience in Regional Perspective', Working Paper No.38, April, Washington DC: Center for Global Development,

Trueblood, M. and S. Shapouri (1999), "Trade liberalization and the sub-Saharan African countries," ERS/USDA Food Security Assessment document GFA-11, Washington, D.C.

Valdes, A. and A.F. McCalla (1999), "Issues, interests and options of developing countries," World Bank: Washington, D.C..

Vanzetti, David and Brett Graham (2002), " Simulating agricultural policy reform with ATPSM", Trade Analysis Branch, UNCTAD

Vanzetti, David and Ralf Peters (2003), " An analysis of the WTO, US and EU proposals on agricultural reform", Trade Analysis Branch, April, UNCTAD, Geneva.

Wacziarg, R. (2001), "Measuring the Dynamic Gains from Trade" , *The World Bank Economic Review*, 15(3).

Walters, A.A. (1963), "Production and cost functions: An econometric survey", *Econometrica*, 31(1).

Wichmann, T. (1997), *Agricultural technological progress and the development of the dual economy*, Heidelberg: Physica-Verlag.

Wiggins, S. (2001), 'Spatial dimensions of rural development', memo, Department of Agricultural and Food Economics, University of Reading

Winters, L. Alan; Neil McCulloch; and A. McKay (2002), "Trade Liberalization and Poverty: The Empirical Evidence", CREDIT Research Paper No.02/22, October, Center for Research in Economic Development and International Trade, University of Nottingham.

World Bank (2002), *World Development Indicators 2002*, Washington, D.C.