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**Working Paper**

## Can the Poor Benefit from the Doha Agenda? The Case of Indonesia

ERD Working Paper Series, No. 72

**Provided in Cooperation with:**

Asian Development Bank (ADB), Manila

*Suggested Citation:* Brooks, Douglas H.; Sugiyarto, Guntur (2005) : Can the Poor Benefit from the Doha Agenda? The Case of Indonesia, ERD Working Paper Series, No. 72, Asian Development Bank (ADB), Manila,  
<https://hdl.handle.net/11540/1900>

This Version is available at:

<https://hdl.handle.net/10419/109281>

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# ERD Working Paper

ECONOMICS AND RESEARCH DEPARTMENT

## SERIES

No. 72

### Can the Poor Benefit from the Doha Agenda? The Case of Indonesia

Douglas H. Brooks  
and Guntur Sugiyarto

October 2005

Asian Development Bank

ERD Working Paper No. 72

# **CAN THE POOR BENEFIT FROM THE DOHA AGENDA? THE CASE OF INDONESIA**

**DOUGLAS H. BROOKS AND GUNTUR SUGIYARTO**

October 2005

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©2005 by Asian Development Bank  
October 2005  
ISSN 1655-5252

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## **FOREWORD**

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## **ABSTRACT**

Agricultural trade barriers remain prevalent among developing countries. Three important questions arise from this fact. First, is there any justifiable reason for agricultural protection in developing countries? Second, what are the effects of farm trade liberalization that might result from the Doha Development Agenda (DDA) in the current round of multilateral negotiations under the World Trade Organization? Third, as most farm producers are poor, will the poor benefit from the DDA and, if so, how? A computable general equilibrium model of the Indonesian economy is employed to answer these questions for one country by assessing the economywide welfare and distributional implications of the DDA, first with respect to the agricultural sector, and then to broader trade liberalization. To put the current agricultural protection into context, the assessment includes the welfare cost of existing sectoral taxes, and of changes in those taxes. Several trade liberalization scenarios are introduced. These include a complete removal of tariffs on agricultural products, which is then combined with a complete removal of domestic taxation on agricultural products. A complete trade liberalization simulation is also included to provide a ceiling for the benefits from trade liberalization. The overall results suggest that a removal of agricultural tariffs alone will generate adverse effects, while its combination with removal of agricultural taxes will create benefits for the economy, households, and the poor. Single-sector trade liberalization seems not a good strategy and a more comprehensive trade reform is desirable. In addition, the last simulation result provides further evidence of the inefficiency of raising revenue through commodity taxation.

## I. INTRODUCTION

The latest and ongoing round of trade negotiations under the World Trade Organization (WTO) has become commonly referred to as the Doha Development Agenda (DDA). It was set out in the WTO's Doha Ministerial Declaration in November 2001. Earlier trade negotiation rounds took place under the auspices of the General Agreement on Tariffs and Trade (GATT), but since 1 January 1995 the WTO has been mandated to discuss international trade issues, including multilateral negotiations to create an open trade environment (Table 1). The WTO advocates that global free trade will raise standards of living, and promote greater employment with a large and steadily growing volume of real income and effective demand.<sup>1</sup>

The Doha round of WTO negotiations was scheduled to be completed by the end of 2004. When it started in November 2001, this round of global trade talks promised to conclude its ambitious agreement on liberalizing trade in goods and services within 3 years. The agreed emphasis was to help the poorest countries, and most of the benefits were expected to come through agricultural trade liberalization. So far, a deal is nowhere in sight. The delay is unfortunate, but unsurprising and even "predictable" given that no global trade round has stuck to its original schedule and that this round must face considerable challenges. The Uruguay Round launched in 1986, for instance, took almost 8 years to complete and poor countries have been yearning for better access for their farm products in developed country markets ever since.

**TABLE 1**  
**THE TRADE NEGOTIATION ROUNDS**

YEAR	PLACE/NAME	MAIN SUBJECTS	COUNTRIES
1947	Geneva	Tariffs	23
1949	Annecy	Tariffs	13
1951	Torquay	Tariffs	38
1956	Geneva	Tariffs	26
1960–1961	Dillon Round	Tariffs	26
1964–1967	Kennedy Round	Tariffs and antidumping measures	62
1973–1979	Tokyo Round	Tariffs, nontariff measures "framework" agreement	102
1986–1994	Uruguay Round	Tariffs, nontariff measures, rules, services, intellectual property, dispute settlement, textiles, agriculture, creation of WTO, etc.	123
2001–present	Doha Development Agenda	Agriculture and services	148

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<sup>1</sup> WTO is an international trade organization to complement the two "Bretton Woods" institutions of the World Bank and IMF that were started just after World War II. The 23 founding members of the GATT have expanded into the current 148 members of WTO.



Protectionism is not a monopoly of developing countries, although various kinds of trade barriers are rife there. In farm trade, for instance, developing countries have been yearning for better access for their products to developed country markets, while keeping their domestic markets protected. Various agreements in WTO have achieved significant progress in reducing protection in manufactured products, but a reduction or removal of agricultural protection has been problematic. The existing forms and levels of protection result in a thin international commodity market with a relatively small trade volume and less active agents, making commodity trade flows and world prices volatile. As a result, successful agricultural trade liberalization is a crucial part of the DDA. Reduction in global agricultural trade barriers could improve overall welfare because it would lead to expansion of markets and efficiency benefits, although the sectoral and distributional effects are difficult to predict beforehand.<sup>2</sup> Another major distortion comes from domestic agricultural and food policies, reflected in the wide gap between international and domestic prices of agricultural products.

The trade liberalization of agricultural products under the DDA is built on the long-term objective of the agreement to establish a fair and market-oriented trading system through a program of fundamental reform. The DDA calls for substantial reductions in trade-distorting domestic support, and in all forms of export subsidies,<sup>3</sup> as well as improvements in market access. These are the three “pillars” in the agricultural trade liberalization discussions.<sup>4</sup> Potential gains from improvement in market access have been shown to be the most important among the three. Market access is the key to successful liberalization, for it could account for two thirds of the potential global gains and over half of the potential gains to developing countries (Hertel and Keeney 2005). Within the scope for market access, empirical studies have shown that agricultural market access is one of the most potentially significant issues on the DDA (Achterbosch et al. 2005).

The DDA has a core ambition of freeing trade in farm goods and services within 3 years, with the emphasis being on helping the poorest countries, i.e., promoting both economic development

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<sup>2</sup> International expansion of agricultural markets will make some sectors expand while others contract. Depending on factor intensities of sectors, factor prices may either increase or decrease, following the increasing/decreasing demand for the particular factor, including labor. This in turn will have different effects on different groups of households. Furthermore, factor demands will change, particularly for labor. These will further affect factor incomes of households. Since factor income is a major source of household income, and since household endowments vary considerably within a country, there will be winners as well as losers.

<sup>3</sup> Export subsidies have received much criticism from academics and policymakers, and are widely believed to be among the most trade-distorting forms of policies. The issue has received high priority in the current Doha round of negotiations. Between the kick-off of the round with the Doha ministerial declaration (WTO 2001) and the latest general council decision of July 2004 (WTO 2004), the wording on export subsidies has changed from “...reductions of, with a view of phasing out ...” to a much more ambitious “... ensuring the parallel elimination of all forms.” This signals a broad consensus that export subsidies will have to disappear over time. Export subsidies are generally a consequence of domestic policy arrangements that aim at stabilizing and increasing domestic prices in agriculture. The European Union’s (EU) Common Agricultural Policy (CAP) provides a case in point. The CAP initially shielded the EU from imports through prohibitive tariffs, allowing the successful implementation of domestic market policies, which subsequently led to excess supply in key commodities. This excess supply had to be removed from the EU market in order to maintain high domestic prices, and this eventually required a disposal of surpluses on world markets at subsidized prices.

<sup>4</sup> Domestic support concerns commitments to reduce trade-distorting farm income policies. Export competition concerns the promotion of agricultural exports through direct subsidies, export credits, subsidy elements in food aid and state trading enterprises, and market access concerns reductions in tariffs and tariff rate quotas.

and poverty reduction (WTO 2001). Since the start of the Doha round in 2001, the scope for liberalization in agricultural trade has gradually declined. While the intention is clear, the mechanism to attain this goal is vague. This lack of clarity was the main reason for failure of the trade ministerial meeting in Cancun in September 2003. Since then, developing countries have argued that future progress in negotiations will only be possible with commitments from developed countries to significantly reduce their import barriers and agricultural subsidies. Fortunately, the consultations in July 2004 gave a more optimistic outlook for the DDA achieving some success.

The July 2004 package reveals that WTO members agree on far reaching exemptions from reforms in individual products (special products for developing countries and sensitive products for developed countries). The ambition to reform domestic support in developed countries has become more moderate and a number of developing countries have become less inclined to open their markets through improved access.

For an individual country, the DDA relates directly to the domestic system of protection, reflected in (among others) commodity taxation<sup>5</sup> and industrial policy. Subsidies and import tariffs, for instance, are usually employed to protect domestic industry. Accordingly, the DDA can be thought of as part of efforts to make the tax system less distorting, more transparent, and therefore more amenable to the administrative capacity of developing countries. This has been a main reason for past tax reforms (Rao 1993, World Bank 1991).<sup>6</sup>

As a major agricultural importer and exporter, Indonesia is actively participating in the negotiation process, for it has a major stake in global efforts to liberalize agricultural trade. However, given the prevailing, quite liberal trade regime in Indonesia, the expected overall impacts on national income, trade, and production could be limited. Agricultural liberalization offers positive prospects for externally demanded goods such as vegetable oils and animal products, while small adverse impacts on the protected rice and sugar sectors can be expected.

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<sup>5</sup> Two important aspects of a tax system are the level and structure of taxation. In developing countries, the level of taxation (measured by its share in GDP) varies widely and relates not only to the per capita income level but also to other factors. On the structure of taxation, the incidence of indirect tax becomes increasingly important, while that of personal income and other direct taxes remains very low. The indirect tax is also characterized by substitution between taxes on international trade and domestic indirect taxes as the economy develops. The role of international trade taxes is usually very important in the early stages of development, but then becomes substituted by domestic indirect taxes. In developing countries, revenue from indirect taxes constitutes on average almost 60% of total tax revenue, while the share of personal income taxes remains very small (Rao 1993).

<sup>6</sup> Important issues associated with tax reforms in developing countries include how tax (government) revenue is going to be raised and what the consequences of the different options are. This should be perceived in the context of existing government subsidies, import tariffs, and other taxation measures that also reflect domestic protection. A best practice approach to tax reforms includes replacing quantitative restrictions with tariffs, simplifying tax structure, broadening the tax base, levying lower and uniform tax rates, and exempting taxes on intermediate inputs. A removal of quantitative restrictions avoids rent seeking activities; a simpler tax structure is easier to administer; a broader tax base yields larger revenues; a lower and uniform tax rate reduces unintended distortions (besides also being easier to administer); and an exemption on intermediate input taxes may encourage domestic production. The best approach to a successful tax reform seems to be a pragmatic combination of theory and past reform experience, taking into account administrative, political, and information constraints. A "good" tax reform does not merely change the existing tax system but also includes tax administration and acceptability. These can be the key to success in tax reform (Bird 1992, Bird and Oldman 1990). Timing and sequencing are also important in designing tax reform. Most successful tax reforms (Japan in 1949–1950, Korea in 1962–1965 and Indonesia in 1983–1986) were carried out at a later stage as an integral part of economic reforms (Rao 1993).

## II. MAIN PURPOSE

Several important questions arise from the discussion above. First, is there any justifiable reason for agricultural protection in developing countries such as Indonesia? Second, what would be the effects of farm trade liberalization as a result of the DDA? Furthermore, as most farm producers are poor farmers, a direct implication of the issue is to what extent will the poor benefit from the DDA? Finally, would simultaneous liberalization in other sectors alter the welfare implications of agricultural trade liberalization?

A computable general equilibrium (CGE) model of the Indonesian economy based on the social accounting matrix (SAM) in 1993 is developed to answer these important questions by assessing the economywide, welfare, and distributional implications of Doha scenarios, especially with respect to different groups of households.<sup>7</sup> The assessment includes welfare costs of existing sectoral taxation to put agricultural protection into its context. Trade liberalization scenarios are introduced to illuminate the benefits and costs of the DDA. This includes a complete removal of tariffs on agricultural products, which is then combined with a complete removal of their counterparts of domestic taxation on agricultural products. The former is to represent a case of complete international access while the latter is to capture the far reaching globalization of agricultural markets. Finally, a full trade liberalization scenario is used to place agricultural liberalization in the broader DDA context.

The remainder of this paper is organized as follows: The next section provides an overview of Indonesian trade liberalization policies, first highlighting the major developments of Indonesia's foreign trade policy, and then as linked with the DDA. This is followed by discussion of the main features of the Indonesian CGE model developed in this study. The modeling development itself is presented in Appendix 1. The model is then used to measure the welfare costs of existing commodity taxation and marginal excess burden. The former is to assess the sectoral welfare costs due to the commodity taxation imposed, while the latter is to determine if a sector/product is already overtaxed. Effects of removing tariffs on agricultural products are then examined, and combined with removal of corresponding domestic taxation. The economic effects and distributional implications of these two policy options, as well as full liberalization, are examined in the last section, which includes conclusions and policy implications.

## III. TRADE LIBERALIZATION AND THE DOHA AGENDA IN THE INDONESIAN CONTEXT

During the first two decades following Indonesia's independence in 1945, trade taxes continued to be the main source of government revenue, leading to the imposition of devices such as multiple exchange rates and export surcharges. The adoption of a "guided economy" approach at that time led to the government expanding controls over the means of production by nationalizing foreign companies and introducing various quantitative restrictions. On the fiscal side, it was common for the government to print money to finance its budget deficits. Since 1967, the new government

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<sup>7</sup> A more recent (1999) SAM has been compiled, but as it still reflects disruptions resulting from the 1997 Asian financial crisis, the 1993 SAM is more representative of long-term trends in the economy. Real GDP estimates for Indonesia are also based on 1993 data.

has adopted a “balanced budget”<sup>8</sup> policy, preventing the government from printing money or issuing debt securities to finance its deficits, relying instead on foreign funds to balance the budget. At the same time, the capital account was opened, allowing the private sector to gain access to foreign funds.

In the early 1980s, Indonesia experienced a sharp deterioration in its terms of trade and balance of payments due to the decline in world prices for oil and primary commodities, rising international interest rates, and decreasing foreign capital inflows.<sup>9</sup> These external shocks seriously disrupted development plans and induced extensive structural adjustments. The adjustments were first aimed at restoring external creditworthiness, but then led to changes in the government’s development strategy from being public sector led with import substitution industry and repressed financial sector, to being private sector led, and export-oriented with a market-based financial sector. The adjustments were also adopted to reduce distortionary threats arising from expansionary policies inherited from the previous oil boom decade.<sup>10</sup> These voluntary structural adjustments<sup>11</sup> proved successful in restoring the external situation and providing more favorable conditions for the domestic economy. The policy measures taken included massive devaluation, tax reforms, and trade liberalization. Table 2 summarizes trade liberalization measures adopted by the Indonesian government since 1945 (year of independence) up to the present, classified into six stages to reflect the different nature of government policies at those times.

Despite progress, some problems remain. There has been a reluctant attitude toward economic reform on the government side as most major policy changes in Indonesia have traditionally been linked to major political and economic crises, as if only a crisis can be counted on to trigger the necessary political will to embark on economic reform. Furthermore, most of the changes have also been generated by a fall in petroleum prices or other external problems, such as in the balance of payments, so that policy reforms in Indonesia can be thought of as an overall restructuring strategy in response to external factors rather than being motivated by the benefits of economic reform (Pangestu 1996, Hill 1996). In many instances, trade and industrial policy would revert to protectionism and hence be distortionary once there was no problem in the external sector. As a result, export earnings and government revenue were still highly vulnerable to changes in prices of oil and primary commodities in world markets. Progress on removing the existing barriers and other distortions in domestic markets has not been very successful and straightforward.<sup>12</sup>

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<sup>8</sup> This “balanced budget” reflects a political meaning since foreign aid and loans for development are counted as government revenue rather than sources of financing.

<sup>9</sup> These external shocks severely hit most highly indebted countries, which then led to the international debt crisis in 1982.

<sup>10</sup> Oil prices in world markets increased in 1973–1974 and 1978–1979, bringing a substantial increase in government revenue. This oil boom, however, led to the overallocation of domestic resources to the booming sector. This “Dutch disease” phenomenon was then accompanied by overoptimistic predictions of oil prices in the future from the government side. This seriously affected government-planned expenditures since more than two thirds of government revenues at that time were from oil.

<sup>11</sup> As distinguished from structural adjustments conducted as part of conditional loans provided by the IMF/World Bank.

<sup>12</sup> Up to mid-July 1997 (just before the crisis started), for example, both price and nonprice controls were still prevalent, especially on transport services, public utilities, fuel products, and other basic and strategic commodities.

**TABLE 2**  
**SUMMARY OF TRADE LIBERALIZATION MEASURES ADOPTED IN THE INDONESIAN ECONOMY, 1945 TO DATE**

THE CHAOTIC YEARS (1945–1965)	STABILIZATION AND REHABILITATION (1966–1973)	THE OIL WINDFALLS AND BOOM YEARS (1974–1981)	ADJUSTMENT TO EXTERNAL SHOCKS (1982–1984)	FURTHER TRADE LIBERALIZATION (1985–MID-1997)	THE ECONOMIC CRISIS AND AFTERWARDS (1997–TO DATE)
<ul style="list-style-type: none"> <li>• High inflation and frequent economic policy/ government changes</li> <li>• Dominant role of taxation on trade</li> <li>• Multiple exchange rates, export surcharges, quantitative restrictions on imports and tariffs</li> </ul>	<ul style="list-style-type: none"> <li>• New investment law, development plan and balanced budget</li> <li>• Abolition of multiple exchange rates and peg to US dollar</li> <li>• Adoption of an open capital account</li> </ul>	<ul style="list-style-type: none"> <li>• Dominant role of oil</li> <li>• Nontradable and import-substituting industry</li> <li>• Dutch disease</li> <li>• Ignoring trade liberalization</li> <li>• More protective</li> </ul>	<ul style="list-style-type: none"> <li>• International debt and Mexico crises</li> <li>• Tax and financial reforms</li> <li>• Export promoting measure (TRIMs)</li> <li>• “Approved” importer system</li> <li>• Promoting use of domestic products</li> <li>• Ambivalence toward trade liberalization</li> </ul>	<ul style="list-style-type: none"> <li>• Regionalism of AFTA and APEC</li> <li>• Signing GATT-Code (on subsidies and countervailing duties)</li> <li>• Rationalizing tariffs</li> <li>• Deregulating shipping and custom unions</li> <li>• Duty exemption and duty drawback</li> <li>• Removing export licenses and converting quota restrictions with tariffs</li> </ul>	<ul style="list-style-type: none"> <li>• The Asian crisis and IMF package</li> <li>• Further reductions of tariffs</li> <li>• Abolition of export taxes and import restrictions</li> <li>• Liberalization of domestic markets</li> <li>• Post-IMF era and new government’s commitments to reduce more tariffs and nontrade barriers</li> </ul>

A further examination of the government sources of income reveals that over the period 1985–1993, the government was in fact increasingly reliant on commodity taxation (see Table 3). Revenue from this tax contributed 15% of government income in 1985, which then doubled to 30% in 1990 and increased further to 36% by 1993. More than a quarter of that revenue was derived from import tariffs, implying that foreign trade became more protectionist while domestic industry was increasingly distorted. Revenue from tariffs on agricultural products contributed less than one percent, making a good case for agricultural product trade liberalization. The role of domestic commodity taxation on agricultural products in generating government revenue is more significant, although it declined from 6.2% in 1985 to 2.7% in 1993 (Table 4). Detailed information on the structure and level of commodity taxation presented in Tables 5 and 6 further reveals that not only did the tax rate increase but so did its dispersion. The increased taxation was applied to both domestic commodities and imports. Notice that all taxes and tariffs as well as their dispersion increased over the periods 1985–1990, 1990–1993 and 1985–1993, except for import tariff dispersion during 1985–1990.

Further trade liberalization seems inevitable given the Indonesian government's commitments to the WTO, Asia-Pacific Economic Co-operation (APEC) forum, and Association of Southeast Asian Nations (ASEAN) members toward freer international trade. Moreover, the tariff reduction, in conjunction with other measures, such as domestic tax reform and the replacement of quantitative restrictions by tariffs, has also been part of the policy package of IMF/World Bank conditional loans in which the Indonesian government was involved in the past. The DDA is likely to strengthen trade liberalization in the form of further reductions in tariff and nontariff barriers and all kinds of domestic support such as export subsidies. Foreign or border trade liberalization is likely to be followed by domestic market liberalization, reflected in reductions in commodity taxation in the domestic market. This is to make domestically produced goods competitive with imported products. The liberalization of both international and domestic markets for agricultural products is also in line with the DDA on improving market access "behind the border." This liberalization is captured in the modeling simulation.

**TABLE 3**  
**GOVERNMENT INCOME BY SOURCE**

SOURCE OF INCOME	1985		1990		1993	
	VALUE (BILLION RP)	SHARE (PERCENT)	VALUE (BILLION RP)	SHARE (PERCENT)	VALUE (BILLION RP)	SHARE (PERCENT)
1. Factor income/ capital payments	66.9	0.4	1937.8	4.7	4249.8	6.9
2. Taxation on						
• Households	1817.7	9.7	1997.8	4.8	3848.4	6.2
• Firms/corporate	13998.3	74.9	24845.3	59.9	31014.8	50.1
• Commodity/sector	2789.9	14.9	12269.4	29.6	22355.8	36.1
– Domestic	2029.2	10.9	9204.5	22.2	15963.7	25.8
– Import tariff	760.6	4.1	3064.9	7.4	6392.1	10.3
3. Rest of the world	29.7	0.2	464.9	1.1	398.5	0.6
Total	18702.4	100.0	41515.2	100.0	61867.2	100.0

Sources: Calculated from the Indonesian SAMs for 1985, 1990, and 1993.

**TABLE 4**  
**GOVERNMENT REVENUE FROM COMMODITY TAXATION (BILLION Rp)**

COMMODITY TAXATION	1985		1990		1993	
	REVENUE	PERCENT	REVENUE	PERCENT	REVENUE	PERCENT
Agriculture	173.0	6.2	401.3	3.3	610.2	2.7
Nonagriculture	1856.2	66.5	8803.2	71.7	15353.4	68.7
Subtotal	2029.2	72.7	9204.5	75.0	15963.6	71.4
<b>Import Tariff</b>						
Agriculture	13.5	0.5	17.1	0.1	103.0	0.5
Nonagriculture	747.1	26.8	3047.8	24.8	6289.1	28.1
Subtotal	760.6	27.3	3064.9	25.0	6392.1	28.6
Total	2789.8	100.0	12269.4	100.0	22355.8	100.0

Sources: Calculated from the Indonesian SAMs for 1985, 1990, and 1993.

**TABLE 5**  
**STRUCTURE AND LEVEL OF INDIRECT COMMODITY TAXATION IN INDONESIA, 1985, 1990, AND 1993**

SECTOR/ COMMODITY	1985			1990			1993			CHANGE IN TAX RATE (PERCENT)		
	DOMESTIC COMMODITY (BILLION RP)	REVENUE (BILLION RP)	TAX RATE (PERCENT)	DOMESTIC COMMODITY (BILLION RP)	REVENUE (BILLION RP)	TAX RATE (PERCENT)	DOMESTIC COMMODITY (BILLION RP)	REVENUE (BILLION RP)	TAX RATE (PERCENT)	1985-1990	1990-1993	1985-1993
Food crops	14511.8	98.0	0.7	28510.7	201.2	0.7	35644.8	250.8	0.7	0.0	0.0	0.0
Other agriculture	13861.3	75.1	0.5	24273.9	200.1	0.8	40866.7	359.4	0.9	0.3	0.1	0.3
Mining	16706.3	20.9	0.1	28375.6	244.4	0.9	35430.0	319.9	0.9	0.7	0.0	0.8
Food processing	15837.0	677.4	4.3	35298.1	2964.2	8.4	63452.8	6208.2	9.8	4.1	1.4	5.5
Textile	3403.4	32.2	0.9	47156.2	781.9	1.7	80964.1	1363.6	1.7	0.7	0.0	0.7
Construction	20188.3	273.0	1.4	13984.4	191.4	1.4	20336.5	277.8	1.4	0.0	0.0	0.0
Papers and metals	6505.0	130.8	2.0	20962.8	736.2	3.5	32990.3	1164.1	3.5	1.5	0.0	1.5
Chemical	19385.7	-682.9	-3.5	40365.5	-484.3	-1.2	61641.1	-771.4	-1.3	2.3	-0.1	2.3
Utilities	1801.9	0.7	0.0	4487.6	19.4	0.4	8253.0	42.9	0.5	0.4	0.1	0.5
Trades	14319.5	877.3	6.1	30874.6	2505.6	8.1	54570.8	3769.5	6.9	2.0	-1.2	0.8
Restaurant	4688.9	135.9	2.9	12028.0	521.8	4.3	18428.3	799.4	4.3	1.4	0.0	1.4
Hotel	933.9	34.8	3.7	2146.2	91.4	4.3	3452.2	147.0	4.3	0.5	0.0	0.5
Land transport	5614.4	67.1	1.2	11017.2	180.6	1.6	18835.5	313.2	1.7	0.4	0.0	0.5
Other transport and communications	3124.3	11.7	0.4	8892.9	74.1	0.8	17047.1	125.8	0.7	0.5	-0.1	0.4
Bank and insurance	3102.5	17.5	0.6	11420.3	96.7	0.9	19394.2	161.1	0.8	0.3	0.0	0.3
Real estate	4831.4	147.7	3.1	9476.4	457.2	4.8	17239.8	802.9	4.7	1.8	-0.2	1.6
Public services	10547.6	44.6	0.4	18347.0	194.4	1.1	26128.0	304.3	1.2	0.6	0.1	0.7
Personal services	5030.6	67.5	1.3	11497.8	228.1	2.0	16939.4	325.2	1.9	0.6	-0.1	0.6
Total	164393.9	2029.2	1.2	359115.3	9204.5	2.6	571614.5	15963.7	2.8	1.3	0.2	1.6
Standard deviation (percent)			2.1			2.6			2.7			

Sources: Calculated from the Indonesian SAMs for 1985, 1990, and 1993.



**TABLE 6**  
**STRUCTURE AND LEVEL OF IMPORT TARIFFS IN INDONESIA, 1985, 1990, AND 1993**

SECTOR/ COMMODITY	1985			1990			1993			CHANGE IN TARIFF RATE (PERCENT)			
	IMPORT (BILLION RP)	REVENUE (BILLION RP)	TARIFF RATE (PERCENT)	IMPORT (BILLION RP)	REVENUE (BILLION RP)	TARIFF RATE (PERCENT)	IMPORT (BILLION RP)	REVENUE (BILLION RP)	TARIFF RATE (PERCENT)	1985-1990	1990-1993	1985-1993	
Food crops	422.0	6.9	1.6	632.8	16.3	2.6	1425.2	55.5	3.9	0.9	1.3	2.3	
Other agriculture	391.4	6.6	1.7	198.8	0.9	0.4	449.9	47.5	10.6	-1.3	10.1	8.9	
Mining	1157.5	9.5	0.8	2567.3	3.6	0.1	2414.6	38.5	1.6	-0.7	1.5	0.8	
Food processing	211.6	17.9	8.4	1302.7	24.6	1.9	2614.3	310.5	11.9	-6.6	10.0	3.4	
Textile	148.8	15.0	10.1	37.8	1.3	3.6	87.4	20.1	23.0	-6.6	19.4	12.9	
Construction	3.5	0.6	16.2	2599.7	227.0	8.7	4901.9	278.2	5.7	-7.4	-3.1	-10.5	
Papers and metals	6393.0	505.2	7.9	23330.1	2202.9	9.4	34970.9	3359.8	9.6	1.5	0.2	1.7	
Chemical	3797.2	195.7	5.2	12317.4	575.9	4.7	18873.1	2242.4	11.9	-0.5	7.2	6.7	
Public services	717.5	0.6	0.1	1587.1	0.1	0.0	2867.2	0.7	0.0	-0.1	0.0	-0.1	
Personal services	246.4	2.5	1.0	964.6	12.5	1.3	1796.2	39.0	2.2	0.3	0.9	1.2	
Total	13488.9	760.5	5.6	45538.2	3064.9	6.7	70400.6	6392.1	9.1	1.1	2.4	3.4	
Standard deviation (percent)			5.3			3.4			6.9				

Sources: Calculated from the Indonesian SAMs for 1985, 1990, and 1993.



#### IV. MAIN FEATURES OF THE MODEL

The CGE model was developed using the Indonesian SAM for 1993. The economy concerned is an open economy, with transactions between the domestic economy and the rest of the world (ROW) in the product (i.e., exports and imports), factor markets, and capital markets. Production activities are classified into 18 categories and the commonly used assumption that one sector produces only one good is adopted, so that classifications for sectors and commodities are exactly the same. Each production activity is modelled as a Leontief production function of intermediate inputs and value added. The intermediate input is an Armington aggregation of domestically produced and imported commodities, while the value added is a Cobb Douglas function of different kinds of labor and capital. Labor is categorized into eight groups based on a combination of sector, type of workers, and job status. Some wages (for farmers and production workers) are fixed—allowing for unemployment—to reflect excess supply and various government interventions to control their wages. Wages for other types of workers are allowed to adjust according to their market clearing levels, which also reflect the marginal productivity of labor. On the capital side, capital is classified into five categories based on ownership and the nature of capital.

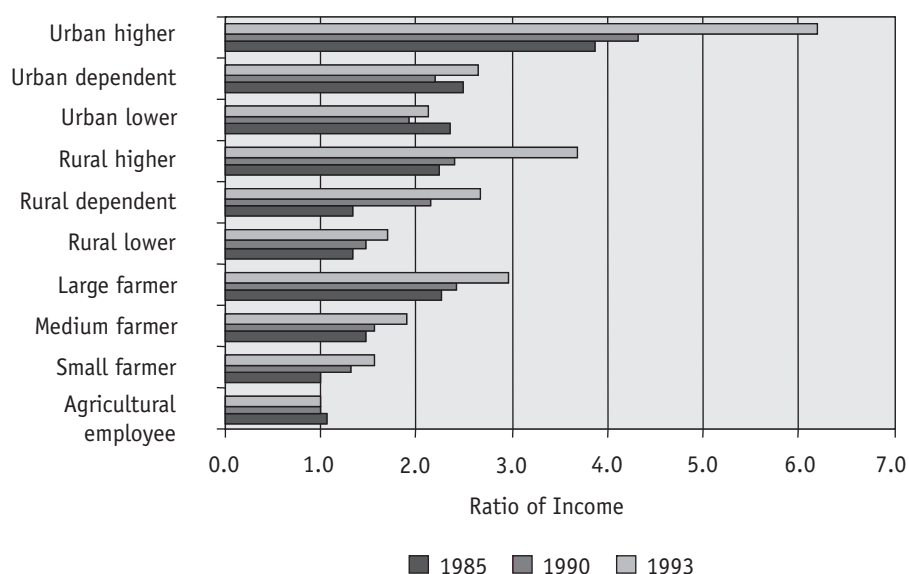
Households are classified into ten groups, based on a combination of income sources, area of residence, and job status of the head of household. First, households are divided into agricultural and nonagricultural households. The former is then split into landless employee farmers, small farmers (land size < 0.5 hectare), medium farmers (between 0.5-1.0 hectare), and large farmers (>1.0 hectare). For the nonfarmers, the disaggregation is based on area of residence (urban and rural), level of income, and a combination of occupation and job status. Based on these variables, the nonfarmers in each area are then classified into low, dependent,<sup>13</sup> and high-income groups. As can be seen, the household classification has been developed based on “real” variables, which can easily be identified for policy targeting, as common in the development of a SAM. Other institutions in the economy are firms, government, and ROW. Figure 1 shows that in terms of their per capita income, landless farmers (agricultural employees) and small farmers are among the poorest groups. Compared to urban higher-income groups, for instance, their income level is less than one fourth that of the nonagricultural high income group in urban areas (urban higher). Another group that is relatively poor is the nonfarmer low income group in rural areas (rural lower). These three groups of poor households, which constitute around 45% of the total households, are the most important focus in the examination of the poverty impact of the DDA (see Table 7 for details).

Armington specification is employed to introduce imperfect substitutability characteristics between domestically produced and imported commodities. This feature is especially important for trade policy issues, as the assumption of perfect substitutability would systematically exaggerate the power that trade policy has over the domestic price system and economic structure. The assumption of perfect substitutability would also rule out the possibility of two-way trade of the same commodity group. On the other hand, treatment of domestically produced and imported commodities as perfect complements would introduce a great deal of rigidity, because it would imply a tendency toward a high degree of specialization, which mostly contradicts the facts. In this case, trade policy-induced changes in relative prices such as changes in the exchange rate

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<sup>13</sup> The dependent household group refers to households where the head of the household is not in the labor force, relying instead on income transfer from relatives, friends, or government. The CGE model developed in this paper is slightly different from the one used in Sugiyarto et al. (2003).

**FIGURE 1**  
**RATIOS OF INCOME OF DIFFERENT TYPES OF HOUSEHOLD**  
Income ratio of households (lowest group=1)



Sources: Calculated from the Indonesian SAMs for 1985, 1990, and 1993.

would have no direct effect on the structure of the economy. This would create a foreign exchange gap that cannot be alleviated by trade and exchange rate policies (Dervis et al. 1982).<sup>14</sup>

Production is specified as two-level nesting of Leontief and Cobb Douglas functions and total production is allocated to domestic demand and exports. On the import side, the “small country” assumption is adopted, meaning that the domestic economy is a price taker for imports. The final demand in the domestic economy consists of household consumption, government consumption, and investment. Households maximize Cobb Douglas utility functions, while the government is assumed to have a planned consumption, which is not affected by commodity prices or the government’s income. Government saving is, accordingly, residual. The government (and domestic firms) also has access to foreign borrowing for balancing its budget. Consistent with the government consumption behavior, aggregate investment is fixed, reflecting the “investment-driven” nature of the economy.

Since it is impossible to determine absolute price levels in a general equilibrium model, it is necessary, therefore, to establish relative prices by setting one price as the numéraire. If the model is going to be used as a tool of policy analyses and formulation: “...it is best to use a price-normalization rule that provides a ‘no-inflation’ benchmark against which all price changes are relative price changes” (Shoven and Whalley 1992, 150). In this model, the price of the ROW account is used as a numéraire. Accordingly, all prices will be measured relative to the “world price” (the price of the ROW account measured in domestic currency) and the domestic price level then appears based on a real foundation (Drud et al. 1986). Given the choice of numéraire, it is also implicitly

<sup>14</sup> See Greenaway et al. (1993), Shoven and Whalley (1992), and Robinson (1989) for fuller discussions of CGE modeling.

assumed that the exchange rate is fixed and balance of payment deficits are endogenously determined by the model.<sup>15</sup>

TABLE 7  
NUMBER OF HOUSEHOLDS BY TYPE AND ANNUAL PER CAPITA INCOME, 1985-1993

TYPES OF HOUSEHOLD	1985			1990			1993		
	NUMBER (MILLION)	PERCENT-AGE	INCOME ('000 RP)	NUMBER (MILLION)	PERCENT-AGE	INCOME ('000 RP)	NUMBER (MILLION)	PERCENT-AGE	INCOME ('000 RP)
Agricultural Employee	11.5	7.01	255.1	15.7	8.7	441.5	18.7	10.0	508.0
Small farmer	39.1	23.8	242.1	49.7	27.6	575.1	51.3	27.4	798.1
Medium farmer	13.1	8.0	358.9	11.2	6.2	692.5	11.6	6.2	960.1
Big farmer	15.9	9.7	548.6	11.6	6.5	1065.2	12.0	6.4	1507.0
Rural lower	21.9	13.4	323.6	16.2	9.0	650.5	16.6	8.9	862.3
Rural dependent	8.4	5.1	322.3	2.8	1.6	946.3	2.9	1.6	1350.0
Rural higher	13.4	8.2	538.0	23.7	13.2	1061.7	24.3	13.0	1878.3
Urban lower	20.7	12.6	572.1	22.7	12.6	844.9	23.3	12.4	1081.6
Urban dependent	6.3	3.8	600.1	4.7	2.6	967.3	4.8	2.6	1344.7
Urban higher	13.8	8.4	935.3	21.5	12.0	1899.8	22.1	11.8	3138.5
Total	164.1	100.0	438.3	179.8	100.0	881.8	187.6	100.0	1303.6

Sources: Calculated from the Indonesian SAMs for 1985, 1990, and 1993.

## V. SIMULATION ANALYSIS

The simulation analysis is conducted by first calculating welfare costs of the existing commodity taxation; second, the near marginal tax incidence; and third, DDA simulations. The first calculation indicates the magnitude as well as the share of welfare costs of the existing commodity taxation. As the calculation is conducted for each commodity, the results therefore indicate which sectors/commodities are relatively more distorted than others. The second calculation shows how a small (marginal) increase in the commodity tax will affect total welfare so that one can determine whether

<sup>15</sup> The assumption of an endogenous balance of payment deficit, however, suffers from the criticism that there will be seemingly unlimited foreign borrowing available to the domestic economy (Robinson 1989). Nevertheless, the empirical situation prior to the Asian crisis suggests this choice. As far as foreign borrowing is concerned, the problem for Indonesia is more in limiting than in getting foreign loans. This may be due to the fact that while the position of the government's foreign loans at that time was already high, the loans were mostly in the form of long-term concessional loans with relatively long grace periods. In addition, the government has consistently put its debt repayments as a priority, maintaining its creditworthiness in the international debt market. Pack and Pack (1990), for instance, concluded that the foreign loans have stimulated private investments. Fane (1996) also suggested that the accumulation of Indonesian foreign loans has been reflected more in the growth of investment than in the growth of consumption. In 1994, Indonesia—as the head of the Non-Aligned Movement (NAM)—was even asked to help in managing foreign loans in other low-income highly indebted countries (*Far Eastern Economic Review* September 1994).

the particular commodity is already over/under taxed. The last (third) set of simulations explore what the results of the DDA in agriculture might be, reflected first in complete liberalization of agricultural tariffs; second, combined with complete liberalization of domestic agricultural taxation; and third, with liberalization of other sectors.

### A. Welfare Costs of the Existing Commodity Taxation

The welfare costs (loss) of the existing commodity taxation can be calculated for both tariffs and indirect taxes on domestic commodities. The results are then compared to sectoral outputs and tax revenues.<sup>16</sup> Table 8 shows that some sectors are relatively much more distorted than others. For example, the three sectors of textiles, food processing, and chemicals contribute more than 10% of total output (i.e., 14.2, 11.1, and 10.8%, respectively), but their contributions to the tax revenue amounted to 38.9, 8.54, and even -4.83% (i.e., the net subsidized chemical sector). Another sector that contributes nearly 10% of output but has more significant contribution in tax revenues is the trade sector. Its output share is about 9.6% but it contributes 23.6% of total indirect taxes from domestic commodities. This sectoral imbalance is made worse by its impacts on welfare. Roughly two thirds of the welfare loss originated from the food processing industry (52%) and the trade sector (15%).

The sectoral imbalance is also recorded on the import side, as most government revenues from tariffs were collected from papers and metal products (about 53%) and chemicals (35%). The latter results from protecting the domestic chemicals sector.<sup>17</sup> Note that the welfare impact of tariffs differs from that of domestic taxation. Welfare costs of sectoral tariffs are in line with the value of sectoral imports, making them more predictable.

The welfare cost impacts show that the existing indirect taxes and tariffs generate relatively high distortions in the economy. For every unit of indirect tax collected, there are 1.3 units of welfare costs, while for imports the ratio is 0.8. This suggests that the existing tax system is not an efficient mechanism for collecting revenues. Sectors with the ratio of welfare cost to revenue collected more than unity are food crops, other agriculture, food processing, construction, utilities, restaurant, bank and insurance, real estate, public and personal services.

On the import side, the most distortionary tariffs are those on food processing and construction, (118 and 101%, respectively). Food processing is also among the most highly taxed in the domestic market, amounting to 39% of total indirect tax on domestic commodities.<sup>18</sup> Furthermore, using a ratio of sectoral welfare loss to revenue of one half as a cut-off point for the possibility of raising taxes to increase revenue, it seems that this can only be done through increasing taxation in two sectors, namely: mining and textiles. On the import side, this can be made possible with increasing tariffs on food crops and textile products.

<sup>16</sup> See Shoven and Whalley (1984) and Ballard et al. (1985) for detailed discussion on this topic.

<sup>17</sup> In 1993, the net subsidy to this sector amounted to 771 billion rupiah or about 5% of total revenue from indirect taxation on domestic commodities.

<sup>18</sup> Food processing contributes to around 11% of the total output in 1993 (the CBS 1996).

Total welfare losses associated with the implementation of indirect taxation on domestic commodities is nearly 4% of the total production. The actual welfare loss could be much higher should the effects of the subsidy be more fully incorporated. On the import side, the total welfare loss is more than 7% of total import value.

**TABLE 8**  
**WELFARE COSTS OF THE EXISTING COMMODITY TAXATION, 1993**

**INDIRECT TAXATION**

SECTOR / COMMODITY	OUTPUT		TAX REVENUE		WELFARE COSTS		WELFARE COSTS AS PERCENT OF			
	VALUE	PERCENT	VALUE	PERCENT	VALUE	PERCENT	SECTOR OUTPUT	TOTAL OUTPUT	SECTOR TAX	TOTAL TAX
Food crops	35644.8	6.2	250.8	1.6	485.8	2.4	1.4	0.1	193.7	3.0
Other agriculture	40866.7	7.2	359.4	2.3	499.6	2.5	1.2	0.1	139.0	3.1
Mining	35430.0	6.2	319.9	2.0	145.9	0.7	0.4	0.0	45.6	0.9
Food processing	63452.8	11.1	6208.2	38.9	10427.7	51.8	16.4	1.8	168.0	65.3
Textile	80964.1	14.2	1363.6	8.5	741.3	3.7	0.9	0.1	54.4	4.6
Construction	20336.5	3.6	277.8	1.7	282.2	1.4	1.4	0.1	101.6	1.8
Papers and metals	32990.3	5.8	1164.1	7.3	1018.8	5.1	3.1	0.2	87.5	6.4
Chemical	61641.1	10.8	-771.4	-4.8	-620.2	-3.1	-1.0	-0.1	80.4	-3.9
Utilities	8253.0	1.4	42.9	0.3	45.7	0.2	0.6	0.0	106.5	0.3
Trades	54570.8	9.6	3769.5	23.6	2959.4	14.7	5.4	0.5	78.5	18.5
Restaurant	18428.3	3.2	799.4	5.0	1025.1	5.1	5.6	0.2	128.2	6.4
Hotel	3452.2	0.6	147.0	0.9	138.5	0.7	4.0	0.0	94.2	0.9
Land transport	18835.5	3.3	313.2	2.0	279.8	1.4	1.5	0.1	89.3	1.8
Other transportation and communication	17047.1	3.0	125.8	0.8	114.4	0.6	0.7	0.0	90.9	0.7
Bank and insurance	19394.2	3.4	161.1	1.0	168.6	0.8	0.9	0.0	104.7	1.1
Real estate	17239.8	3.0	802.9	5.0	839.2	4.2	4.9	0.2	104.5	5.3
Public services	26128.0	4.6	304.3	1.9	322.6	1.6	1.2	0.1	106.0	2.0
Personal services	16939.4	3.0	325.2	2.0	401.5	2.0	2.4	0.1	123.5	2.5
Total	571614.5	100.0	15963.7	100.0	20151.1	100.0	3.5	3.5	126.2	126.2

*continued.*

TABLE 8. CONTINUED.

IMPORTS										
SECTOR / COMMODITY	IMPORTS		TARIFF REVENUE		WELFARE COSTS		WELFARE COSTS AS PERCENT OF			
	VALUE	PERCENT	VALUE	PERCENT	VALUE	PERCENT	SECTOR IMPORT	TOTAL IMPORT	SECTOR TARIFF	TOTAL TARIFF
Food crops	1425.2	2.0	55.5	0.9	13.9	0.3	1.0	0.0	25.1	0.2
Other agriculture	449.9	0.6	47.5	0.7	40.1	0.8	8.9	0.1	84.4	0.6
Mining	2414.6	3.4	38.5	0.6	31.0	0.6	1.3	0.0	80.5	0.5
Food processing	2614.2	3.7	310.5	4.9	365.0	7.2	14.0	0.5	117.6	5.7
Textile	87.4	0.1	20.1	0.3	2.7	0.1	3.1	0.0	13.5	0.0
Construction	4901.9	7.0	278.2	4.4	280.9	5.6	5.7	0.4	101.0	4.4
Papers and metals	34970.9	49.7	3359.8	52.6	2408.8	47.8	6.9	3.4	71.7	37.7
Chemical	18873.1	26.8	2242.4	35.1	1870.9	37.1	9.9	2.7	83.4	29.3
Total	70400.6	100.0	6392.1	100.0	5038.6	100.0	7.2	7.2	78.8	78.8

Sources: Output and tax revenue were calculated from the Indonesian SAMs for 1993, while the welfare costs were from simulation results.

## B. Near Marginal Tax Incidence

Literature on the marginal tax incidence (Newbery and Stern 1997 and Ahmad and Stern 1991) concerns how a very small change in a tax has impacts on welfare (W) and tax revenue (T). Define  $\lambda$  as the ratio of changes between the two:

$$\lambda = \frac{\delta W}{\delta T}$$

It then follows that a positive (negative)  $\lambda$  means that welfare can still be improved (reduced) by increasing tax. Accordingly, the value of  $\lambda$  can be used as an indicator of whether a particular sector/commodity is already over/under taxed. A positive  $\lambda$  means that an increase in tax results in a welfare improvement, showing that the sector/commodity is still under taxed, and vice versa.<sup>19</sup> Table 9 summarizes the results of this simulation (introducing a 1% increase in the tax rate), with sectors ranked by the value of  $\lambda$ .

The results show that nearly all sectors/commodities have already been overtaxed, except for the utility sector, implying that the existing tax system has generated distorted industrial and domestic markets. The result also highlights the costly method of collecting and possibly raising further revenue through taxation as any increase in the tax rate will reduce welfare. The distortions are very significant, such that every unit of revenue collected from the commodity taxation actually creates more welfare loss. The value of  $\lambda$  in the utility sector (consisting of electricity, water, and

<sup>19</sup> In the CGE context this “near marginal” concept can be simulated by introducing a small increase in the tax rate while maintaining fiscal neutrality with offsetting transfers to ensure a constant real government consumption. As the marginal increase in welfare is compared to the marginal increase in the tax revenue, the value of  $\lambda$  also reflects the marginal excess burden (MEB) per additional unit of tax revenue collected.

gas) should be interpreted carefully as there is direct government provision and intervention in this sector. The same caution should also be applied to the chemical sector, which is a net subsidized sector. Table 9 also shows that the negative values of  $\lambda$  vary from 32% (mining) to 203% (food crops), implying that any project should produce benefits of at least 1.32 per unit cost if the project is to be welfare improving.<sup>20</sup>

**TABLE 9**  
**NEAR-MARGINAL TAX INCIDENCE**

SECTOR/COMMODITY	MARGINAL CHANGE IN		$\lambda$
	WELFARE	TAX REVENUE	
Food crops	-4.3	2.1	-2.0
Food processing	-95.6	47.3	-2.0
Other agriculture	-4.4	3.0	-1.5
Restaurant	-9.4	6.5	-1.4
Personal services	-3.4	2.7	-1.2
Real estate	-7.6	6.8	-1.1
Chemical	6.8	-6.6	-1.0
Construction	-2.2	2.2	-1.0
Papers and metals	-9.3	9.4	-1.0
Public services	-2.6	2.7	-1.0
Trades	-26.9	29.6	-0.9
Land transport	-2.2	2.7	-0.8
Bank and insurance	-1.1	1.4	-0.8
Hotel	-0.8	1.2	-0.6
Textile	-6.7	11.1	-0.6
Other transportation and communication	-0.6	1.1	-0.5
Mining	-0.9	2.7	-0.3
Utilities	0.1	0.4	0.3
Total	-180.4	125.5	-1.4

Source: Simulation results.

## C. Simulations of Liberalization

Three scenarios are simulated here, namely: a complete removal of tariffs on agricultural products (Doha Partial), the same combined with a complete removal of their domestic taxes (Ag Complete), and total (border) trade liberalization (TTL). The first captures the increasing access for agricultural products demanded by the DDA; the second shows the effects if government is proactive in agricultural product liberalization by also removing domestic taxation to level the playing field; and the third reflects broader cross-sectoral implications, in line with the DDA for Indonesia.

<sup>20</sup> Ballard et al. (1985) found that the MEB for the US is in the range of 17-56 cents per dollar extra revenue.

The results of introducing the three scenarios are summarized in Tables 10 and 11. The assessment is based on key variables such as macroeconomic aggregates, external performance, welfare, household income and consumption, and variables for the poor household groups. The economic indicators summarized in Table 10 are calculated as percentage changes from the benchmark (business as usual) data. In most cases, a positive number reflects an increase or improvement, and vice versa.

**TABLE 10**  
**ECONOMYWIDE EFFECTS OF DOHA AGENDA AND TOTAL TRADE LIBERALIZATION (PERCENT)**

INDICATORS	DOHA-PARTIAL	AG-COMPLETE	TOTAL TRADE LIBERALIZATION
GDP	0.0	0.2	3.4
Employment	-0.1	0.2	5.8
Real exports	0.1	-0.1	-1.0
Real imports	0.2	0.4	10.5
Trade balance	-1.4	-5.5	-133.2
Domestic absorption	0.0	0.2	5.8
Household income	-0.1	0.3	9.6
Household real consumption	0.0	0.5	10.8
Agriculture household income	-0.2	0.5	9.9
Rural household income	-0.1	0.3	9.1
Urban household income	-0.1	0.3	9.5

Source: Simulation results.

**TABLE 11**  
**WELFARE EFFECTS OF DOHA AGENDA AND TOTAL TRADE LIBERALIZATION ON DIFFERENT HOUSEHOLD GROUPS**

HOUSEHOLD EQUIVALENT VARIATION	DOHA-PARTIAL			AG-COMPLETE			TOTAL TRADE LIBERALIZATION		
	BILLION RP	PERCENT OF INCOME	PERCENT OF CONSUMPTION	BILLION RP	PERCENT OF INCOME	PERCENT OF CONSUMPTION	BILLION RP	PERCENT OF INCOME	PERCENT OF CONSUMPTION
Agriculture employee (landless farmers)	-9.1	-0.1	-0.1	55.8	0.6	0.6	946.2	10.0	9.7
Small farmers	-41.1	-0.1	-0.1	268.9	0.7	0.7	4635.9	11.3	11.4
Medium farmer	-12.5	-0.1	-0.1	85.0	0.8	0.9	1536.6	13.8	14.8
Large farmer	-15.5	-0.1	-0.1	132.4	0.7	1.0	2308.1	12.8	15.0
Rural low-income group	0.8	0.0	0.0	71.9	0.5	0.6	1427.5	10.0	10.7
Rural dependent income group	0.8	0.0	0.0	9.0	0.2	0.3	68.3	1.8	2.0
Rural high-income group	-1.0	0.0	0.0	229.9	0.5	0.7	5276.1	11.6	15.1
Urban low-income group	5.1	0.0	0.0	82.1	0.3	0.4	1900.3	7.5	8.3
Urban dependent income group	0.3	0.0	0.0	27.9	0.4	0.5	600.2	9.3	10.4
Urban high-income group	28.4	0.0	0.1	260.1	0.4	0.6	7816.2	11.3	14.9
	-43.9			1222.9			26515.3		

Source: Simulation results.



The Doha Partial results indicate that increasing agricultural border market access alone would generate additional adverse effects on the domestic economy when all other distortions are maintained. Notably, the poor and other farmers are worse off in this scenario. The tariff removal increases imports but does not stimulate domestic production, bringing repercussions to the domestic economy in such forms as reductions in GDP, lower employment levels, less total domestic absorption, and a loss of household welfare. This helps to explain the reluctance of many developing countries to embrace agricultural trade liberalization.

However, if the agricultural tariff removal is combined with similar removal of domestic agricultural taxes, i.e., Ag Complete Scenario, the results are very different. The removal of taxes in both border and domestic markets reduces production costs and stimulates domestic production, which is then followed by its ramifications on the economy as reflected in increased GDP, higher employment levels, more total domestic absorption, and greater household welfare. The poor (landless farmers, small farmers, and rural low-income group) get clear benefits from the complete removal of agricultural tax barriers. In addition, contrasting the first two simulation results confirms that the existing domestic commodity taxation is an expensive way of collecting revenue, as shown by its associated welfare costs and the benefits from its removal.<sup>21</sup>

However, liberalizing one sector alone can also send false signals to resource allocation in the broader economy. This, together with different relative interests in different sectors by different countries, underlies the more comprehensive nature of negotiations under the auspices of the WTO, where trade-offs between sectors are incorporated.

In the TTL scenario, in which border trade is liberalized for all sectors, the results are substantially superior for GDP, employment, domestic absorption, household income, and household real consumption. Even more striking, household welfare is improved for all household groups. The trade balance deteriorates from a surplus to a deficit, but the deficit is small (less than 1% of GDP).

## **VI. CONCLUSIONS AND POLICY IMPLICATIONS**

The Doha round has an ambitious agenda, notably including freeing trade in farm goods and services within three years in the hopes of helping the poorest countries. The agenda was set in November 2001 and was supposed to be completed in 3 years. However, as of September 2005 no agreement has been reached. The July 2004 package offered some moderate compromises so that the talks can continue.

Since protection is not a monopoly of developing countries, the DDA faces formidable challenges from both developed and developing countries. While maintaining their own widespread trade barriers, developing countries have been yearning for better access for their farm products to developed countries' markets. Protection in agriculture and its impact on both developed and developing countries has become an important issue.

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<sup>21</sup> In the model results, government consumption is found to be lower in the Doha-Partial scenario than in the baseline, but higher in the Ag Complete Scenario, and higher still in TTL. Note however, that residual government financing is assumed to be readily available from international sources.

Important questions arising from this fact relate to whether there is any justifiable reason for agricultural protection in developing countries and what effects might result from farm trade liberalization under the DDA. Furthermore, as most farm producers are poor farmers, an important issue is whether the poor will benefit from the Doha round.

The CGE model developed in this study has been employed to shed some light on these issues by simulating what the likely effects of the DDA would be for a developing country such as Indonesia. The assessment is conducted at the economywide level, including welfare and distributional implications for different household groups. Moreover, the assessment includes the welfare costs of existing sectoral taxes, to put the agricultural protection into its broader context.

The near marginal tax incidence results indicate that nearly all sectors have already been overtaxed, except for utility sectors. The existing tax system has distorted the economy so that a unit of revenue collected increases welfare loss. The analysis then suggests that any project financed by new tax money should produce benefits of at least 1.32 times its cost if the tax collection is to be welfare-improving.

A further elaboration of the welfare costs of the existing commodity taxation reveals that some sectors are relatively much more distorted than others. This applies for both tariffs and domestic indirect taxes, even though the welfare costs of tariffs are relatively less than those of domestic taxes. Contrasting the first two simulation results further confirms that the existing domestic agricultural commodity taxation is an expensive way of collecting revenue as shown by its associated welfare costs and the potential benefits from its removal.

The simulation of Doha-Partial (only removing agricultural border taxes) indicates that increasing market access alone will generate more adverse effects for the domestic economy, since all other distortions remain. Doha-Partial does not stimulate domestic production, increase employment, or improve welfare. Perhaps most important, the result is not pro-poor.

In the Ag-Complete Scenario, however, the results are very promising. The removal of both agricultural tariffs and domestic taxes boosts domestic production, which yields positive ramifications in the economy. Welfare is improved and the poor benefit.

The detailed results also show that full benefits of trade liberalization cannot be obtained only by piecemeal trade liberalization. Liberalizing one sector alone will generate misleading signals to resource allocation in the economy. The TTL scenario yields the greatest benefits for the poor, and for the economy as a whole. This calls for more comprehensive trade liberalization, aligned with domestic industrial and other policies. The government could expand the benefits of the DDA by further liberalizing both international and domestic markets. This, however, requires strong commitments as well as collaboration with other trading partner countries. The latter is essential since unilateral trade liberalization is not as desirable a course of action, reflecting a key role for the WTO.

## APPENDIX 1 MODELING DEVELOPMENT

### Production/Supply Side

In the model, output was specified as an input-output function of intermediate input and value added. The intermediate input consumption  $(INT)_i$  was set as a constant elasticity of substitution (CES) aggregation of domestically produced and imported commodities (allowing imperfect substitution between the two commodities, with a different degree of substitution for each type of commodity as reflected by the value of elasticity used) in the form:

$$INT_i = A \left[ \alpha_d D_i^{(\sigma_i-1)/\sigma_i} + (1 - \alpha_d) M_i^{(\sigma_i-1)/\sigma_i} \right]^{\sigma_i/(\sigma_i-1)} \quad (S.1)$$

where  $A$  = scale parameter,  $\alpha_d$  = share parameter for domestically produced commodities as a share of total commodities available in the domestic economy ( $0 < \alpha_d < 1$ ), and  $D_i$  and  $M_i$  are domestically produced and imported commodities, respectively. The elasticity of substitution between domestically produced and imported commodities is represented by  $\sigma_i$ .

The value added was set as a Cobb-Douglas function of different types of labor and capital. Total production was allocated to domestic demand and exports.

### Demand Side

Total final demand in the domestic economy consists of demand for consumption and for investment purposes. Consumption is the sum of household and government consumption, while the demand for investment is generated by the aggregated saving-investment (capital) account. Appendix figure 1 shows a schematic representation of the demand system of the model. A Cobb-Douglas utility function is assumed for the households, while the government is assumed to have planned consumption reflected in a Leontief specification, which is not affected by commodity prices or the government's income. Aggregate investment is fixed to reflect the "investment-driven" nature of the economy. In addition to the main functional specifications for production and final demand, there are other equations in the model to define prices (for activities, commodities, and factors); incomes and expenditures (by institutions); and to balance the model.

### Price Equations

The domestic price of each composite commodity ( $P_i$ ) can be written as a CES function of the domestic prices of imported ( $PM_i$ ) and domestically produced goods ( $PD_i$ ):

$$P_i = \left[ \alpha_d PD_i^{(\sigma_i-1)/\sigma_i} + (1 - \alpha_d) PM_i^{(\sigma_i-1)/\sigma_i} \right]^{\sigma_i/(\sigma_i-1)} \quad (P.1)$$

On the import side, the adoption of the small country assumption implies that the domestic economy is a price taker and there is unlimited supply from the ROW at the given world price. The domestic price of imports is given by

$$PM_i = \overline{PW}_i (1 + tm_i) \overline{ER} \quad (P.2)$$

where  $\overline{PW}_i$  is the world price,  $\overline{ER}$  is the exchange rate, and  $tm$  is the tariff rate on imported commodities. The bar sign indicates that the variable is fixed. Assuming that domestic products sold in the international market face a downward sloping demand curve, the export price ( $PWE$ ) can be represented as

$$PWE_i = PD_i / (1 + te_i) \overline{ER} \quad (P.3)$$

where  $te$  is the export subsidy rate.

### Income and Expenditure Equations

Household incomes ( $Y_h$ ) consist of factor incomes (i.e., wages and rent payments for factors used domestically and abroad, expressed by the first two parts on the right hand side) of equation I.1 and transfer incomes from the government ( $TGH$ )<sub>h</sub>, domestic firms ( $TFH$ )<sub>h</sub>, other households ( $THH$ )<sub>h</sub> and the ROW ( $TWH$ )<sub>h</sub>. These incomes can be written as:

$$Y_h = \left[ \sum_i \sum_k W_k L_{kih} + \sum_i (PN_i X_i - \sum_k W_k L_{ki})_h \right] + (TGH)_h + (TFH)_h + (THH)_h + (\overline{TWH})_h \overline{ER} \quad (I.1)$$

Firm incomes ( $Y_f$ ) include payments for capital used in production, transfers from other firms ( $TFF$ ), and transfers from the ROW ( $TWF$ )<sub>f</sub>, which is set as a residual. It is given by:

$$Y_f = \left[ \sum_i (PN_i X_i - \sum_k W_k L_{ki})_f + (TFF) + (TWF) \overline{ER} \right] \quad (I.2)$$

Government income ( $Y_g$ ) can be categorized into payments for capital used in production activities; income taxes from domestic institutions (households, domestic firms and government-owned companies); income from indirect taxes levied on commodities; and transfers from ROW ( $TWG$ ), which is endogenously determined by the model. It is given by:

$$Y_g = \left[ \sum_i (PN_i X_i - \sum_k W_k L_{ki})_g + \sum_h t_h Y_h + \sum_f t_f Y_f + \sum_i td_i X_i^S PD_i + (TWG) \overline{ER} \right] \quad (I.3)$$

Transfer payments from the ROW to households are set exogenously (as shown by a bar sign on the variables in the equations), while transfers to government and firms are set endogenously (as residuals). This is consistent with the behavior of domestic firms as well as the fiscal policy of the government—both rely on foreign sources for funding their deficits. These transfer payments consist of foreign loans, grants and other transfers.

Household expenditure ( $E_h$ ) consists of consumption of composite commodities, direct tax payments to the government, transfers to other household groups and savings:

$$E_h = (\sum_i CH_i) + (\sum_h t_h Y_h) + (THH)_h + S_h \quad (E.1)$$

The expenditures of firms ( $EF$ ) consist of transfers to households, direct tax payments to the government, transfers to other firms (retained profit), transfers to the ROW ( $TFW$ ), and saving:

$$EF = (TFH)_h + (\sum_f t_f Y_f) + (TFF) + (TFW) + SF \quad (E.2)$$

Government expenditure ( $EG$ ) consists of consumption of composite commodities, transfers to households ( $TGH$ ), transfers to the government ( $TGG$ ), transfers to the ROW ( $TGW$ ), and saving:

$$EG = (\sum_i CG_i) + (TGH)_h + (TGG) + (TGW) + SG \quad (E.3)$$

### Saving–Investment Equations

Total saving in the domestic economy consists of household savings ( $S_h$ ), firm savings ( $SF$ ), government saving ( $SG$ ), and capital injections from the ROW ( $SW$ ):

$$S = \sum_h S_h + SF + SG + \overline{SW} \quad (S-I.1)$$

In equilibrium, total saving equals total investment, which is distributed to each sector based on fixed shares.

$$S = I$$

$$I_i = \sum_i \bar{\delta}_i I \quad \text{and} \quad \sum_i \bar{\delta}_i = 1 \quad (S-I.2)$$

Aggregate final demand (total final consumption of composite commodities) is accordingly given by

$$C_i = \sum_i CH_i + \sum_i CG_i + I_i \quad (S-I.3)$$

where

$$C_{ij} = \delta_{ij} (1 - \overline{MPS}_j)(1 - t_h)Y_j, \quad j = h, g$$

### Employment and Wages

For nonagricultural and nonproduction workers in Indonesia, wages are set in competitive markets and reflect the marginal product of the workers:

$$PN_i (\partial X_i / \partial L_{ki}) = W_k \quad \text{with} \quad L_k^D = \sum_{i=1}^n L_{ki} \quad \text{and} \quad L_k^D = \overline{L}_k^S \quad (L.1)$$

For labor in the agricultural sector and production workers, wages are fixed and the last part of the equation above becomes

$$L_k^D = L_k^S \quad \text{where} \quad L_k^S < L_k^{*S} \quad \text{and} \quad W_k = \bar{W}_k \quad (\text{L.2})$$

thus allowing for unemployment in the agricultural sector and among production workers.  $D$  and  $S$  in the equations above refer to demand and supply while  $\bar{W}_k$  is the wage at equilibrium level.  $L_k^{*S}$  is the optimum labor supply.

## Foreign Trade

The export demand equation is

$$E_i = \bar{E}_i (AVE_i / PWE_i)^{\eta_i} \quad (\text{F.1})$$

where  $\bar{E}_i$  = exports when  $AVE_i = PWE_i$ ,  $PWE$  = supply price of domestic exports in foreign currency,  $AVE$  = average world price of the commodity,  $\eta$  = the export demand elasticity.

The import demand equation is

$$M_i = (\delta_i / 1 - \delta_i)^{\sigma_i} (PD_i / PM_i)^{\sigma_i} D_i \quad (\text{F.2})$$

where  $\delta$  = share parameter and  $D_i$  = total demand for domestic use

The balance of payments equilibrium equation is given by:

$$\left[ \sum_i \bar{P}W_i M_i + (TGW) + (TFW) + \sum_k (RMTW)_k \right] = \left[ \sum_i PWE_i E_i + \sum_k (\overline{RMFW})_k + \sum_h (\overline{TWH})_h + (TWF) + (TWG) \right] \quad (\text{F3})$$

The left hand side of the equation above is the ROW revenue that consists of imports, capital flight, transfers from government and firms, and capital payment from foreign capital used in domestic production to the ROW. On the right hand side is the ROW total expenditure, covering exports; capital payments; and transfers to domestic households, firms, and government. Since the transfers from ROW to domestic firms and government are set as residuals, the current account deficit equation is given by

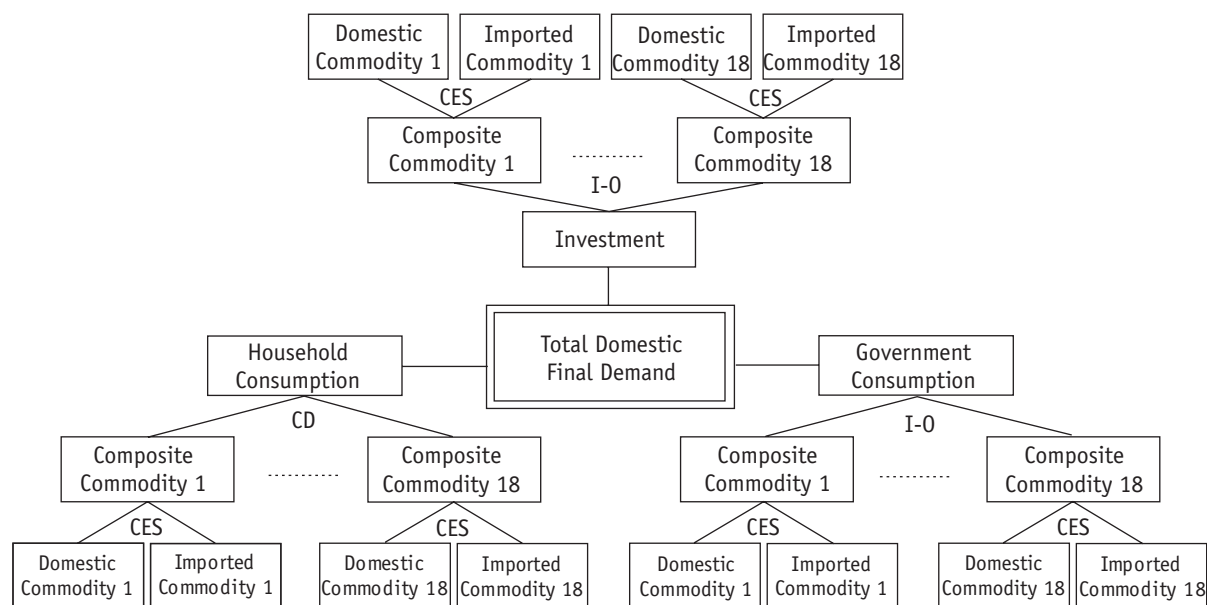
$$\begin{aligned} [(TWF) + (TWG)] = & \left[ \sum_i \bar{P}W_i M_i + (TGW) + (TFW) + \sum_k (RMTW)_k \right] \\ & - \left[ \sum_i PWE_i E_i + \sum_k (\overline{RMFW})_k + \sum_h (\overline{TWH})_h \right] \end{aligned} \quad (\text{F4})$$

The model provided by the equations above is then used to examine the welfare costs of the existing import tariff, and various trade liberalization scenarios.

## APPENDIX 2 CALCULATION OF THE WELFARE COSTS OF THE EXISTING IMPORT TARIFFS

In a CGE context (see Shoven and Whalley 1984), the calculation of welfare loss of the existing import tariff is conducted by simulating the removal of import tariffs individually in the context of maintaining government revenue from taxation. The result is summarized in Table 6. Notice that most government revenue from tariffs is collected from Papers & Metal products (about 53%) and Chemicals (35%). The latter is actually a net subsidized sector, implying that this sector is the most protected one (in 1993, the net subsidy of this sector amounted to 771 billion rupiah or about 5% of total revenue from indirect taxation on domestic commodities). From the welfare loss calculation, it shows that the existing tariff generates relatively high distortions, i.e., 0.8 for every single unit of currency collected from the import tariff. This suggests that the existing import tariff is an inefficient mechanism for collecting revenues. For some sectors, namely Food Processing and Construction, the ratios of welfare cost to revenue collected are even more than unity (i.e., 118% and 101%, respectively), implying the distortionary nature of these tariffs. Moreover, food processing is also among the most highly taxed sectors in the domestic market, accounting for around 39% of the total tax on the domestic commodities, while this sector contributed around 11% of the total output in 1993 (CBS 1996).

APPENDIX FIGURE 1  
SCHEMATIC REPRESENTATION OF FINAL DEMAND



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