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This paper is from the
GTAP Annual Conference on Global Economic Analysis
https://www.gtap.agecon.purdue.edu/events/conferences/default.asp

Trade Liberalization and Labor Markets: the case of Indonesia

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Abstract

Trade liberalization has long been advocated for standard reasons of increasing competition and welfare. Yet, there is still considerable debate, particularly in developing countries, about the range of effects that result from liberalization and the relative magnitudes of different effects. Such debate stems, in part, from the fact that trade reform takes place in a distortionary context. The effects of trade reform in the presence of other distortions fall into two strands: trade liberalization and distortionary domestic taxes, and trade liberalization and labor market distortions. Whereas the former has received significant attention, the analysis has generally been undertaken in the context of an unchanging labor market regime. However, labor market reforms are commonly under consideration, so that it is important to take account of their possible effects on trade liberalization and welfare of different sectors of the population.

This paper examines trade liberalization in the presence of alternative labor market regimes in urban and rural sectors. The analysis first considers a form of labor market distortion that is relatively common in developing countries. The presence of wage rigidities in the form of minimum wages, unionized labor or government controls in formal or urban sectors contrasts with the absence of such rigidities in informal or rural sectors. This paper examines the consequences of trade liberalization in such a setting, showing that, under certain conditions, labor market rigidities can mean that trade liberalization reduces welfare. The paper also examines the effects of trade liberalization in the context of higher or lower rigidities in labor markets. The alternative combinations of labor market rigidity/liberalization and trade liberalization are tested in a computable general equilibrium model of Indonesia that incorporates 18 production sectors, 8 types of labor, 5 types of capital and 8 representative household groups. While full trade liberalization is found to be welfare improving, liberalizing only part of the tariff schedule can lead to welfare losses.

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1. Introduction

Trade liberalization has long been advocated for standard reasons of increasing welfare. Yet, there is still considerable debate, particularly in developing countries, about the range of effects that result from liberalization and the relative magnitudes of different effects. Such debate stems, in part, from the fact that trade reform takes place in a second-best world where a multitude of other distortions exist. The effects of trade reform in the presence of other distortions have only recently been addressed, and fall into two strands: trade liberalization and distortionary domestic taxes, and trade liberalization and labor market distortions.

The literature that concentrates on trade liberalization and distortionary domestic taxes admits that there are two reasons why liberalization may be harmful to welfare. Firstly, through a revenue replacement effect when the forgone tariff revenues are raised through domestic taxes which may be more distortionary than the original tariff levels (Harrison et al., 1993). Secondly, if the structure of domestic taxes imposes a higher tax burden on industries that are protected by the highest tariffs, then the distortionary nature of the domestic tax system may be offset by distortions in the opposite direction in the tariff structure (Konan and Maskus, 2000). Liberalization of tariffs may remove these offsetting distortions and could lead to a more distorted post-liberalization economy. The case of joint reform of tariffs and taxes was considered by, for example, Clarete and Whalley (1987, 1988), and Yilmaz (1999) examined the welfare effects of optimal export taxes. Konan and Maskus (2000) extended the analysis to encompass the decomposition of the welfare effects into the effects of trade reform, tax reform and their interaction.

However, little attention has been paid to the second strand of literature examining how labor market distortions affect the welfare effects of trade liberalization. Notable exceptions are Devarajan *et al*.'s (1997) study of the effects of unions on the outcomes of economic reform and Bussolo *et al*.'s (2002) work on the effects of trade and labor market distortions on trade volumes and the wage gap between the skilled and unskilled. The first of these papers found that the presence of active labor unions increases the gains from trade liberalization as the power of such unions to extract rents is diminished in a liberalized economy. Despite this significant finding, there has been little attempt to examine how other types of labor market distortions alter the welfare effects of trade liberalization. This paper attempts to fill a small part of this gap by examining the effects of tariff liberalization in the presence of wage rigidities.

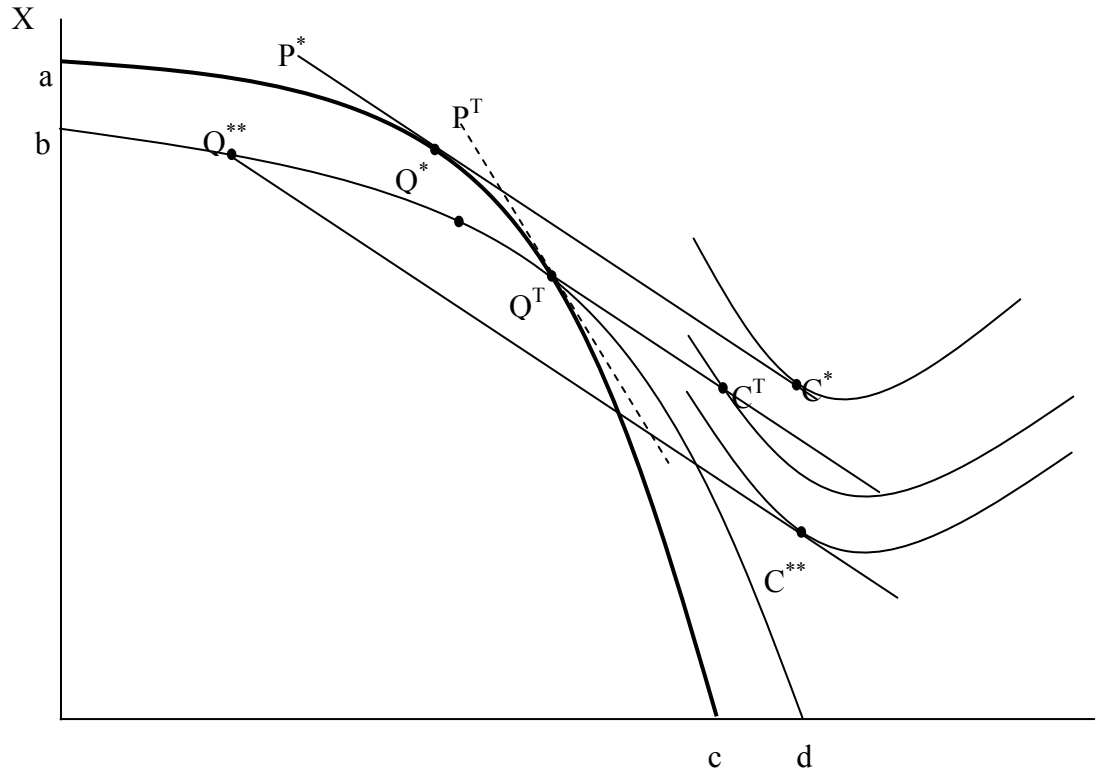
The issue of the welfare effects of trade liberalization is further complicated by the fact that different types of trade and labor market reforms have different effects on different groups within the population. Increasing concern about the distributional repercussions of liberalization (Harrison *et al*., 2002) raises questions about which groups gain the most from joint policy reform and which, if any, lose. This paper will therefore also examine the distributional effects of liberalization in the presence of wage rigidities.

2. The theoretical framework

The intuition behind the framework presented below is relatively straightforward. Consider an economy that protects import-competing sectors through tariffs and in which there are real wage rigidities in those import-competing sectors but not in other sectors. The rigidities could be imposed by the government (minimum wages or incomes policies) or by unions (setting fixed real wages). Typically, it is useful in the developing country context, to consider minimum wages that are (i) not applied in agriculture; (ii) below current wage levels in services; and (iii) at a binding wage level in (import-competing) manufacturing sectors. Labor is not fully mobile between the import-competing sectors and other sectors. In this economy, tariff removal would result in less protection of the import-competing sectors, lower levels of output and employment in those sectors, and therefore lower levels of employment of labor in those sectors and in the economy as a whole. There are therefore two effects on welfare: firstly, a removal of distortions that increases welfare by allowing producers and consumers to react to world prices, and secondly a resource effect that reduces welfare because some of the economy's resources (labor) are unemployed.

Standard arguments for tariff reductions, based on a two good, two factor model, predict that trade will raise welfare by allowing an economy to consume beyond its production possibility frontier, and that tariffs restrict the ability of countries to consume beyond that frontier.

Figure 1: Tariff liberalization with wage rigidities



A two-sector specific-factors model can be used to illustrate the effects of trade liberalization, initially in a first best context of no labor market distortions and, subsequently, in the context of rigidities in labor markets. The model consists of sectors producing exportables and importables in a small open economy, in which both sectors use mobile capital and sector-specific labor to produce their respective goods. Both sectors are perfectly competitive and have constant returns to scale technology. The production possibility frontier aQ^Tc in Fig. 1 shows the different combinations of exportables and importables that can be produced in an economy without distortions. Under free trade at world prices $P^* = P_M/P_X$, the economy is able to produce at point Q^* and consume at point C^*. A tariff t forces producers and consumers to respond to the distorted price ratio $P^T = (1+t)P^*$, when production occurs at point Q^T and consumption at point C^T, on a lower indifference curve than point C^*.

The frontier bQ^Td shows the output combinations that are produced when the economy is subject to a fixed real wage in the importables sector that is equal to the real wage received by importable-specific labor at point Q^T. To the left of Q^T, any reduction in importable production is accompanied by a reduction in employment of importable-specific labor. Consequently, more of importable production must be forgone in order to produce an additional unit of exportables, compared to the case without labor market distortions on the original frontier. To the right of Q^T, the reverse holds as increases in importables production are accompanied by increases in employment at the fixed real wage. A realistic interpretation of a minimum wage is that the economy is restricted to production possibilities given by bQ^Tc, where (as the minimum wage clears the importables-specific labor market at point Q^T) the economy follows the original production possibilities frontier to the right of point Q^T, but is restricted to the left of Q^T.

Following tariff liberalization (here, tariff removal), production will move around the production possibilities curve to a point such as Q^{**}, at which the levels of consumption at C^{**} give a lower level of utility than the tariff-distorted levels at C^T. The slope of the production possibilities curve at point Q^{**} is crucially not tangential to the world price ratio, and it is this fact that generates the fall in utility. In order to understand why the price ratio is not tangential to the production possibilities curve at point Q^{**}, recall that the output of importables and exportables are given by production functions,

$$X = x\left(L_x, K_x\right)$$

$$M = m\left(L_m, K_m\right)$$

The slope of the production possibility frontier, dM/dX, can easily be derived by taking derivatives of these functions, and setting marginal value products equal to wages:

$$\frac{dM}{dX} = \frac{P_X}{P_M}\frac{w_M dL_M + rdK_M}{w_X dL_X + rdK_X}$$

In a Hecksher-Ohlin model both factors are mobile so that both sectors face the same wage rate ($w_X = w_M$) and any change in employment of either labor or capital in either sector must be accompanied by an offsetting change in employment in the other sector ($dL_X = -dL_M$ and $dK_X = -dK_M$). Eq. 1 then leads to the conclusion that the slope of the PPF must equal the negative of the price ratio, $dM/dX = -P_X/P_M$, the standard result where the slope of the production possibilities frontier depends only on the relative prices.

If labor is immobile then instead of facing the same wage rate, employment in each industry must equal labor supply, if wages are flexible and clear labor markets ($dL_X = 0$ and $dL_M = 0$). This again leads to the same conclusion in Eq. 1 that $dM/dX = -P_X/P_M$. If, however, wages in the importables sector are fixed relative to the capital rental rate[1], $w_M = \gamma r$ then while the exportable-specific labor market must still clear ($dL_X = 0$), the importables-specific labor market need not do so ($dL_M \neq 0$). Eq. 1 then leads to:

$$\frac{dM}{dX} = -\frac{P_X}{P_M}\left(1 + \frac{\gamma dL_M}{dK_M}\right)$$

Because $dL_M/dL_X < 0$, the slope of the production possibilities curve at point i is less steep than the world price ratio which leads to a fall in utility when the tariff is removed. Note that higher real wages (higher γ) will lead to an even larger difference between the price ratio and the slope of the production possibilities curve, at a point to the left of Q**, which would lead to an even larger fall in utility.

The basic logic behind this conclusion generalizes to models with more complex structures, although there are other factors that need to be taken into consideration. In multi-sector applied models, such as the one employed below, there are usually several sectors that can be classified as import-competing; the tariff levels applied to imports may differ in these sectors. There are often more than one factor of production and it may be more realistic to consider wage rigidities as applying to a certain type or types of labor than to labor in specific industries. The CGE model detailed below includes assumptions of labor immobility, for example, but also applies wage rigidities to mobile labor. In this framework the share of import-competing sectors in total employment of these labor types becomes important. If import-competing sectors dominate in the employment of one or more of these labor types, results similar to those derived above may be found; if other sectors also employ significant levels of these labor types then any fall in employment in the import-competing sectors may be offset by increases in employment in other (for example, exporting) sectors. Distortionary domestic taxes also exist in real-world economies, and it is important that applied models take these into account. It is equally important in the present context to take care that welfare losses caused by the presence of a distortionary domestic tax system, or to the distortionary effects of revenue replacement, are not wrongly attributed to the effects of wage rigidities. For this reason, the effects of tariff reform will be examined both with and without wage rigidities, and both with and without revenue replacement through distortionary domestic taxes.

3. Tariffs and labor markets in Indonesia

Trade liberalization has a checkered history in Indonesia, as governments have continued to rely on international trade taxes as a source of revenue. Major changes in trade policy have been triggered by political and economic crises, generally linked to unfavorable external

[1] Note that the results are not determined by the price that real wages are set against. The wage could also be fixed relative to a consumer price index with the same conclusion.

conditions such as falls in the prices of primary commodities. The sequencing of trade liberalization in Indonesia followed substantial liberalization of capital and the financial market, as the main trade reforms were implemented only after 1985, as indicated in Table 1, mainly in response to balance of payments problems. Government policies have tended to revert towards protectionism in the absence of such problems.

Table 1: **Indicators of Reform (%)**

Measure	**1985**	**1991**
Average tariff: Unweighted	27	22
Production weighted	19	17
Import Licensing: Import weighted	43	13
Production weighted	41	12
Index of Dispersion[1)]	108	89

[1)] Measured by the coefficient of variation.

Source: World Bank (1992), Indonesia Growth, Infrastructure and Human Resources, Report No. 10470-IND.

Table 2: Trade liberalization episodes in Indonesia, 1945 onwards

Trade Liberalization Measures Adopted in Each Period					
The Chaotic Years (1945-65)	**Stabilization and Rehabilitation (1966-73)**	**The Oil Windfalls and Boom Years (1974-81)**	**Adjustment to External Shocks (1982-84)**	**Further Trade Liberalization (1985-mid 1997)**	**The Economic Crisis and Afterwards (1997-to date)**
⇨ High inflation and frequent economic policy/government changes. ⇨ Dominant role of taxation on trade. ⇨ Imposing multiple exchange rates, export surcharges, quantitative restrictions on imports and tariffs	⇨ New investment law, development plan and balance budget. ⇨ Abolish multiple exchange rates and peg to US $. ⇨ Adopt an open capital account.	⇨ Dominant role of oil. ⇨ Non-tradable and import substituting industry. ⇨ Dutch Disease. ⇨ Ignore trade liberalization. ⇨ More protective.	⇨ International Debt and Mexico crises. ⇨ Tax and financial reforms. ⇨ Export promoting measure (TRIMs). ⇨ 'Approved' importer system. ⇨ Promoting Use of Domestic Products. ⇨ Ambivalent towards trade liberalization.	⇨ Regionalism of AFTA & APEC. ⇨ Sign GATT-Code (on subsidies & countervailing duties). ⇨ Rationalize tariffs. ⇨ Deregulate shipping & custom unions. ⇨ Duty exempt and duty drawback. ⇨ Removes export licenses and convert QRs with tariffs.	⇨ The Asian Crisis and IMF package. ⇨ Reduce tariff more. ⇨ Abolish export taxes and import restrictions. ⇨ Liberalize domestic market.

The trade liberalization measures adopted by the Indonesian government since independence in 1945 are summarized in Table 2. The measures are classified into six main stages, to reflect the nature of government policies at each stage

Further trade liberalization seems inevitable, given the Indonesian government's commitments to the World Trade Organization, Asia-Pacific Economic Co-operation and Association of South East Asian Nations agreements to liberalize international trade. Moreover, a reduction of tariffs, in conjunction with other liberalization measures, has been part of the policy package of conditional loans to Indonesia by the IMF and World Bank.

Labor markets in Indonesia are also experiencing significant changes. Controls have been a principal feature of labor markets in the manufacturing sector, initially by means of a single, government-controlled union and, from 1989 onwards, by means of the implementation of a minimum wage policy for the manufacturing and clerical sectors. The government's tax and subsidy policy towards agriculture has also contributed towards wage fixing within this sector. Real wages in the manufacturing sector have tended to rise over time, owing to labor unrest in the post-Suharto era, increases in the minimum wage and, more recently, to labor shedding in response to the Asian financial crisis. Wages in the small business, agriculture and informal sectors decreased during the crisis and have generally remained low, as the relatively high minimum wage in the export-oriented manufacturing sector has limited employment in manufacturing, causing surplus labor to move into the other sectors of the economy. Although the share of output provided by the manufacturing sector has increased considerably over the medium term, the share of labor within the agriculture and service sectors of the economy remains high relative to countries such as Korea and Malaysia. This employment structure raises interesting distributional issues for trade reform, the effects of which will be considered within the framework of the CGE model of the Indonesian economy.

4. The Model

The model incorporates all production, trade and consumption in the Indonesian economy, and is calibrated to a social accounting matrix (SAM) for 1993 (Central Bureau of Statistics 1996). Production is aggregated to eighteen sectors or industries, with eighteen commodities corresponding to these industries. Each industry produces only its corresponding product. Table 3 shows the eighteen sectors in the SAM and model, and shows the relative sizes of the sectors, in terms of their gross value added. Industries are characterized by constant returns to scale production technologies and act in a perfectly competitive manner, maximizing profits given existing prices; and freedom of entry and exit ensures no profits are made above capital rental rates.

Output is specified as a fixed coefficient or Leontief function of different intermediate inputs and value added. Value added is a Cobb Douglas function of sixteen different types of labor (four categories, agricultural, production, clerical and professional, each having four components, waged rural, waged urban, non-wage rural and non-wage urban) and seven different types of capital. Table 4 shows each of the labor and capital types, with data for their total GVA earnings. This table also shows the sizes of indirect tax payments in the SAM.

Table 3: The Eighteen Sectors in the Model: Gross Value Added, 1993.

		GVA (Bn Rupiah)	Percent of total GVA
ag-fc	Agriculture-food crops	32,149	9.7
ag-oth	Agriculture-others	29,929	9.1
mining	Mining and quarrying	31,536	9.6
foodpro	Food processing	24,392	7.4
textile	Textile industry	27,734	8.4
constrc	Construction	7,008	2.1
pap-met	Paper and metal products	15,446	4.7
chemic	Chemicals	24,688	7.5
electgw	Electricity, gas and water	3,247	1.0
trades	Trade services	41,628	12.6
restaur	Restaurants	8,557	2.6
hotels	Hotels	2,136	0.6
landtra	Land transports	11,876	3.6
otracom	Other transport and communication	7,958	2.4
bankins	Banking and insurance	14,005	4.2
realest	Real estate	14,043	4.3
ser-pub	Public services	24,626	7.5
ser-prv	Other private services	8,775	2.7

The model contains different labor market formulations that will be used in different simulations. When labor is mobile between sectors and market clearing conditions are invoked the wage rate w_j adjusts to maintain equilibrium:

$$\overline{N}_j = \sum_i L_{i,j} \qquad j = \{agricultural, production, clerical, profesional\} \tag{1}$$

The combination of full mobility of labor and market clearing wages will be termed the 'competitive' case. In a second case, termed 'mobile, minimum real wages', agricultural and professional labor are mobile with market clearing wages while production and clerical labor, of which there are four types each, will have fixed wages, i.e.

$$\overline{N}_j = \sum_i L_{j,i} \qquad j = \{agricultural, profesional\} \tag{2}$$

$$\overline{N_j} \le \sum_i L_{j,i} \qquad j = \{production, clerical\} \tag{3}$$

$$w_j / cpi \ge \overline{w_j} \qquad j = \{production, clerical\} \tag{4}$$

Where labor is sector specific in import competing industries with minimum real wages, mobility and market clearing still takes place in other industries, i.e.

$$\overline{N}_j = \sum_i L_{j,i} \qquad j = \{agricultural, profesional\} \tag{5}$$

Table 4: Factors of Production: Gross Value Added, 1993.

		GVA (Bn Rupiah)	Percent of total GVA
lbagwg-rl	Labor agriculture wages-rural	9,041	2.7
lbagwg-ur	Labor agriculture wages-urban	1,940	0.6
lbagnw-rl	Labor agriculture non-wages-rural	27,891	8.5
lbagnw-ur	Labor agriculture non-wages-urban	1,465	0.4
lbpnwg-rl	Labor production wages-rural	16,638	5.0
lbpnwg-ur	Labor production wages-urban	18,908	5.7
lbpnnw-rl	Labor production non-wages-rural	4,776	1.4
lbpnnw-ur	Labor production non-wages-urban	2,631	0.8
lbclwg-rl	Labor clerical wages-rural	6,554	2.0
lbclwg-ur	Labor clerical wages-urban	27,188	8.2
lbclnw-rl	Labor clerical non-wages-rural	10,245	3.1
lbclnw-ur	Labor clerical non-wages-urban	11,847	3.6
lbplwg-rl	Labor professional wages-rural	3,770	1.1
lbplwg-ur	Labor professional wages-urban	7,439	2.3
lbplnw-rl	Labor professional non-wages-rural	259	0.1
lbplnw-ur	Labor professional non-wages-urban	370	0.1
cp-land-ag	Capital land and other agriculture	16,846	5.1
cp-own-hs	Capital own occupied house	8,953	2.7
cp-oth-rl	Capital others-rural	25,534	7.7
cp-oth-ur	Capital others-urban	27,936	8.5
cp-pdom	Capital private domestic	38,094	11.6
cp-gov	Capital government-owned	3,409	1.0
cp-foreign	Capital foreign-owned	35,685	10.8
	Import tariffs	6,392	1.9
	Other indirect taxation	15,964	4.8
	Total	329,776	100.0

$$\overline{N}_j^N = \sum_{i \in N} L_{j,i} \qquad j = \{production, clerical\} \qquad (6)$$

where N is the set of non-import competing sectors and $\overline{N}_j^N$ is total employment in these industries, which is fixed. In import competing industries,

$$L_{j,i} \le \overline{L_{j,i}} \qquad j = \{production, clerical\} \qquad (7)$$

$$w_{j,i} / cpi \ge \overline{w_{j,i}} \qquad j = \{production, clerical\} \qquad (8)$$

Equations 5 to 8 describe a set of simulations termed ‘sector specific (pn,cl)’ in the results section. A fourth set of simulations will be performed where all labor types are sector specific in import competing industries is termed ‘sector specific (all)’. With this labor market specification, equation 5 is dropped and equations 6 to 8 apply to all labor types.

Intermediate input consumption is 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. The production function also allows for substitution between similar types of labor and capital as well as between labor and capital in general. Thus:

$$INT_i = A\left[\alpha_d \, D_i^{(\sigma_i-1)/\sigma_i} + (1-\alpha_d)\, M_i^{(\sigma_i-1)/\sigma_i}\right]^{\sigma_i/(\sigma_i-1)} \quad (9)$$

where A = scale parameter, α_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 given by σ_i.

The domestic price of each composite commodity (P_i) is a CES function of the domestic prices of imported (PM_i) and domestically produced goods (PD_i):

$$P_i = \left[\alpha_d \, PD_i^{(\sigma_i-1)/\sigma_i} + (1-\alpha_d)\, PM_i^{(\sigma_i-1)/\sigma_i}\right]^{\sigma_i/(\sigma_i-1)} \quad (10)$$

Trade is governed by the small country assumption, implying that the domestic economy is a price taker and there is unlimited supply from the rest of the world (ROW) for imports at the given world price. The domestic price of imports is given by:

$$PM_i = \overline{PW_i^M}(1+tm_i)\overline{ER} \quad (11)$$

where $\overline{PW}_i^M$ is the world price, ER is the exchange rate, *tm* is the tariff rate on imported commodities and the bar sign indicates that the variable is fixed. Export prices are determined in a similar manner:

$$PX_i = \overline{PW}_i^X/(1+te_i)\overline{ER} \quad (12)$$

where *te* is the export subsidy rate.

Table 5 shows exports, imports and import tariff levels by commodity. Two products (paper and metals, and chemicals) clearly dominate the structure of Indonesia's imports, and both these products have a reasonably high tariff applied to them. The largest tariff is applied on textiles (16.0%) but imports of textiles are negligible. Indonesia's exports are dominated by four products at this level of commodity detail: mining and quarrying, textiles, construction and chemicals.

Table 5: Trade Data in the SAM (Bn Rupiah, 1993).

		Exports	Imports	Import Tariff
ag-fc	Agriculture-food crops	172	1,425	3.5
ag-oth	Agriculture-others	1,753	450	7.7
mining	Mining and quarrying	13,252	2,415	1.5
foodpro	Food processing	6,558	2,614	8.4
textile	Textiles	13,628	87	16.0
constrc	Construction	14,667	4,902	4.5
pap-met	Paper and metal products	8,491	34,971	7.1
chemic	Chemicals	18,357	18,873	8.8
electgw	Electricity, gas and water			
trades	Trade services		463	
restaur	Restaurants		651	
hotels	Hotels		1,049	
landtra	Land transports		214	
otracom	Other transport and communication		1,789	
bankins	Banking and insurance		1,736	
realest	Real estate		2,080	
ser-pub	Public services		2,867	0.0
ser-prv	Other private services		1,796	2.1

Household incomes (Y_h) consist of factor incomes (wages and rent payments for capital used domestically and abroad) and transfer incomes from the government $(TGH)_{gh}$, domestic firms $(TFH)_{fh}$, other households $(THH)_{hh}$ and the ROW $(TWH)_{wh}$, given by:

$$Y_h = \begin{bmatrix} \sum_i \sum_k W_k L_{ki} + \sum_i (PN_i X_i - \sum_k W_k L_{ki})_h \\ +(TGH)_{gh} + (TFH)_{fh} + (THH)_{hh} + (\overline{TWH})_{wh}\,\overline{ER} \end{bmatrix} \quad (13)$$

Firms' incomes (Y_f) include payments for capital used in production, transfers from other firms $(TFF)_{ff}$ and transfers from the ROW $(TWF)_{wf}$, set as a residual:

$$Y_f = \left[\sum_i (PN_i X_i - \sum_k W_k L_{ki})_f + (TFF)_{ff} + (TWF)_{wf}\,\overline{ER} \right] \quad (14)$$

Government income (Y_g) is 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 the ROW $(TWG)_{wg}$, set as a residual:

$$Y_g = \begin{bmatrix} \sum_i (PN_i X_i - \sum_k W_k L_{ki})_g + \sum_h t_h Y_h + \sum_f t_f Y_f + \\ +\sum_i td_i X_i^S PD_i + (TWG)_{wg}\,\overline{ER} \end{bmatrix} \quad (15)$$

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

$$E_h = (\sum_i C_{ih}) + (\sum_h t_h Y_h)_g + (THH)_{hh} + S_h \tag{16}$$

Expenditure by firms (E_f) consists of transfers to households, direct tax payments to the government, transfers to other firms (retained profit), transfers to the ROW (TFW) $_{fw}$ and saving:

$$E_f = (TFH)_{fh} + (\sum_f t_f Y_f)_g + (TFF)_{ff} + (TFW)_{fw} + S_f \tag{17}$$

Government expenditure (E_g) consists of consumption of composite commodities, transfers to households $(TGW)_{gh}$, transfers to the government $(TGW)_{gg}$, transfers to the ROW $(TGW)_{gw}$ and saving.:

$$E_g = (\sum_i C_{ig}) + (TGH)_{gh} + (TGG)_{gg} + (TGW)_{gw} + S_g \tag{18}$$

Transfer payments from the ROW to households are set exogenously (shown by a bar sign on the variables in the equations), the 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. Transfer payments consist of foreign loans, grants and other transfers.

Total saving in domestic economy consists of household savings (S_h), firms saving (S_f), government saving (S_g) and capital injections from the ROW (S_w). In equilibrium, total saving equals total investment, which is distributed to each sector based on fixed shares. Aggregate final demand (total final consumption of composite commodities) is given by:

$$C_i = C_{ih} + C_{ig} + I_i \tag{19}$$

where $\mathrm{C_{ij}} = \delta_{ij}(1 - \overline{\mathrm{MPS_j}})\mathrm{Y_j}, \mathrm{j} = \mathrm{h, g}$

For non-agricultural and non-production workers in Indonesia, wages are set in competitive markets and reflect the marginal product of labor:

$$PN_i(\partial X_i / \partial L_{ki}) = W_k \quad with \quad L_i^D = \sum_{i=1}^{n} L_i \quad and \quad L_i^D = \overline{L_i^S} \tag{20}$$

For labor in the agricultural sector and production [manufacturing] workers, wages are fixed and the last part of equation (20) becomes $L_k^D = L_k^S \quad where \quad L_k^S < L_k^{*S}$. 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 W_k is the equilibrium wage.

The balance of payments equilibrium equation is given by:

$$\left[\sum_i \overline{PW}_i M_i + (\overline{TSW})_{sw} + (TGW)_{gw} + (TFW)_{fw} + (RMTW)_{kw}\right] =$$
$$\left[\sum_i PWE_i E_i + (\overline{RMFW})_{wk} + (\overline{TWH})_{wh} + (TWF)_{wf} + (TWG)_{wg}\right] \quad (21)$$

The left hand side of the equation above is the ROW revenue, consisting of imports, capital outflows, transfers from government and firms and capital payments from foreign capital used in domestic production to the ROW (remittances). On the right hand side is the ROW total expenditure, covering exports, capital payments and transfers to domestic households, firms and government. The balance of payments can be fixed or residual, depending on the assumption about the exchange rate. In the fixed exchange rate case, the balance of payments deficit is residual to clear the market, while in the flexible exchange rate case, the deficit is fixed.

Table 6 shows the part of the SAM where factor of production rows intersect with sectors. It therefore shows factor employment by sector, with payments made by sectors in the columns to factors in the rows. For example, the first four rows relate to agricultural labor (waged rural, waged urban, non-waged rural, non-waged urban). These labor types are employed only in the first two sectors (agriculture-food crops and agriculture-other), and the non-waged rural component is clearly larger than the other components of agricultural labor.

Table 7 shows aggregated employment of factors of production for sectors grouped into net importing and other sectors. The net importing sectors can be seen in Table 5 to be: agriculture-food crops, paper and metal products, chemicals, and all service sectors with the exception of the non-traded utilities sector. As Table 7 shows, these net importing sectors are particularly large users of clerical and professional labor and are more intensive users of agricultural labor than other sectors. The other sectors are more intensive users of production labor and capital than the net importing sectors.

Table 8 shows a further analysis of factor payments by industry, with employment of factors (in columns) at the aggregated level given for each industry (row). From this table it be discerned that the more intensive use of production labor by the "other" sectors in Table 7 is largely due to the textile sector, which uses 30% of all production labor in Indonesia. This sector is notably an exporting sector. The more intensive use of clerical labor in import competing sectors can be seen to be due to most of the employment of this type of labor occurring in service sectors. The two import competing sectors that are protected by high tariffs (paper and metals, and chemicals) use relatively small quantities of clerical labor.

Table 9 shows the distribution of factor payments (columns) to households (rows) in the SAM, with factors of production aggregated as in previous tables. In general, higher income households (i.e. groups 7 and 10) receive a higher proportion of their incomes from capital, professional labor and clerical labor than other households, and lower income households (i.e. groups 5 and 8) receive larger proportions of their income from production labor, although these generalizations have their exceptions; for example, the high income rural group (7) receives a higher proportion of its income from production labor than any other group.

Table 6: Factor Payments in the SAM (Bn Rupiah, 1993).

	Ag-fc	ag-oth	mining	foodpro	textile	constrc	pap-met	chemic	electgw	trades	restaur	hotels	landtra	otracom	bankins	realest	ser-pub	ser-prv
lbagwg-rl	4,061	4,981																
lbagwg-ur	894	1,046																
lbagnw-rl	21,878	6,013																
lbagnw-ur	1,114	350																
lbpnwg-rl	24	486	1,685	2,814	5,600	861	563	1,663	70	76	20	1	1,087	167	10	54	375	1,084
lbpnwg-ur	2	78	788	2,025	6,568	962	2,415	1,069	459	246	32	22	1,610	447	84	293	686	1,122
lbpnnw-rl	9	41	84	384	464	586	216	289	4	52	2	0	932	19	1	1	163	1,529
lbpnnw-ur	1	3	9	131	232	335	118	39	9	36	1	0	840	19	1	4	161	695
lbclwg-rl	3	146	80	98	69	13	66	116	33	1,291	443	62	134	98	673	78	2,918	233
lbclwg-ur	1	81	290	254	602	156	748	1,490	210	5,799	1,488	481	331	767	4,311	825	8,731	623
lbclnw-rl	10	10	1	13	2	3	2	1	1	9,626	214	3	9	2	5	4	149	189
lbclnw-ur	1	2	4	11	6	20	5	7	1	10,888	371	11	11	4	10	5	220	271
lbplwg-rl	2	22	66	26	26	21	19	40	33	16	4	5	4	38	28	11	3,246	163
lbplwg-ur	1	25	169	77	321	70	259	332	100	135	12	26	18	181	470	197	4,862	184
lbplnw-rl	1	2	6	8	3	10	2	12	2	4	1	0	3	2	0	1	140	62
lbplnw-ur	0	1	5	8	9	71	11	11	2	16	2	3	9	7	2	6	147	60
cp-land-ag	3,823	13,023																
cp-own-hs																8,953		
cp-oth-rl			1,827	5,722	1,880	237	620	6,476	282	372	2,233	175	1,886	1,846	398	297	487	796
cp-oth-ur			736	2,576	854	186	504	8,381	690	1,696	2,540	663	4,627	1,439	590	620	577	1,258
cp-pdom	5	2,294	36	1,807	9,450	1,917	4,603	971	677	5,405	368	331	41	2,685	4,125	1,876	1,370	131
cp-gov	11	114	593	453	12	84	52	649	26	958		32	21	112	177	15	90	9
cp-foreign	0	806	24,798	1,469	251	921	721	1,670	648	1,242	26	173			2,961			

Table 7: Total Factor payments by net importing and other sectors (Bn Rupiah, 1993).

	Net importing sectors (Bn Rupiah)	Other sectors (Bn Rupiah)	Net importing sectors (%)	Other sectors (%)
Agricultural	27,947	12,390	14.5	10.8
Production	18,277	24,676	9.5	21.5
Clerical	53,730	2,105	27.9	1.8
Professional	10,756	1,082	5.6	0.9
Capital	82,087	74,370	42.6	64.9
Total	192,797	114,623	100.0	100.0

Table 8: Factor payments by Sector in the SAM (Bn Rupiah, 1993).

	Agric-ultural	Produc-tion	Clerical	Profess-ional	Capital	Total	% of exports	% of imports
ag-fc	27,947	35	16	5	3,840	31,843	0.2	1.8
ag-oth	12,390	608	239	49	16,236	29,522	2.3	0.6
mining		2,567	375	246	27,990	31,177	17.2	3.1
foodpro		5,352	375	118	12,028	17,874	8.5	3.3
textile		12,863	679	360	12,448	26,350	17.7	0.1
constrc		2,744	192	171	3,345	6,452	19.1	6.3
pap-met		3,311	821	290	6,500	10,922	11.0	44.6
chemic		3,059	1,615	396	18,147	23,217	23.9	24.1
electgw		542	244	137	2,323	3,247		
trades		409	27,604	171	9,674	37,858		0.6
restaur		55	2,516	19	5,167	7,758		0.8
hotels		23	557	34	1,374	1,989		1.3
landtra		4,469	484	34	6,576	11,563		0.3
otracom		652	871	227	6,082	7,832		2.3
bankins		95	4,999	500	8,250	13,844		2.2
realest		352	912	216	11,760	13,240		2.7
ser-pub		1,385	12,018	8,394	2,524	24,321		3.7
ser-prv		4,431	1,317	470	2,194	8,411		2.3
Total		42,952	55,834	11,837	156,458	307,420	100.0	100.0

Table 9: Factor Endowments in the SAM (Bn Rupiah, 1993).

	Labor types				Capital	Total
	Agric-ultural	Produc-tion	Clerical	Profess-ional		
1. Agricultural employee household	3,830	435	164	14	3,893	8,336
2. Agricultural small farmer household	13,441	4,071	1,789	259	18,609	38,169
3. Agricultural medium farmer household	5,074	947	407	105	4,020	10,554
4. Agricultural large farmer household	9,060	1,866	797	168	3,757	15,649
5. Non-agricultural rural-low income group household	1,454	2,264	2,370	551	3,539	10,178
6. Non-agricultural rural-dependent income group household	105	690	254	65	2,171	3,285
7. Non-agricultural rural-high income group household	6,481	13,392	12,124	3,011	8,772	43,779
8. Non-agricultural urban-low income group household	474	3,509	6,798	532	11,071	22,384
9. Non-agricultural urban-dependent income group household	25	1,451	1,054	76	3,214	5,821
10. Non-agricultural urban-high income group household	392	14,328	30,077	7,057	15,907	67,761
Firms	0	0	0	0	66,020	66,020
Government	0	0	0	0	4,250	4,250
Total	40,337	42,953	55,834	11,838	145,223	

5. Results

The model described above is subjected to a number of simulations under different labor market assumptions and macroeconomic closure conditions. In every simulation reported here the results show the effect of complete removal of all import tariffs on all commodities. The simulations are designed to show the relative magnitude of factors that influence the size of the net gains from trade liberalization.

Table 10 shows the equivalent variation of tariff removal under the different labor market conditions and closures. The different labor markets and macroeconomic closures are as follows.

Four types of labor markets are used, from 'competitive' to 'sector specific (all)' with increasing levels of labor immobility and wage rigidity. In the 'competitive' case for each of the sixteen segmented labor markets, labor can move freely between industries and real wages adjust to clear markets. There are no opportunities for increases or decreases in unemployment overall for any labor category, but individual sectors can change their employment levels at the market clearing real wage. No movement is allowed between labor market categories in this or any other type of labor market.

In the 'mobile, minimum real wages' case the markets for the four types of production labor and four types of clerical labor are changed from the 'competitive' case so that minimum real wages exist in these eight categories of labor. A fall in demand therefore leads to unemployment.

In the 'sector specific (pn,cl)' case the markets for the four types of production labor and four types of clerical labor are further segmented. Employment of these labor types in import-competing sectors is sector-specific with a minimum real wage for each combination of labor type and sector. Full mobility exists within each of the sixteen labor market segments in other sectors, and for agricultural and professional labor in the import competing sectors.

In the 'sector specific (all)' case the markets for all sixteen labor markets are further segmented, with employment in import-competing sectors being sector-specific with a minimum real wage for each combination of labor type and sector. Full mobility exists within each of the sixteen labor market segments in other sectors.

The welfare effect of trade liberalization with these four labor markets is shown in the first row of Table 10. In this row, simulations are conducted with any reduction in government revenues leading to reductions in government consumption, which is included in the EV figures; within these simulations there is therefore considerable change in the composition of consumption, with falls in public consumption and increases in private consumption. With 'competitive' labor markets, tariff removal leads to welfare benefits; with minimum real wages but no immobility of labor, this benefit is reduced slightly. With the two types of sector-specific labor there are large reductions in welfare from trade liberalization.

The second row of Table 10 shows the welfare effects of the same simulation under the same labor market conditions where the government changes income tax to ensure revenue neutrality. Government consumption does not change in these simulations. In the 'competitive' labor markets case, revenue neutrality reduces the welfare benefits of trade liberalization but the benefits are still positive. Under the 'sector specific' labor markets revenue neutrality reduces the magnitude of the welfare loss, although these losses are still

much larger in magnitude than the effects of moving to revenue neutrality with 'competitive' labor markets.

Table 10: Equivalent Variation (Bn Rupiah)

Labor markets / closure	Competitive	Mobile, minimum real wages	Sector specific (pn,cl)	Sector specific (all)
Government consumption	105	102	-1,010	-1,852
Revenue neutral	33	33	-343	-1,004
Domestic distortions removed	-59	-	-	-

Table 11: Employment (Bn Rupiah constant value)

Labor markets / closure	Competitive	Mobile, minimum real wages	Sector specific (pn,cl)	Sector specific (all)
Government consumption	0	-3	-966	-1,772
Revenue neutral	0	0	-266	-864
Domestic distortions removed	0	-	-	-

6. Conclusions

This paper has examined import tariff liberalization in the presence of labor market distortions (real minimum wage restrictions) and mobility restrictions. Theory suggests that in this case there is the possibility of trade liberalization being welfare worsening, but previous empirical work on labor markets and trade liberalization has concentrated more on the presence of market power and unionization. The literature also suggests that the presence of domestic distortions and the need for revenue replacement as reasons why tariff liberalization might be welfare worsening.

The empirical investigation has been through a computable general equilibrium model of Indonesia, with different labor market assumptions. The results have shown that the presence of sector specific wage rigidities has a significant effect on the net gains from tariff liberalization. Revenue neutrality has a small and negative effect on the net gains from tariff liberalization. The presence of domestic distortions has a larger effect on the net gains from tariff liberalization than revenue neutrality, but is much smaller than the effects of sector specific wage rigidities. Minimum real wages have little effect on the net gains from tariff liberalization where labor is mobile between sectors. The magnitude of welfare losses when labor markets are rigid (sector specific) and where reductions in employment in import competing sectors feeds through to increases in unemployment are much greater than these other sources of welfare loss.

Overall, these results provide support for the need for measures to ensure greater labor market flexibility when undertaking trade liberalization. They also imply that where labor market flexibility cannot be achieved trade liberalization may be detrimental to welfare.

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