Short Run Impacts of Tariff Reforms on Regional Employment in Indonesia: A Multiregional Computable General Equilibrium Approach

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ABSTRACT

This research is aimed at analysing impacts of tariff reforms on Regional Imployment in Indonesia by applying Multiregional Computable General Equilibrium. This model consists of 15 sectors and 5 regions. Multiregional I-O Table1990 updating into 1995 was applied. The research results show that all regions experience an increase in numbers employed with the exception of Java because its industries change toward more capital intensive than labor intensive industries. This study also finds that broad trade liberalization (the second policy scenario) has resulted in much higher impacts on employment implying that the degree of impact on total employment is associated with the degree of openness. Moreover, liberalization of Indonesian trade changes the occupational pattern of employment. Employment contracts heavily in the agricultural sectors. In these sectors, both unpaid and paid agricultural workers are disadvantaged from trade liberalization with the exception being in Kalimantan and Sulawesi. Across sectors, skilled and unskilled workers are the winners from tariff reforms both at regional and national levels.

Key words: Short Run. Tariff Reforms, Multiregional CGE

INTRODUCTION

Numerous studies have addressed a wide range of policy issues in Indonesia in recent years. However, little attention has been paid to the role of policy changes from the perspective of regional development or to the response of regional economies to policy changes. Most studies focus on the impact of policy at national level. In fact, changes in policy may have different impacts on different regions because each region has different sources of growth, economic structure and different types of transportation and communication. Furthermore, as liberalization of the Indonesian market resulted in increased and diversification of trade in the region, there is a growing pressure to liberalize more by reducing or removing trade barriers. However, it is not clear how trade liberalization has affected the regional economy. So far, studies on the consequences of trade liberalization in Indonesia have emphasized the national level rather than the regional level. Therefore, in this respect, it is worthwhile to assess the impact of trade liberalization on the regional economy.

Among analysis tools, Computable General Equilibrium (CGE) or Applied General Equilibrium (AGE) models have been used with increasing frequency in assessing the nature of structural adjustment such as trade policy, income distribution, or environmental regulation. These models allow quantitative analyses to be made of the effects of policy changes on sectors, government, geographic regions, the environment, etc. As Shoven and Whalley (1992) noted, these models provide a relevant framework for assessing the implications of policy changes on resources and determination of losses and gains associated with policy that are not obtainable by other empirical macro-econometric models.

The rest of this paper is organized as follows: Section 2 reviews the structural features of Indonesian Regional Economy. This is aimed at examining the Indonesian economic performance focused on regional level. The Multiregional CGE for Indonesia which was developed by following closely to the MONASH-MRF: A Multiregional and Multisectoral Model of the Australian Economy designed by Peter et al. (1996) are presented in Section 3. Section 4 present simulation result and discussion. Finally, Section 5 outlines the main conclusion of the study.

Structural features of Indonesian Regional Economy

When analyzing Indonesia's overall economic performance, some notable economic achievements were also identified also at the regional level. Over the past three decades,

every region in Indonesia to some extent experienced economic growth. The growth of Gross Regional Domestic Products (GRDP) expanded over 5 per cent per annum on average. Data published by BPS showed that Sumatera region seems on average to show the lowest GRDP growth in regional as well national context. On average, the highest growth occurred in the regions of Sulawesi and Java even above the national level, except during the economic crisis. Hill (1991, 1992, 1996, and 1998) noted that the pattern of economic growth has been reasonably even across the country due to the success of the government in distributing the proceeds of the oil windfall and its implementation of macroeconomic policy. With the assistance of the oil windfall and foreign aid, the Indonesian government invested in transport facilities, communications and other physical infrastructure that provided a reduction in regional barriers to commerce.

However, due to the economic crisis regional economic growth was greatly reduced. Java experienced the worst impact of the crisis. Its economy slowed down by 16.2 per cent followed by Sumatera, which contracted by 7.5 per cent in the first year of the crisis. However, the regional economies began to improve slightly in the second year of the crisis. Many believed this economic recovery to be due to a rebound in the agricultural sector (see Nasution 2000).

Even though there was some economic growth in all regions that does not mean it was uniform across the country. Large interregional variation exists in a number of ways.

In terms of its contribution of GRDP to GDP, Java dominated the Indonesian economy. Java contributed well over 50 per cent to total GDP which is more than 10 times Sulawesi and ROI. If oil and gas are excluded from GDP and GRDP, the contribution of Java from non-oil GDP is still the highest, at about 63 per cent, whereas all other regions combined contributed a bit more than one third. Hence, the Indonesian economy is highly concentrated on Java.

When the size of regional populations is taken into account, in terms of per capita GRDP with and without oil and gas, there are also large disparities as pointed out by Kawagoe (1997) and Hill (1996). For example, between 1987 and 2000, the data published by BPS show that the average per capita GRDP for the abundant natural resources region of Kalimantan was around four times the per capita GRDP of Sulawesi and twice the per capita of Java whereas Sumatera showed the second largest per capita GRDP. These disparities become greater if they are calculated at provincial levels. For East Kalimantan, for instance, it was more than 16 times the size of that for West Nusa Tenggara. Furthermore, these proportions remain very significant even after oil and gas revenues have been excluded. During the same period, Kalimantan showed the highest per capita non-oil GRDP when it was twice to that of Sulawesi and ROI, followed by Java and Sumatera.

Even though there has been a trend for the agricultural sector in GRDP to decrease significantly, its contribution to employment is still considerable. From 1982 to 2000, this sector employed well over 50 per cent of the total labor force in most regions except Java. In contrast, the manufacturing sector, which partially replaced the agricultural sector in GRDP in Java, employed only around 17 per cent of total workers in 2000. This sector contributed approximately 8 per cent to employment in the four other regions. Another important sector was "other services". This sector absorbed more than 41 per cent of workers in Java and over 30 per cent in other regions. An interesting finding from this structural change in terms of employment is the increasing role of the agricultural sector in providing employment during the recent economic crisis. This is indicated by a slight increase in employment in this sector in 2000 compared to in 1996 (Hugo 2000). Hugo also noted that there has been movement of workers from urban to rural areas as a result of the crisis.

The Analytical Framework

The Model

Behrman, et al. (1989) and Kusumanto (1989) were among the pioneers in using of CGE models for Indonesia. Since then, a number of CGE models were developed and widely used. By 2001, at least 30 applications of CGE models to Indonesia could be found in the economic literature including PhD dissertations. However, the CGE applications to Indonesia were that CGE models were mostly used to analyze the implication of such policy issues in Indonesia at national level. The application of interregional CGE models in Indonesia has been very limited. As in other countries, the paucity of regional data is likely to restrict this application. The work of Temenggung (1995) followed by that of Wuryanto (1996) and Resosudarmo et al. (1999) are the earliest attempts to apply the CGE approach at the regional level in Indonesia.

Different to many CGE models developed and applied for Indonesia, which mostly used a variant of Scarf's fixed point algorithm to solve the model, the multiregional CGE for Indonesia in this study follows the linearization method developed by Johansen (1960). The theoretical structure of the model used in this study, henceforth called MRS-INDO, is developed by following closely to the MONASH-MRF. The Monash-MRF is the Johansen type or ORANI approach to CGE modeling which is designed for forecasting and policy analysis purposes.

MRS-INDO divides the Indonesian economy into 5 sub-nations (regions), namely, Java, Sumatera, Kalimantan, Sulawesi and Rest of Indonesia (ROI includes Bali and Nusa Tenggara, Maluku and Irian Jaya). There are five types of agent recognized in MRS-INDO: producers, investors, households, governments, and foreigners. In each region, the model identifies 15 industries, where each industry is assumed to produce a single commodity and creates a single type of capital. Inputs in production are composed of intermediate inputs, sourced domestically and imported, two primary inputs, capital and labor and other cost items. There are four types of labor recognized in this model, that is, unpaid agricultural workers, paid agricultural workers, unskilled workers and skilled workers.

Capital creation is made through investment by 15 industries and 15 investment goods. Investors of each region combine input produced domestically and imported goods to form units of capital. No primary inputs are used directly as inputs to capital formation. Furthermore, in each region, there is only one single household type in MRS-INDO. This means MRS-INDO is not suitable to analyze income distribution impact of different policy changes. There are also foreigners who trade with each region. Exports are classified into traditional and non-traditional commodities. The traditional export commodities comprise agricultural sectors: food crops, estate crops, livestock, forestry, and fishery, and mining sector. Others are classified into non-traditional commodities. Finally, government "other" demand comprise government expenditure and change in inventories.

The model's database is primarily based on the Multiregional Input–Output Table of Indonesia in 1990 estimated and constructed by Regional Economic Analysis for Regional Investment Planning Project, National Development Planning Agency (Bappenas). This multiregional input-output Table consists of 25 economic sectors over 27 provinces including East Timor and was constructed only in producer prices. For the purpose of this study, this multiregional input output table is aggregated into 15 industries over five regions and updated into the 1995 prices.

CGE Core

The CGE core is based on ORANI, a single-region model of Australia (Dixon et al. 1997). The difference from the single-region ORANI model is that MRS-INDO includes interregional linkages.

Sectoral Production: demand for intermediate and primary inputs

Production activities are disaggregated into 15 production sectors in each region. Each sector is assumed to produce only one commodity and does not engage in joint production. To produce a commodity or output, firms utilize two broad categories of inputs (intermediate inputs and primary factors), and other costs. Intermediate inputs can be obtained domestically, within regions, and also imported. Meanwhile, two primary factors used to produce outputs are labor, classified into four occupation types, and capital.

By allowing differencing elasticities among the set of factors, the regional production technology for the sectors is encountered by a series of separability assumptions. This production tree consists of two main branches (intermediate inputs and primary factors) and three levels of production structure. At the highest level, firms combine composite intermediate inputs, composite primary factors, and other costs according to a Leontief production technology so that the demand for the composite inputs is proportional to output. The second level involves substitution between domestically produced and imported intermediate inputs, on one side, and substitution between labor and capital, on the other side. Composite intermediate inputs are subject to a Constant Elasticity of Substitution (CES), also knows as the Armington assumption (Armington 1969, 1970). As well as composite intermediate inputs, primary input bundles are subject to a CES production function. At the lowest level, the bundles of domestically produced intermediate input are formed as a combination of inputs from the different regions and subject to the Armington assumption. Meanwhile, demand for labor is derived from four different occupations and uses the CES production technology.

Demands for Investment Goods

Capital creators for each regional sector combine inputs to form units of capital. Given a level of investment expenditure, industry chooses inputs to minimize the costs of capital creation. Following assumptions stated by Peter et al. (1996), capital is assumed to be manufactured with inputs of domestically produced and imported commodity. It is also assumed that no primary factors are used directly as inputs to capital formation. The primary factors are merely used through inputs of the construction commodities.

The input-demand functions to create fixed capital are assumed to follow a nesting structure. This nesting structure of investment demand is similar to a nesting pattern of intermediate input demands, except there is no primary input branch to capital formation. Similar to the nesting pattern of intermediate input demand, demand for investment goods also involves three-levels of separability assumptions on the production technology. This means that the investment-good demand equations are also derived from the solutions to the investor's three-part cost minimization problems.

Household Demands

The structure of household consumption follows a nesting pattern to allow different elasticities of substitution. In this nest, each regional household determines the optimal composition of its consumption bundle based on a nested CES and Stone-Geary utility function. A Keynesian consumption function determines regional household expenditure as a function of household disposable income. At the bottom level of the nest, a CES utility function is used to allow substitution across different domestic sources of supply. A similar functional form is also applied for the subsequent upper level of household demand structure, that is, the demand for domestic composite good and imported goods. Then, in the highest level, the household determines its consumption based on a Stone-Geary utility function leading to a Linear Expenditure System (LES).

Foreign Export Demand

In modeling an export demand, commodities for export divide into two categories: *traditional exports* (6 sectors: food crops, estate crops, livestock, forestry, fisheries, and mining), which comprise the bulk of export and the remaining, *non-traditional exports* (fobetob, textile, woodconst, papermet, chem_basmet, electric, tradehotrest, transcomm and finance). For most traditional export commodities, the exports account for large shares in total output but only small shares in total output for non-traditional export commodities.

Government Demand for Current Consumption

In modeling the government demand for current consumption, according to Naqvi and Peter (1996), there is no explicit theory in determining governments' consumption expenditures. Three ways that usually used for determining governments' expenditure for current consumption are: (i) endogenously, by the rule as moving government expenditures with household consumption expenditure or domestic absorptions; (ii) endogenously, as a policy instrument which varies in order to accommodate an exogenously determined policy target such as a required level of foreign debt; and (iii) exogenously. For this study, the regional government expenditures are set endogenously as a constant proportion of regional private consumption.

Price System

Since the 1990's Multiregional I-O Table for Indonesia was constructed only in the producer's prices and there is no demand for a margins module in this model, as typical of ORANI-style models. Following Peter et al. (1996), the price system underlying this model are based on two initial assumptions: (i) there are no pure profits in the production or distribution of commodities, and (ii) that the prices received by the producer are uniform across all customers. Zero-pure-profit condition in the production means that the unit prices (revenue) received by producers of commodities is fixed to equal to unit costs in the industry. This condition also applies to the capital formation and importing activities. Meanwhile, the zero-pure profit condition in the distribution indicates that the price paid by the users is set to equal to the producers' price plus commodity taxes.

Market Clearing Equations

Market clearing equations are derived to ensure that demand equals domestically produced and imported commodities respectively. This mean that output of regionally produced commodities must equal direct demands by the users. Domestically produced commodities are the sum over industry output while total demand is made of demand for inputs to current production and the

capital creation, demands for consumption goods and exports, and regional government demands for current consumption.

Indirect Taxes

The indirect tax equation for each user (producers, investors, households, exports and regional government) is based on the specification of indirect taxes module proposed in the Monash-MRF. Sales taxes are treated as *ad valorem* on the basic value with the sales-tax variables being the ordinary change in the percentage tax rate, that is, the percentage-point change in the tax rate. In this module, each equation allows the changes in the relevant tax rates to be commodity-specific, sources-specific and destination-specific.

Regional Incomes and Expenditure

The nominal regional gross products from the income side consist of total factor payments, other costs and commodity tax components. The components of regional total factor payments include payments for labor and capital. Meanwhile, components of commodity taxes comprise indirect taxes levied on the commodity flows to producers, investors, households, foreign purchasers and regional governments and tariff revenue on imports. From the expenditure side, the components of regional gross products include the aggregate expenditure by households, investors, regional governments, and trade balance.

Government Finance Module

The government finance block of equations encompasses equations determining the budget deficit for regional governments, aggregate regional household consumption and gross regional products for each region. In this block of equations, the government finance module is presented in five groups: value-added disaggaregation; gross regional products; household income; miscellaneous equations; and summary of financial transactions.

Closing and Testing the Model

The model above has more variables than equations. To close the model, a number of variable have to be exogenous and the endogenous variables must equal to the number of equations. For a big and complex model such as MRS-INDO, it may be difficult to specify a sensible closure. To overcome this problem, a condensation approach is introduced to reduce the model dimension.

Condensation is a process of reducing the number of rows and or columns in the Johansen model. In this approach, some variables may be omitted and or substituted. With omission, the components of a linear variable are excluded from the system. In this case, the variables being omitted are not to be perturbed in policy simulation. This procedure reduces the number of columns but does not change the number of rows. The variables being omitted are often the multi-dimension technological changes. In the substitution procedure, however, the number of rows as well as columns is reduced from the system. The candidates for substitution are endogenous variables and are of less importance in the analysis and simulation.

After coping with the dimension of the model, specifying a feasible closure is less complex than before since the size of model has been reduced. In specifying variables into exogenous or endogenous variables, it is very flexible depending on the macroeconomic environment as well as the type of simulation carried out. However, general rules in determining a feasible closure should be followed. Firstly, it is essential that at least one monetary variable should be declared exogenous; otherwise, the simulations will breakdown since there is no way of determining the absolute price level. Secondly, if the price variable is exogenous, the corresponding quantity should be declared as endogenous, or *vice versa*. For instance, if the tariff is set as exogenous then imports should be endogenous. Then, if sales taxes are specified as endogenous, consumption should be exogenous and so on.

There are two standard closures available for alternative time frames of analysis in a single-period simulation, that is, short run and long run. Those closures differ in assumptions about capital stock mobility. In the short run closure, capital stocks are held fixed while in the long run policy changes affect capital stocks. Other assumptions are also introduced along with the assumption of capital mobility whether inter-industry or inter-regional. In the short run, beside the inter-industry and inter-regional immobility of capital stock, it is assumed that regional population, labor supply, regional wage differentials and national real wage are fixed.

To check for computational errors, a test simulation for which the correct results are known *a priori* from the structure of the model is conducted. This test is known as a homogeneity test. It is intended to ensure money illusion does not exist in the model. Under this test, all exogenous variables are held fixed at zero except for the exchange rate that is shocked by one percent. Since the model is homogenous, it is expected that all nominal variables increase by one percent, and all quantity variables remain unchanged.

SIMULATION RESULTS

Policy Scenarios

The Indonesian government, as many other countries, has a wide range of policies for restricting international trade and protecting domestic industries. These policies include subsidies, import tariffs, export taxes, local content schemes, among others. In this study, experiments on liberalizing Indonesian trade refer to the effects of tariff reduction on the regional economy as well as on the national economy. The research does not consider non-tariff barriers.

To represent trade liberalization in Indonesia, two scenarios of tariff reduction are proposed. In the first policy scenario, the MRS-INDO is used to calculate regional and national economic impacts resulting from a 25 per cent tariff reduction on the manufacturing sectors. In this experiment, the manufacturing sectors include the Food, Beverage, and Tobacco (fobetob) sector; Textile (textile) sector; Wood and Construction (woodconst) sector; Paper, Metal, and Other Manufacturing (papermet) sector; and the Chemical, Non-metal, Basic Metal (chem_basmet) sector. In the second policy scenario, the effects of a 25 per cent tariff reduction across the board on regional economies and national economies are quantified.

In any analysis of the effects of policies it is essential to capture the short and long term effects particularly for the purpose of drawing policy conclusions. The differences between the short and long run are reflected in the assumptions underlying the treatment of investments (or capital) and the choice of exogenous variables. In the short run, it is assumed that capital is immobile both in terms of inter-industry and inter-regional effects. The short run closure also includes fixed regional population and labor supply, fixed regional wage differentials and fixed national real wages. There are three reasons underlying these latter assumptions. Firstly, changes in demand for labor are met by the changes in the unemployment rate rather than by changes in real wages. Secondly, inter-regional immobility of labor in the short run implies that migration is not a short-term decision. Finally, nominal wage differentials are constant reflecting a geographical segmentation of the workforce. In addition to these assumptions, investment plays only a demand-side role. It is assumed not to augment the capital stock available for use in the short run. No technical change variable is used in any equation in the model and hence, technology variables are exogenous. Finally, the income tax rate is also exogenous allowing the model's Keynesian consumption function to determine aggregate consumption. Therefore, trade balance is determined as the residual in the GDP identity.

Effects of a 25 Per Cent Tariff Reduction on Manufacturing Sectors

The implementation of trade liberalization policy through a 25 per cent tariff cut in the manufacturing sectors also generates positive effects on employment. Given the nature of the short run closure, producers only respond to exogenous shocks through changes in the employment level. Looking at sectoral employment, with a few exceptions in Sumatera and Java, all regional producers respond positively to the first policy scenario (see Table 2). The percentage change in employment varies across regions and sectors from - 1.11 per cent (electric sector in Sumatera) to 2.71 per cent (textile sector in Sulawesi).

In these sector categories, Java and Sulawesi are the main beneficiaries in terms of employment absorption. However, agricultural labor in the regions of Sumatera and Java move away to other sectors with only food crop and estate crop sectors experiencing slight increases in employment. The forestry sector seems to be the main loser from trade liberalization in the manufacturing sectors. This is understandable since the output effects in these sectors are also negative. These findings are in line with how employment and output is modeled in MRS-INDO where sectoral employment and output level contract or expand correspondingly.

Table 2 Short run: Sectoral Employment Effects of a 25% Manufacturing Sector's Tariff Reduction

Sectors	REGION					
	Sumatera	**Java**	**Kalimantan**	**Sulawesi**	**ROI**	**Indonesia**
Food crop	0.16	0.12	0.13	0.19	0.14	0.13
Estate	0.44	0.16	0.62	0.51	0.53	0.35
Livestock	-0.04	-0.23	0.11	0.10	0.00	-0.12
Forestry	0.00	-0.13	-0.19	0.18	0.15	-0.08
Fishery	0.09	-0.09	0.01	0.05	0.04	0.02
Mining	0.47	0.03	0.47	0.67	0.61	0.43
Food beverage & tobacco	0.51	0.52	0.49	0.47	0.40	0.52
Textile	1.91	3.35	0.84	0.84	1.59	3.23
Wood & construction	0.88	0.57	0.67	0.70	1.04	0.66
Paper & metal	0.33	2.41	-0.24	0.22	0.18	2.24
Chemical & basic metal	1.88	1.19	0.98	1.31	0.42	1.38
Electricity	-0.36	0.59	-0.14	0.36	0.53	0.43
Trade, hotel & restorant	0.38	0.65	0.28	0.52	0.76	0.57
Transportation & communication	0.07	0.50	0.06	0.20	0.25	0.34
Finance	0.37	0.69	0.29	0.47	0.52	0.60

Source: Simulation Results
Note: All results are presented in the percentage changes.

Table 3 Short Run Effect of a 25 % Manufacturing Sector's Tariff Reduction on Regional Employment

Variable	Regional Gain or Loss					Indonesia
	Sumatera	**Java**	**Kalimantan**	**Sulawesi**	**ROI**	
1. Employment (total)	0.5150	0.4214	0.5256	0.5945	0.5630	0.4669
2. Employment by Occupation						
a. Paid Agricultural	0.1478	0.0221	0.5282	0.4264	0.3825	0.2048
b. Unpaid Agricultural	0.1332	0.0309	0.4511	0.3643	0.2914	0.1573
c. Unskilled	0.5478	0.7128	0.4931	0.6056	0.5541	0.6305
d. Skilled	0.7178	0.4263	0.5665	0.7733	0.7407	0.5400
3. Unemployment Rate	-0.5009	-0.4071	-0.5112	-0.5694	-0.5516	-0.4521

Source: Simulation Results

The 25 per cent tariff reduction in the manufacturing sectors also generates new employment at regional and national level. AS discussed above, tariff reductions create an expansion in sectoral employment except for a few agricultural sectors in Sumatera and Java. These beneficial effects are also reflected in total employment at the regional level. Total employment in all regions increases by similar rates. In Sumatera and Java where percentage changes in livestock, forest and fishery employment are negative, total employment generated from trade liberalization in the manufacturing sectors is more than 0.42 per cent. For Kalimantan, Sulawesi and ROI, total employment improves by more than 0.53 per cent. From Table 3, it is clear that increasing total employment in every region is attributed to rapid expansion of unskilled and skilled workers that are predominantly employed in the manufacturing sectors. Regional differences in the percentage change in total employment are likely to results from differences in the changes in activity level and employment by occupation.

As having explained, the level of employment in the short run is more stimulated by the changes in unemployment rates than by changes in real wages. This proposition is confirmed by the simulation results where the unemployment rates decreased across both regions and country. At regional and national level, the unemployment rate declined almost at similar rates

with the changes in total employment. Regionally, the unemployment rate decreases approximately 0.50 per cent, while at national level it fell around 0.45 per cent.

Impacts of a 25 per cent Across the Board Tariff reduction

The 25 per cent tariff reduction across the board also changes regional employment. Generally, as discussed in the short run results for the first policy scenario, changes in industrial employment across regions correspond to changes in sectoral outputs. For instance, when foodcr sector's output contracts due to the tariff reduction, employment absorption in this sector also declines. Once more, at the regional level, only Sumatera and Java have mixed results in industrial employment. In these regions, the average rate of sectoral employment growth is 0.36 per cent and 0.48 per cent respectively with other regions growing at 0.64 per cent (Kalimantan), 0.87 per cent (Sulawesi) and 0.66 per cent (ROI). At country level, the uniform tariff cut positively affects total employment by industry with an average growth of 0.61 per cent (Table 4).

Table 4 Short Run: Effect of a 25 % Across the Boards Tariff Reduction on Regional and National Employment

Variable	Regional Gain or Loss					Indonesia
	Sumatera	Java	Kalimantan	Sulawesi	ROI	
1. Employment (Total)	0.5576	0.4352	0.5430	0.6122	0.5806	0.4871
2. Employment by Occupation						
a. Paid Agricultural	0.1691	0.0043	0.5526	0.4276	0.3777	0.2047
b. Unpaid Agricultural	0.1360	-0.0041	0.4616	0.3546	0.2572	0.1374
c. Unskilled	0.6104	0.7442	0.5102	0.6348	0.5856	0.6650
d. Skilled	0.7686	0.4491	0.5850	0.8063	0.7769	0.5686
3. Unemployment Rate	-0.5424	-0.4204	-0.5281	-0.5863	-0.5689	-0.4716

Source: Simulation Results.

Across industries, the textile sector attracts more labor than other sectors. This is because as an exportable good, textiles sector demand more primary and intermediate inputs resulting in resources constraints as these are attracted from other sectors. Because MRS-INDO is not a full employment model, some of these resources are drawn from the pool of unemployed (Table 5), dampening the intensity of the resource pull conflict. Other inputs are attracted to the expanding sector which in turn feed back into cost of production and supply responses. The overall effects of an across the board tariff reduction is, then, a shift resources out of importable sectors (such as food crops) and into exportable sectors (such as textiles).

The impacts of the tariff reductions on total employment under the two policy scenarios show that trade liberalization brings about changes in total regional employment. With the exception of Java, all regions experience increases in numbers employed. This finding is not surprising as tariff reduction induced growth in outputs. Thomas et al (1991) argued that the effects of trade policy reforms on employment are through changes in relative incentives. That is, trade reforms improve profitability of exportable production and reduce incentives for import substitution and, in most cases, for production of nontradables. Because labor intensity differs among the industries, therefore, trade liberalization is unlikely to be neutral with respect to employment.

Furthermore, broad trade liberalization (the second policy scenario) has resulted in much higher impacts on employment compared with the other two policy scenarios. In other words, the degree of impact on total employment is associated with the degree of openness as represented by the level of tariff reduction. A reason for this is that the higher level of openness has resulted in rapid expansion in outputs which then increase numbers employed with the exception of Java. The main explanation for the fall in employment in Java, even though this region has the highest impacts on sectoral outputs, is increased capital intensity. This is indicated by the highest increase in capital usage among the regions in all policy scenarios.

Table 5 Short run: Sectoral Employment Effects of a 25 % Across the Boards Tariff Reduction

Sectors	REGION					
	Sumatera	**Java**	**Kalimantan**	**Sulawesi**	**ROI**	**Indonesia**
Food crop	0.14	0.11	0.07	0.16	0.11	0.12
Estate	0.74	0.47	0.77	0.81	0.81	0.65
Livestock	0.28	0.15	0.25	0.54	0.35	0.24
Forestry	0.38	0.03	0.11	0.91	0.54	0.24
Fishery	0.24	0.09	0.11	0.22	0.21	0.17
Mining	0.58	0.18	0.58	0.82	0.74	0.56
Food beverage & tobacco	0.09	0.34	-0.07	0.22	0.67	0.30
Textile	2.16	3.65	0.90	1.06	1.87	3.52
Wood & construction	0.98	0.70	0.79	0.79	1.19	0.78
Paper & metal	0.46	2.52	-0.15	0.38	0.34	2.35
Chemical & basic metal	2.11	1.41	1.15	1.59	0.60	1.60
Electricity	-0.23	0.76	-0.37	0.48	0.67	0.58
Trade, hotel & restorant	0.57	0.86	0.36	0.77	0.99	0.77
Transportation & communication	0.25	0.70	0.12	0.38	0.45	0.52
Finance	0.57	0.89	0.40	0.70	0.74	0.80

Source: Simulation Results.

The occupational pattern of the employment indicates that generally contraction is most heavy in the agricultural sectors both at national and the regional levels. In these sectors, both unpaid and paid agricultural workers are disadvantaged by trade liberalization except in Kalimantan and Sulawesi. Investment expansion in the agricultural sectors in Kalimantan and Sulawesi, as indicated by high capital creation in these sectors compared to the manufacturing and service sectors, leads to expansion of agricultural employment. In addition, even though Sumatera, Java and ROI experience an increase in agricultural output, this growth is mainly attributable to capital usage rather than employment. In other words, expansion of the agricultural sectors in these regions reflected increased capital intensity.

Drabek and Laird (2001) stated that efficiency gains from trade policy reform originate in the efficiencies generated by reallocation of resources towards sectors in which countries or regions exhibit comparative advantages. Using this analogy, once Indonesian trade is liberalised, efficiencies will be gained through reallocation of abundant resources (labor in this case) towards regions or sectors which have comparative advantages. These efficiency benefits come from inter-sectoral and or inter-regional shifts through increased production. This is evident from the regional occupation pattern where every region has different responses in numbers employed. Take the agricultural sectors for example. Investment in these sectors is likely to be more profitable if it is allocated outside of Sumatera and Java. In other words, Kalimantan and Sulawesi show evidence of comparative advantages in the agricultural sectors on the basis of employment.

Conclusion and Policy Implication

Trade liberalization brings about changes in total regional employment. All regions experience an increase in numbers employed with the exception of Java because its industries change toward more capital intensive than labor intensive industries. This study also finds that broad trade liberalization has resulted in much higher impacts on employment implying that the degree of impact on total employment is associated with the degree of openness. Moreover, liberalization of Indonesian trade changes the occupational pattern of employment. Employment contracts heavily in the agricultural sectors. In these sectors, both unpaid and paid agricultural workers are disadvantaged from trade liberalization with the exception being in Kalimantan and Sulawesi. Across sectors, skilled and unskilled workers are the winners from tariff reforms both at regional and national levels.

The main problem faced by Indonesia is the unequal distribution of population. Most of the Indonesian population is concentrated in Java (almost 60 per cent) implying that the

availability of labor is high in Java. Within national context, this abundance of labor is a comparative advantage however in the regional development context this becomes a problem because the regions beyond Java face a problem of labor availability. Although trade liberalization will promote labor migrations out of Java, policies designed to stimulate an increase in labor mobility are necessary. This study also shows that the interaction of market forces in Indonesian economy benefits more developed regions, that is, Sumatera and Java. In many circumstances, many incoming investments in Indonesia are located in the densely populated regions such as Java and this, to some degree, causes the exodus of highly qualified workers to Java. Therefore, the public authorities need to design policies to induce labor and capital to locate to other regions. One policy is to provide subsidies to cover the financial costs of migration. This reflects the geography of Indonesia where potential migrants often face a problem from the high cost of migration. Lack of financial resources may prevent workers from Java moving to other regions. Other policies that may help stimulate labor mobility are improving flows of information and housing help for potential migrants.

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Appendices

Table 1 Percentage of Regional and Sectoral Employment Absorption in Selected Years

Region	Sector						
	Agriculture	Mining & Quarrying	Manufacturing	Elect, Gas, & Water	Construction	Other	Total
Sumatera							
1982	67.18	0.80	5.98	0.12	2.76	23.17	100.00
1991	68.08	0.75	4.43	0.16	2.26	24.30	100.00
1996	56.48	0.83	7.39	0.15	3.20	31.95	100.00
2000	58.17	a)	6.84	a)	3.17	31.82	100.00
Java							
1982	48.42	0.63	12.17	0.11	4.13	34.54	100.00
1991	45.65	0.70	13.40	0.23	3.82	36.21	100.00
1996	35.48	0.94	15.63	0.21	5.18	42.56	100.00
2000	37.73	a)	16.51	a)	4.25	41.50	100.00
Kalimantan							
1982	65.64	0.99	8.76	0.07	3.30	21.24	100.00
1991	64.27	1.68	7.17	0.14	2.01	24.73	100.00
1996	55.84	1.63	9.11	0.17	3.28	29.97	100.00
2000	51.86	a)	8.06	a)	3.18	36.91	100.00
Sulawesi							
1982	60.81	0.36	9.30	0.08	2.98	26.48	100.00
1991	67.70	0.48	5.01	0.10	1.58	25.14	100.00
1996	57.18	0.35	6.69	0.19	4.06	31.53	100.00
2000	58.39	a)	6.41	a)	3.30	31.91	100.00
Rest of Indonesia							
1982	67.36	0.82	7.73	0.06	3.23	20.80	100.00
1991	65.27	0.62	8.17	0.12	2.63	23.19	100.00
1996	62.28	0.66	8.75	0.14	2.58	25.59	100.00
2000	55.61	a)	10.02	a)	3.99	30.38	100.00
Indonesia							
1982	54.66	0.68	10.42	0.11	3.71	30.43	100.00
1991	53.92	0.74	10.40	0.20	3.19	31.56	100.00
1996	44.01	0.90	12.58	0.19	4.43	37.89	100.00
2000	45.28	a)	12.96	a)	3.89	37.87	100.00

Sources: BPS (various years, a) and Author's calculation
Note : a) included in Other Sector.