The Impact of AFTA on Wage, Employment, and Income Distribution in Thailand: A Computable General Equilibrium Model

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ABSTRACT

This paper adopts the Computable General Equilibrium (CGE) technique to analyze the impacts of tariff reduction under AFTA's scheme concerning wage earning and employment outcomes in Thailand. In aggregate terms, Thai laborers are expected to gain from the full implementation of AFTA. By sectoral differential, the impacts of AFTA on wage and employment outcomes of Thai workers are varied, depending on production intensity, rate of substitution between inputs, and linkages.

Keywords: ASEAN Free Trade Area, Wage and Employment, Thailand

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ผลกระทบของการลดภาษีภายใต้กรอบการค้าเสรีอาเซียน
ต่อค่าจ้าง การจ้างงาน และการกระจายรายได้ในประเทศไทย
: แบบจำลองดุลยภาพทั่วไป

พิริยะ ผลพิรุฬห์

บทคัดย่อ

งานศึกษานี้ใช้เครื่องมือแบบจำลองดุลยภาพทั่วไป (Computable General Equilibrium) ในการวิเคราะห์ผลกระทบของการลดภาษีภายใต้กรอบการค้าเสรีอาเซียน (AFTA) ต่อค่าจ้าง การจ้างงาน และการกระจายรายได้ในประเทศไทย โดยพบว่า ถึงแม้แรงงานไทยจะได้รับประโยชน์จากเปิดการค้าเสรีอาเซียนก็ตาม แต่ผลที่ได้กลับแตกต่างในแต่ละสาขาการผลิตโดยขึ้นอยู่กับ ความเข้มข้นของการผลิต การทดแทนกันของปัจจัยการผลิต และการเชื่อมโยงในแต่ละสาขาการผลิตเป็นสำคัญ

คำสำคัญ : *การค้าเสรีอาเซียน ค่าจ้างและการจ้างงาน ประเทศไทย*

INTRODUCTION

In the last few decades, most developing countries have been living in a world characterized by the conjugation of three factors; namely, globalization, rapid technical change, and intense competition. This analysis of the current economic situation starts with globalization, and then considers technical changes and competitiveness as results of the decisions of policy-makers. Globalization has given rise to concerns about its impacts and about the effects of mobility of capital on inequality, in particular about how globalization affects both capital and labor. Workers are concerned about their incomes and job security. In other words, given the consequences of globalization, how much bargaining power does labor have? Workers are greatly exposed to the uncertainties that may come with globalization and are particularly fearful of immiserisation and the possibility of unemployment. The main difference between the present world of globalization and earlier times is that, before, both labor and capital were equally mobile, while now, financial capital is more mobile while labor is remarkably less mobile[1]. Diwan (2001, 2002) argues that there are two implications of globalization affecting capital and labor. First, the burden sharing of negative shocks between labor and capital is most likely unequal, and labor ends up bearing a larger burden. On the other hand, if globalization benefits certain sectors, labor benefits less in comparison. Second, in a world of greater mobility of both financial and physical capital, labor for each country will have to compete harder to attract capital, leading to lower wages.[2] At present, the existing degree of globalization is driven more by the opening of trade and investment of the respective country. Detailed studies of trade liberalization are needed to investigate those implications linked to production factors in the market.

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[1] Physical capital is also much less mobile and cannot credibly threaten to flee abroad easily. Thus, when we speak of the mobility of capital we mean mobility of financial capital, while international movement of physical capital would come in the role of foreign direct investment or investment in the real sectors.

[2] However, this argument has been given less credence since a number of studies explain the behavior of capital inflow as mainly caused by productivity and economic performance of the countries involved.

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Trade globalization or trade openness created by trade liberalization has brought both benefits and costs to the Thai economy, both changes and responsive reactions, and both wider choices and social tensions. Positive net gain from trade on overall welfare is possible, but it may not be realized unless domestic structural adjustment takes place. As an abundant labor force, Thai labor should gain from higher demand for labor-intensive products due to greater trade liberalization. However, this impact of higher demand on income distribution is a cause of concern. To start thinking about the impacts of trade on labor, the following theoretical approaches in trade can be used: (i) the Heckscher-Ohlin Theorem (H-O)[3], (ii) the Stoper-Samuelson Theory (S-S)[4], and (iii) the Rybczynsky Theory.[5]

However, for a number of reasons the relationship between trade liberalization and its implications for labor in Thailand cannot be explained by using theoretical predictions alone. First of all, Thailand has gone through structural adjustments, including the adoption of unprecedented economic reforms involving trade liberalization, privatization of state-owned enterprises, and deregulation of the financial and capital markets, all of which have caused fast

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[3] The H-O theorem states that for a country that has a comparative advantage in the production of goods that involve intensive but abundant labor, a relatively cheaper price should result. Thus, countries in which labor supply is relatively abundant, especially those developing countries including Thailand, should specialize in the production of labor intensive goods, and vice-versa for countries whose capital supply, or capital stock, is relatively large (e.g., developed countries).

[4] The S-S theorem was the first theoretical formulation to explain the effects of free trade on income distribution among production factors. The basic result according to the S-S theorem is that protectionism increases the returns to a scarce production factor, such as labor in developed countries and capital in developing countries. On the contrary, trade liberalization should increase labor wages in developing countries and improve income inequality where labor is abundant. The opposite is expected to result in developed countries due to capital abundance. In the case that a country faces a policy of trade liberalization, inverse results would be observed. The return to capital falls by a larger proportion than the price reduction of the imported good, at the same time that the return to labor increases, since the country specializes in the production of good A.

[5] The Rybczynski Theory claims that, with the production of labor-intensive goods, the growth of labor employment should increase, thus creating more labor intensive outputs. Therefore, given this theoretical prediction, Thailand becoming involved in trade liberalization and labor movement should produce more labor-intensive goods.

and deep changes in the Thai economy. Secondly, what the country did in the past was launch a policy of promoting import substitution, which was followed beginning in the 1960s and determined how resources were used. Consequently, the remuneration of productive factors and the rate of investment have been influenced directly by the orientation of industrial and trade policies. Moreover, the allocation of resources is sensitive to the structure of protectionist measures. As a result, the allocation of labor, including the return on wages, may differ. Thirdly, because Thailand, as well as many other developing countries, has received large amounts of foreign direct investment (FDI), it tends to rely on foreign technologies by importing them from developed countries rather than creating its own technologies.

Nonetheless, how trade liberalization affects different production sectors depends on a number of factors, for example intensity of production, input requirement state of the art of technology, and structural changes within the industries. However, a number of studies that have analyzed the impacts of trade liberalization on labor markets, such as job creation or job loss have analyzed these phenomena in aggregate terms. Therefore, a job is a position filled by a worker, without distinguishing among part-time, full-time, or overtime employment, all of which count equally as a single job. In addition, desegregated studies of trade liberalization's effect on wages, skill premiums, unemployment, job security, and gender inequality have, however, received more consideration. Pholphirul (2007) explains the conceptual linkages of trade liberalization, such as AFTA and other liberalizations, with various labor market outcomes in Thailand by examining the general issues of wage earnings and share of employment and proceeds to cover labor standards and protections, the flow of labor through migration, human development, gender issues, and unionization.[6]

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[6] Tripartite interviews were also conducted with employers, employees, and government officials to obtain more information on the linkages. In the conclusion, various policy implications of trade liberalization regarding labor issues in Thailand are discussed.

However, there are few weak points in adopting a simple econometrics model in this research. First, there is a lack of sector-wise disaggregated data on time series data in Thailand, such as gender disaggregation, skilled and unskilled workers, and quality of life. Second, the impact of trade liberalization should be calculated for the specific period for which it is implemented. Labor demand, including the composition of the labor market by sector, can change during the period in which data are obtained. Third, estimation of labor demand elasticity follows the Ceteris Paribus condition by directly observing only the impacts between output and labor. The degree of substitution among labor, capital, and other production inputs is, however, treated as a constant.[7]

A MODEL ASSESSMENT

This section adopts a quantitative assessment by implementing the Computable General Equilibrium (CGE) model to investigate the impact of AFTA directly on macroeconomic foundations and various sectors in Thailand.[8] Regarding the definitions of the model, each sector of production uses intermediate inputs, factors of production, and pays indirect taxes. Intermediate inputs in each sector of production were treated as they would be in a Leontief-type model, so that the input-output table had fixed coefficients in quantities, i.e., the quantity of commodity j needed to produce one unit of commodity i was assumed to be fixed. The intermediate inputs are modeled as composites of domestic and imported commodities to allow for substitution between the two as price changes. The domestic and imported

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[7] In fact, the degree of production substitution between labor and other employed factors should be taken into account since labor demand elasticity should be rather varied not only in terms of output, but also in terms of relative wage compared to the return of other production factors.

[8] The TDRI's General Equilibrium Model (TDRI's CGE) is based on a Social Accounting Matrix (SAM) of the Thai's economy. The key feature of the SAM is that all accounts must balance. In terms of commodity flows and factor use, this is equivalent to the requirement that demand equals supply for all sectors. Thus, the picture of the SAM can be regarded as an equilibrium situation of the economy.

intermediate commodities are combined into a composite based on a constant elasticity of substitution. The intermediate inputs were also combined with value added in fixed proportions. This allows different elasticity of substitution for different combinations of factors of production, between capital and labor. In any event, factors of production are substitutable, a quality that is derived from the factor demand equation given a constant elasticity of substitution (CES) production functions. If capital becomes more expensive, then some labor could be substituted for capital according to the value of the elasticity of substitution. Within the model, the degree of elasticity of substitution varies among agriculture and non-agriculture sectors. Generally, the degree of substitution between of capital and labor as in factor demand function is set higher in agriculture due to the assumption of labor intensity in production.

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Production of a Particular Commodity

Composite Intermediate Inputs

Fixed Coefficients

Composite Value Added

CES Production Function

Labor   Capital
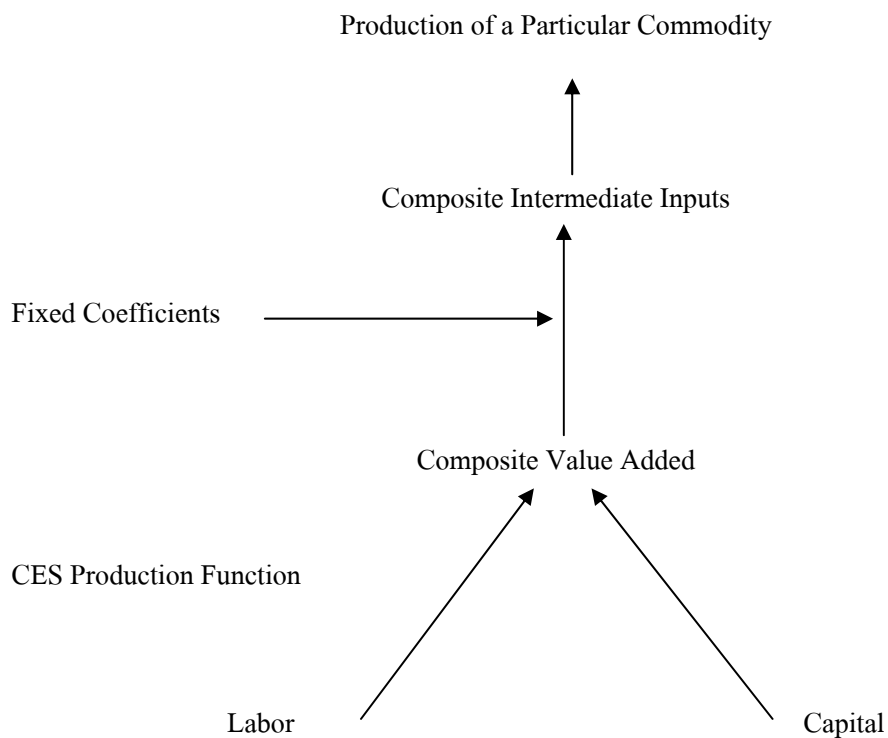
Figure 1:   Modeling of Production in the Computable General Equilibrium Model

Composite Commodity

Constant Elasticity of Substitution

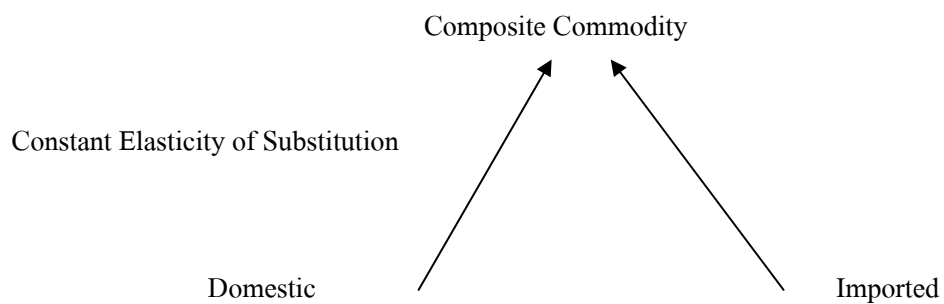Domestic   Imported

Figure 2:   Modeling of Composite Commodities

In terms of commodities, domestic commodities and imported commodities are combined according to a CES in response to the fact that imports and domestic commodities are not perfectly substitutable. In addition, the share of imports in the composite will depend on the relative prices of the imported and domestic commodities. The elasticity of substitution will govern the degree to which the import shares respond to a change in price. There are two primary factors of production: labor and capital, each separated into two main sectors: agriculture and non-agriculture.[9] This result therefore accounts for import types of the model.

FINDINGS

The impact of tariff reduction under the AFTA schedule can be assessed through commodities and export demand function. Tariff reduction on each commodity should be reflected in changes in all commodity sectors, including prices of goods, production, price of labor and capital, etc. The simulated results show that Thailand's GDP in agriculture and the service sector is expected to grow about 0.56 percent and 0.5 percent per annum, respectively, while the growth in manufacturing GDP would drop about 2 percent per annum. Regarding the macroeconomic final demand, aggregated demand in household consumption would increase by 1.44 percent per annum. Government consumption would increase by 0.23 percent. Government investment would increase by 0.74 percent, and private investment would increase by 1.18 percent. Final demand for exports in goods and services is expected to expand about 0.39 percent, while the final demand for imports in goods and services should increase about 1.18 percent.[10] Domestic price, referred as CPI, decreases about 0.84 percent per annum, which is

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[9] Land for agriculture is included as capital.

[10] The CGE model does not include analysis of the export side on export tariff and import tariff of other trading partners. Only the shock on the reduction of Thailand's imported tariff schedule based on the CEPT scheme is calculated in the model. Therefore, this should lead to an under-estimated result of 0.39 percent growth of Thailand's export volume. Therefore, the negative figure of GDP in manufacturing sectors does not include the amount of Thailand's exports from tariff reductions of other ASEAN countries.

what the international trade theory predicts. Elimination of trade barriers should reduce general prices of imported goods, passing along lower domestic prices for general goods.

To study the direct impacts of AFTA on labor market outcomes, results based on CGE alone provide the total wage earnings allocated to each sector. What we need to know from the model is: (i) the impact of AFTA on wages earned by individual laborers, (ii) the impact of AFTA on the numbers of laborers employed, and (iii) the impact of AFTA on functional income distribution between workers and firms.

Regarding the growth of wages, wage growth amounts to about 14.44 percent in the manufacturing sector, compared to 11.40 and 8.31 percent for, respectively, those working in agriculture and the service sector. Small increases in wages in the service sector can be attributed to the indirect impact of tariff reduction, which usually applies to goods rather than to services. From the perspective of the manufacturing sector, wage earnings are about to achieve the highest growth in "machinery," "tobacco," and "fabricated metal products." However, workers employed in the "beverage" sector receive the least growth in wages among those employed in manufacturing, who receive an increase of about 5.77 percent. Wage growth in the service sector is less than that of manufacturing and agriculture, especially for those employed in hotels, communication, transportation, etc.

Table 1: CGE Impact of AFTA Implementation on Real GDP and Final Demand:

Percentage Growth

Variables	Growth
Real GDP Agriculture	0.56
Real GDP Industry	-2
Real GDP Service	0.5
CPI (Inflation)	-0.84
Final demand	
Household consumption	1.44
Government consumption	0.23
Government investment	0.74
Private investment	1.18
Export in goods and service	0.39
Import in goods and service	1.9
Real GDP Total	-0.57

Source: Author's calculation of CGE model

However, since the CGE framework assumes fixed numbers for the physical number of workers employed, higher wage earnings may not imply better benefit for all laborers in the sector. Since the numbers of laborers employed also depend on shocks on output, negative shocks on output may indicate that some workers might be laid-off, depending on the degree of production intensity. In this case, effects of AFTA liberalization on employment numbers can be implicitly calculated by multiplying the *ratio of labor intensity* and the *growth*

of output.[11] The ratio of labor intensity is calculated from the basic parameters of the CGE framework by assuming positive/negative growth of output, which implies what percentage of laborers should be employed. With regard to the CGE results, the agriculture and service sectors are expected to employ about 0.11 percent and 0.22 percent more workers, respectively. However, the manufacturing sector is expected to employ fewer of laborers (about −0.76 percent) given the approximation from the negative shocks on manufacturing output. Nevertheless, it is still difficult to determine the number of laid-off workers from the negative employment growth determined from the CGE result. Therefore, to consider the positive/negative impacts of AFTA on each sector, the percentage change of employment alone is not sufficient enough to know the outcomes. There are two main reasons for this argument. First, even though employment growth is the approximation of labor intensity times growth of output, in the real world, firms may not immediately reduce the numbers of employees even though their production decreases.[12] Second, firms might believe that the negative shocks on outputs are temporary shocks and thus may decide to run at less capacity, instead of laying off workers. According to this reasoning, there might be some degree of substitution by altering machine output instead of employing workers, and vice versa. In this case, a firm might decide to bear the cost instead to of passing it along to the laborers. Therefore, benefits and losses from trade liberalization would not be equally borne by workers and firms. This brings us to the third conclusion from the CGE results.

Since production comprises two factors, namely, labor and capital, wages and higher employment alone do not mean that labor would gain without any consideration of capital. In order to cope with the competition from trade liberalization, firms might adjust their

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[11] $\%\Delta$Labor = $\%\Delta$Output * (Labor/Output), where $\%\Delta$Labor is the percentage growth of employment in each sector. $\%\Delta$Output is percentage growth of output caused by AFTA, and (Labor/Output) is the ratio of labor intensity.

[12] This might be due to the different types of employed workers, for example permanent workers, temporary workers, and sub-contracted workers, in each sector.

production to be more efficient. The demand for production inputs might be distorted in the face of a rapid change of technology. Thus, producers should be able to choose between adopting labor or capital depending on their relative costs. The increase of output in a given shock should thus take into account the increase in the number of laborers employed as well as the quantity of capital used ("profit" or "surplus," as they are called in the model). Therefore, we adopt the CGE results to analyze how a possible model can be used to analyze the effects of AFTA on functional income distribution. Supposing labor and capital are regarded as production inputs, return to labor (wage earnings) or number of laborers employed—in this case comparing this to the return to capital (profit or surplus)—determines whether or not the value added in each sector has been allocated equally to each factor.

According to Diwan (2001), labor shares fewer benefits, but more loss, than does capital in those sectors in which the input prices are most likely unequal. Relative to one another, if capital gain is considered the profit rate of producers, AFTA might generate more gains to capital than to labor, due to the lower bargaining power of workers relative to their employers. Let's assume employers are entrepreneurs who receive return in the form of profit indicating the returns to capital in each sector. Table 2 shows the growth of wage earnings (or percentage changes of employed workers) compared to growth of profit surplus in all sectors. Then outcomes of the functional income distribution, computed as growth of wage earnings of labor subtracted from growth of profit surplus in each sector, indicate whether employees or employers should receive more or less benefit from the positive shock to outputs. In addition, the functional income distribution might be used as an indicator measuring bargaining power of laborers relative to employers. A positive income distribution therefore means higher growth of wage earnings compared to those of the returns to capital, implying the strong bargaining power of laborers. On the other hand, a negative income distribution indicates lower growth of wages than of the profit rate, implying the weak bargaining power of laborers.

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Table 2: Percentage Growth of Output, Employment, Wage Earnings, Profit Rates, and

Functional Income Distribution from the Impacts of AFTA**.**

Products	Labor Intensity	Output Growth	Employment Growth	Wage Growth	Profit Growth	Income Distribution
Agriculture Products	-	-	0.11	11.40	12.52	-1.12
Paddy	0.70	0.75	0.53	13.66	14.81	-1.14
Maize	0.69	0.67	0.46	13.21	14.34	-1.14
Sorghum	0.69	0.71	0.49	13.69	14.83	-1.14
Cassava	0.34	0.87	0.29	15.80	16.96	-1.16
Flowers	0.34	0.73	0.25	9.00	10.10	-1.10
Beans and Nuts	0.34	0.71	0.24	10.07	11.17	-1.11
Vegetables	0.19	0.35	0.07	7.82	8.91	-1.08
Fruits	0.18	-0.3	-0.06	7.65	8.73	-1.08
Sugarcane	0.30	0.44	0.13	15.26	16.42	-1.16
Coconut	0.19	0.81	0.15	8.86	9.96	-1.09
Palm bean	0.34	0.65	0.22	13.41	14.55	-1.14
Kanaf and Jute	0.33	0.76	0.25	15.06	16.21	-1.15
Cotton and Kapok	0.14	-30.01	-4.15	15.30	16.47	-1.17
Tobacco	0.34	0.98	0.34	7.85	8.93	-1.09
Coffee, Tea, and Cocoa Bean	0.34	1.44	0.49	8.92	10.01	-1.09
Rubber	0.64	1.25	0.79	13.95	15.09	-1.15
Cattle and Buffaloes	0.53	0.28	0.15	12.01	13.14	-1.13
Swine	0.19	0.67	0.13	10.44	11.55	-1.11
Other Livestock	0.36	0.81	0.30	13.62	14.77	-1.14
Poultry	0.26	0.66	0.17	8.78	9.88	-1.09
Poultry's products	0.28	0.74	0.21	7.29	8.37	-1.08
Silk farming	0.36	0.8	0.29	15.64	16.80	-1.16
Agriculture service	0.35	0.90	0.32	11.51	12.63	-1.12
Logging, Charcoal, and Firewood	0.13	-0.97	-0.13	10.49	11.60	-1.11

Table 2   (Continued)

Products	Labor Intensity	Output Growth	Employment Growth	Wage Growth	Profit Growth	Income Distribution
Other forest products	0.71	0.71	0.51	12.66	13.80	-1.13
Marine Fishery	0.21	0.66	0.14	8.59	9.68	-1.09
Fresh Water Fishery	0.50	0.68	0.34	9.24	10.34	-1.10
Manufacturing Products	-	-	-0.76	14.44	11.84	2.60
Lignite	0.17	0.63	0.11	17.64	13.39	4.25
Natural Gas and Crude Oil	0.19	0.48	0.09	14.83	10.69	4.15
Iron Ore	0.18	1.38	0.25	17.18	12.86	4.32
Tin Mining	0.20	0.83	0.17	9.53	5.58	3.95
Tungsten	0.19	-4.80	-0.91	18.36	14.15	4.21
Other Mining	0.16	0.69	0.11	12.99	8.91	4.08
Fluorite	0.18	0.68	0.12	16.65	12.44	4.21
Salt	0.44	0.68	0.30	13.36	9.26	4.10
Rice Milling	0.52	0.74	0.38	10.38	13.12	-2.74
Tapioca	0.40	0.88	0.35	13.35	16.17	-2.81
Sugarcane	0.36	0.29	0.10	11.93	14.71	-2.78
Other Manufactured Food	0.36	-1.38	-0.50	9.99	12.72	-2.73
Beverages	0.40	0.76	0.30	5.77	8.40	-2.63
Tobacco	0.33	-0.14	-0.05	19.42	26.41	-6.99
Textiles	0.51	-0.56	-0.29	13.53	16.34	-2.82
Wearing Apparel	0.69	-0.55	-0.38	10.59	13.33	-2.75
Leather Products	0.38	0.65	0.25	9.48	12.20	-2.72
Wood and Wood Products	0.67	-0.92	-0.62	17.70	20.62	-2.92
Furniture and Fixtures	0.57	-0.18	-0.10	12.75	15.55	-2.80
Paper and Paper Products	0.33	-2.56	-0.84	10.11	12.85	-2.73
Printing and Publishing	0.58	0.75	0.44	12.05	8.01	4.05
Chemical Products	0.42	-7.90	-3.35	16.18	11.98	4.20

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Table 2 (Continued)

Products	Labor Intensity	Output Growth	Employment Growth	Wage Growth	Profit Growth	Income Distribution
Petroleum and Petroleum Products	0.47	0.53	0.25	12.20	8.14	4.05
Rubber and Plastic Products	0.49	-1.14	-0.55	16.24	12.05	4.20
Non-Metallic Mineral Products	0.43	-1.44	-0.62	17.62	13.37	4.25
Basic Metal Industries	0.50	-12.84	-6.44	19.00	14.70	4.30
Fabricated Metal Products	0.46	-10.35	-4.79	19.61	15.29	4.32
Machinery	0.50	-2.34	-1.16	22.68	18.25	4.43
Electrical Machinery and Supplies	0.40	-8.10	-3.22	17.50	13.25	4.24
Transport Equipment	0.67	-4.90	-3.28	12.77	8.70	4.07
Other Manufacturing Industries	0.57	-1.11	-0.63	16.27	12.07	4.20
Service and Utilities	-	-	0.22	8.31	9.91	-1.60
Electricity	0.29	0.72	0.21	18.47	14.19	4.28
Gas and Distribution	0.20	0.70	0.14	22.23	17.82	4.42
Water Supply	0.28	0.70	0.19	15.62	11.44	4.18
Construction	0.43	0.17	0.07	15.25	18.11	-2.86
Wholesale and Retail Trade	0.46	0.51	0.24	7.35	10.02	-2.67
Restaurants	0.41	0.64	0.26	4.28	6.87	-2.59
Hotels	0.34	0.50	0.17	0.42	2.91	-2.49
Transportation	0.37	0.64	0.24	3.31	5.88	-2.56
Communication	0.21	0.62	0.13	2.24	4.78	-2.54
Financial Institutions	0.39	0.77	0.30	5.80	8.43	-2.63
Insurance	0.57	0.73	0.42	8.59	11.28	-2.70
Real Estate	0.10	0.59	0.06	7.49	10.15	-2.67
Business Services	0.78	0.66	0.51	11.67	14.44	-2.77
Public Administration	0.79	0.09	0.07	7.39	10.06	-2.67
Education	0.67	0.14	0.09	7.45	10.11	-2.67
Medical and Health	0.41	0.41	0.17	3.99	6.58	-2.58

Table 2   (Continued)

Products	Labor Intensity	Output Growth	Employment Growth	Wage Growth	Profit Growth	Income Distribution
Non-Profit	0.43	0.79	0.34	7.66	10.33	-2.67
Recreation and Entertainment	0.32	0.65	0.21	7.19	9.85	-2.66
Repairs	0.38	0.79	0.30	6.33	8.97	-2.64
Personal and Household Services	0.60	0.59	0.35	3.51	6.08	-2.57

Source: Author's calculation of CGE model

Within the categorized sectors shown in the CGE results, a negative functional income distribution implies that labor employed in agriculture seems to receive less benefit from AFTA. Intuitively, agriculture relies largely on unskilled workers, who usually have weak bargaining power when dealing with their employers. In addition, the degree of substitution between both factors, the so-called Marginal Rate of Technical Substitution (MRTS), is relatively high in agricultural sectors. To cope with a fiercer competitive environment, employers in agricultural sectors might look for more opportunities to substitute machinery for laborers.

Regarding those in manufacturing, employees are expected to receive a higher share of the benefits. The income distribution in this sector, on average 2.60, implies that the wage earnings of those workers employed in manufacturing industries grow annually about 2.6 percent more than the profit rates. Nevertheless, there are some sectors in which labor will probably benefit less from AFTA. Noting the negative numbers of income distribution, these sectors are Rice Milling, Tapioca, Sugarcane, Beverage, Tobacco, Textile, Wearing Apparel, Leather Products, Wood and Wood Products, and Furniture and Fixtures. Those industries contain considerably higher proportions of unskilled labor than other manufacturing sectors,

which is found to correlate negatively with workers' bargaining power. Ex-ante analysis of CGE helps to identify gains and losses of laborers employed in each sector. The results vary in terms of impacts on employment, wage earnings, and factor distribution. For further analysis, we can adopt these variables and divide them into the four industry groups as follows:

Group 1: Gained Industries with Labor Advantage (Positive employment growth and positive functional income distribution). Workers that are employed in these sectors are expected to receive the most benefits from AFTA since AFTA causes a positive shock of output as well as higher employment. In addition, workers in these sectors also have higher shares of benefits in terms of their wage earnings than the firms would have, which implies that the bargaining power of those workers is relatively strong. Most of the sectors allied in this group are non-agriculture, namely, "Lignite," "National Gas and Crude Oil," "Iron Ore," "Tin Mining," "Other Mining," "Fluorite," "Salt," "Printing and Publishing," "Petroleum and Petroleum Products," "Electricity," "Gas and Distribution," and "Water Supply."

Group 2: Gained Industries with Advantage for Firms (Positive employment growth and negative functional income distribution). Workers that are employed in these sectors are expected to receive benefits from AFTA. However, workers receive a lower share of the benefits to their wage earnings than do their firms. This might suggest that even though workers in this sector would receive benefits from trade liberalization, in the long run their benefits might be lower since firms need more power to adjust their production and possibly lay off workers if they face a loss. The majority of sectors allied in this group are agriculture and service; namely, "Paddy," "Maize," "Sorghum," "Cassava," "Flowers," "Beans and Nuts," "Vegetables," "Sugarcane," "Coconut," Palm Bean," "Kanaf and Jute," "Rice Milling," "Tapioca," "Sugarcane," "Beverage," Leather Products," "Construction," "Wholesale and Retail Trade," "Restaurant," "Hotel," "Transportation," "Communication," "Financial Institution," "Insurance," "Real Estate," "Business Services," "Public Administration," "Education,"

"Medical and Health," "Non-Profit," "Recreation and Entertainment," "Repairs," and "Personal and Household Services."

Group 3: Losing Industries with Labor Advantage (Negative employment growth and positive functional income distribution). These sectors are expected to employ fewer workers due to the negative shock of output. However, firms in these sectors should bear most of the cost. The majority of sectors allied in this group are hardcore manufacturing industries that require machine and capital as major inputs; namely, "Tungsten," "Chemical Products," "Rubber and Plastic Products," "Non-Metallic Mineral Products," "Basic Metal Industries," Fabricated Metal Products," and "Machinery."

Group 4: Losing Industries with Advantage for Firms (Positive employment growth and positive functional income distribution). Workers that are employed in these sectors are expected to be worse off as a result of AFTA since AFTA causes a negative shock of output as well as lower employment. In addition, workers in these sectors also have a lower share of the benefits added to their wage earnings than do their firms, which implies that the bargaining-power of those workers is relatively weak. With the negative shock, workers should be the ones that have to bear most of the cost. The sectors involved are "Fruits," "Cotton and Kapok," "Logging, Charcoal, and Firewood," "Other Manufactured Food," "Tobacco," "Textiles," "Wearing Apparel," "Wood and Wood Products," "Furniture and Fixtures," and "Paper and Paper Products."

The CGE model indicates whether or not laborers should gain or lose from the impacts of AFTA. All in all, Thai laborers are expected to gain from the full implementation of AFTA. However, since the production process should be more dynamically brought into consideration, substitution between factors of production might exist when firms have to struggle to survive within the opening of trade. This is why functional income distribution should definitely be a concern.

CONCLUSION

This paper adopts the computable General Equilibrium (CGE) technique to analyze the impacts of tariff reduction under the AFTA scheme on wages and employment in Thailand. In general, Thai laborers are expected to gain from the full implementation of AFTA. Impacts of AFTA on wage and employment outcomes of Thai workers vary by sector depending on production intensity, rate of substitution between inputs, and linkages.

The limitations of the CGE model are widely recognized. For example, results explained by CGE do not include the impact of tariff reduction imposed by other ASEAN countries, but take into account only Thailand's imports. Gains received from Thailand's export volume to ASEAN countries should make a significant difference in the CGE outcomes, especially in the case of the Thai economy, for which the main source of growth (more than 50 percent) is exports.

The CGE also excludes some important factors that vary among these three sectors, for example the returns to scale in production, production intensity, share of export/import to sectoral production, etc. Thus quantitative analysis might result in errors unless more sectoral information is included. In order to analyze these impacts by sector, some questions need to be addressed; namely, whether or not the industry output will be positively or negatively affected from trade liberalization. The positive impacts through trade creation and increase of exports would cause more benefits to workers and create more jobs, but the negative impacts from trade, on the other hand, would possibly harm some workers by affecting their job security.

Secondly, factor intensity brought about by trade liberalization affects labor markets differently, depending on whether the focused industries are capital-intensive or labor-intensive. Labor-intensive industries should be affected more significantly compared to capital-intensive industries since the cost of production would be borne mainly by reducing wages.

Generally, workers employed in labor-intensive industries are unskilled and semi-skilled workers. In economic theory, since labor demand and supply of unskilled labor are more elastic than the demand and supply of skilled labor, increases (or decreases) of output generated from trade liberalization would result in more (or less) employment for unskilled and semi-skilled workers. Nevertheless, determining the degree of production intensity depends on the fraction the input contributes to the output.

Thirdly, with regard to the degree of substitution between inputs, whether input is capital or labor indicates whether or not it would be easy for producers to replace laborers with machines. Workers would suffer from trade liberalization if firms realize the usage of capital in a cost-effective means of production.

Lastly, the labor demand for particular workers, differentiated by their skills, gender, and age, should be defined. The negative impacts of trade liberalization will harm workers that are less preferred, while workers that are more preferred should not be harmed. Therefore, demand for workers in specific types of working groups will be another indicator showing less adverse effects or more positive effects from trade.

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