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Regional Economic Integration and Its Impacts on Growth, Income Distribution and Poverty in East Asia: A CGE Analysis

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Abstract

Regional economic integration in East Asia has evolved in fact on the basis of market forces but, now in the 21st century, it is institutionally promoted by forming free trade agreements (FTAs) between countries in the region. Focusing on the network of FTAs in East Asia consisting of ASEAN, NIEs, China and Japan or the East Asian Community (EAC), this paper quantifies impacts of the institution-led regional economic integration to analyze and evaluate its potential on growth, income distribution and poverty reduction for the region. Analysis of poverty and income distribution is made especially for four developing countries in East Asia: China, Indonesia, Thailand, and Vietnam. Methodology is a world CGE (Computable General Equilibrium) model, which links country or regional CGE models all over the world. Its framework and database are basically the same as GTAP (Global Trade Analysis Project), but it incorporates household data of income and expenditures for the four countries and extends the model accordingly in framework to combine micro households and macro industries. The impact analysis based on the world CGE model indicates that the East Asian FTAs generally have positive effects on growth, improve income distribution, and result in poverty reduction, though the impacts on China are a little bit exceptional. The results indicate positive potential or long-run positive effects of the East Asian Community, but its requirement of structural adjustment is the actual problem to be overcome in the short-run.

This paper is based on the analysis of comparative statics for the benchmark year 2001. Our next task is to investigate the time profiles based on the dynamic simulation of the period, say, 2001-2025 by allowing for capital mobility, labor migration, productivity growth, etc., as well as by incorporating the aspect of common currency unit to make implications of the East Asian Community more comprehensive and definite as the economic and monetary union.

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1. Introduction

"East Asian Community (EAC)" has been discussed and investigated widely with high expectation in recent years on its concept, condition, background, possibility, strategy, policy, designing, and so on, including not only economic but also political and cultural factors. When limited to economic and business fields, it is "East Asian Economic Community" which will be a model of regional economic integration comparable with EU (European Union) and NAFTA (North American Free Trade Area).

Regional economic integration in East Asia (ASEAN, China, NIEs and Japan) has moved ahead rapidly since 1980s in substance of trade and investment. Within-region dependence of exports in East Asia increased from 43% to 51% for the period from 1980 to 2001, while that of imports from 45% to 60% for the same period. Within-region trade dependence of East Asia reached 54% in 2004, which stands in-between 46% for NAFTA and 68% for EU. The biggest investors to ASEAN and China are NIEs and Japan, and regional multi-national enterprises lead expansion of production and distribution in East Asia through division of labor within enterprises between production processes and trading of production materials and parts.

Regional economic integration in East Asia has thus evolved in fact on the basis of market forces but, now in the 21st century, it is institutionally promoted by forming free trade agreements (FTAs) between countries or groups of countries in the region such as ASEAN-China FTA, Singapore-Korea FTA, Malaysia-Japan EPA (Economic Partnership Agreement), and so on. ASEAN-Japan EPA and ASEAN-Korea FTA are now in negotiation, along the line with which lies ASEAN+3 (China, Japan, Korea) or its regional extension, namely, the East Asian Economic Community (EAC).

It is a consensus that regional FTA or regional integration led by FTA has economic rationality at least for the region. For the East Asian FTA, there exist not a few quantitative studies which evaluate positively its effects on growth, consumption (welfare), industrial development and productivity.[3] But the question is how poverty and disparity in income are affected by freer regional trade and more competitive regional economy. In other words, FTA causes both growing and stagnating industries, which result in changes in the structure of industry, employment and demand, leading to the question of how income structure, distribution, and poverty are affected. This is an important point to be taken into consideration for the regional economic integration of East Asia in which developing countries are dominant in number.

[3] See Tsutsumi and Kiyota (2002), Iytakura, Hertel and Reimer (2003), Kawasaki (2003), Urata and Kiyota (2003), Kojima (2004, Ch.5), and so on. See also Scollay and Gilbert (2000) for APEC.

Focusing on the network of FTAs in East Asia consisting of ASEAN, NIEs, China and Japan or the East Asian Community, this paper quantifies impacts of the institution-led regional economic integration to analyze and evaluate its potential on growth, income distribution and poverty reduction for the region. Analysis of poverty and income distribution is made especially for four developing countries in East Asia: China, Indonesia, Thailand, and Vietnam. Methodology is a global CGE (Computable General Equilibrium) model, which links country or regional CGE models all over the world. Its framework and database are basically the same as GTAP (Global Trade Analysis Project), but it incorporates household data of income and expenditures for the four countries and extends the model accordingly in framework to combine micro households and macro industries. This paper depends basically on the case studies of four countries above,[4] integrating them in contents and extending them in framework and scope of analysis.

This paper consists of 6 sections. This first section is introduction. Section 2 gives an overview of the regional economic integration in East Asia from the point of view of the development of FTA network in the region, while Section 3 provides an overview of growth, poverty and income distribution focusing on Vietnam, Thailand, and China. Section 4 presents the basic framework of global CGE model to be followed in Section 5 by the analysis and evaluation of EAC based on the simulation results. Section 6 gives summary and concluding remarks.

2. Regional Economic Integration in East Asia – Development of FTA Network

In the European continent, the European Economic Community (EEC) started in 1958 based on the Treaty of Rome, evolved into the European Community (EC) in 1967 by integration with the Coal and Steel and the Atomic Communities, and founded finally the European Union (EU) in 1993 by the Treaty of Maastricht. EU established the 15-country system in 1995, circulated common currency unit, Euro, in 2002 and accepted the new entry from East Europe of 15 countries in 2004 and of 2 countries in 2007, exploring still for further expansion and deepening in member countries. Total population and total GDP of the EU of 27 member countries are more than 490 million people and 13 trillion US dollars, respectively.

In the American continents, on the other hand, the North American Free Trade Area (NAFTA) was established in 1994, consisting of US, Canada and Mexico, while the Free Trade Area of the Americas (FTAA) covering all countries in both North and South American continents was proposed later and confirmed to be started in 2005, but the negotiation is now discontinued due to big differences in views and ideas in some fields. If realized, FTAA will be

[4] See Nguyen and Ezaki (2005) and Nguyen and Ezaki (2006) for Vietnam, Wang and Ezaki (2006) for China, Chaipan, Nguyen and Ezaki (2006) for Thailand, and Hartono, Priyarsono, Nguyen and Ezaki (2007) for Indonesia.

the largest free trade area in the world with total population of about 850 million and total GDP of more than 14 trillion US dollars.

Speaking generally from regional integration, EU is in the stage of political integration beyond the economic one, while NAFTA or FTAA when realized remains in the stage of economic integration. According to WTO, EU is a customs union but NAFTA is a free trade area, and both are regional economic integration with the common basis on Article 24 of GATT which permits to form the trade area of special preferences exceptionally against the principle of free and undifferentiated trade.

The first of such regional economic integration in East Asia is the ASEAN Free Trade Area (AFTA) established in 1992. Before AFTA, there had existed the Asia-Pacific Economic Cooperation (APEC) established in 1989 which consists of 21 countries including the outside countries of East Asia such as US, Canada, Mexico, Chile, Peru, Australia, New Zealand, Russia, and so on. APEC, however, is neither against WTO nor regional economic integration based on Article 24 of GATT in that it adopts the principle of open regionalism, Furthermore, APEC is beyond ordinary free trade agreement in that it contains as contents not only facilitation of trade and investment but also promotion of economic cooperation. In East Asia, free trade areas (FTAs) as exception to the principle of free and undifferentiated trade of WTO have become promoted actively in the 21st century.

As of June 15, 2006, the number of free trade agreements (FTAs) registered at WTO all over the world reaches 148 in total, excluding the cases of overlapped registration.[5] The oldest are the European Union (EU, EC: Treaty of Rome) of 1958 and the European Free Trade Area (EFTA) of 1960. The number of FTA registration counts 17 for the period of 30 years from the 1960s to the 1980s and 53 for the decade in the 1990s, accelerating to 76 for 6 years in the 21st century. When the region is limited to East Asia, the FTA registration counts only 7 cases: Laos-Thailand bilateral FTA of 1991 (based on the Enabling Act), ASEAN Free Trade Area (AFTA) of 1992, Japan-Singapore bilateral FTA of 2002, ASEAN-China FTA of 2003, China-Macao and China-Hong Kong bilateral FTAs of 2004, and Korea-Singapore bilateral FTA of 2006.

As for Japan, the economic partnership agreements (EPAs) have come into effect with Singapore, Mexico and Malaysia, waiting for signature with the Philippines and Thailand, and being negotiated with ASEAN, Indonesia, Brunei, Vietnam, Korea, India, and so on, as of September 2006. The target of Japan is EPA which is more comprehensive than FTA. FTA aims at abolishing tariffs on commodities and regulations on investment in services, while EPA aims at abolishing investment regulations in general, establishing investment rules,

[5] See the homepage of JETRO (Japan External Trade Organization).

harmonizing intellectual property rights and competition policies, expanding human exchanges, and promoting cooperation in various fields.

As for China, FTAs have come into effect with Chile in addition to ASEAN, Hong Kong and Macao mentioned above, being negotiated with Australia, New Zealand, Pakistan, and so on. As for ASEAN as a whole, FTA is concluded with China, waiting for signature with Korea, and being negotiated with Japan, India, Australia and New Zealand, while the member countries of ASEAN are promoting individually bilateral FTAs. Thailand, for example, concluded FTAs with China, India, Australia and New Zealand, finished negotiation of EPA with Japan for signature, and is now negotiating FTA with US. As for Korea, furthermore, FTAs have come into effect with Chile, Singapore, and EFTA, while being negotiated with Japan, ASEAN, Canada, Mexico, US and India.[6]

East Asia has thus progressed rapidly in the 21st century the network of FTAs, along the line with which lies the FTA of "ASEAN+3(China, Japan and Korea)" or its regionally extended version, that is, "East Asian (Economic) Community (EAC)." If, for example, the EAC covering "ASEAN+3(China, Japan and Korea)+2(Hong Kong and Taiwan)" is realized, it will have total population exceeding 2 billion and total GDP exceeding 8trillion US dollars, which is a regional economic integration to be comparable with EU and FTAA.

3. Growth, Distribution and Poverty in East Asia: Vietnam, Thailand and China

Let us first glance at the current situation of growth, distribution and poverty in East Asia in general by Tables 1-1 and 1-2. In terms of the GDP size, Japan, China and Korea are dominantly large. In terms of per capita income, Japan, Hong Kong and Singapore are of the high income group, then, Korea and Taiwan of higher middle income, then, Malaysia and Thailand of middle income, then, China and other old ASEAN of lower middle, and finally the new ASEAN of the low income group. In terms of growth in recent years, China is dominantly high, being followed by ASEAN. NIEs are generally low, and Japan is only 1%.

Next is distribution. In terms of both Gini coefficient and income ratio of top to bottom quintiles, Japan's income inequality is remarkably low (though at the time of 1993). Korea, Indonesia, Vietnam and Laos are of middle inequality. The remaining countries are of high inequality. As for poverty, one dollar per day (PPP version) seems better than the national poverty line for international comparison. Poverty incidence or head count ratio is fairly high in the old ASEAN of low income, while poverty still remains unsolved in the old ASEAN of lower middle income and China.

(Table 1-1), (Table 1-2)

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[6] See the home page of Ministry of Foreign Affairs, Government of Japan. See also Ahn and Cheong (2007), Table 7.

Distribution and poverty in Thailand

Let us look at distribution and poverty in more detail for Thailand, Vietnam and China. Table 2-1 indicates Thai income distribution by region, by quintiles and by urban-rural areas based on the micro household data of socio-economic survey for 2000. Inter-regional inequality is conspicuous in Thailand. Income disparity between Bangkok and Northeast region is more than 20 times. Especially for Northeast region, income ratio between quintiles, urban-rural disparity and Gini coefficient are all very high compared to the other regions. The key element to explain Thai inequality is agriculture with large working population, low productivity, and high income volatility. The change that follows Kuznets pattern is desired and expected for the improvement of Thai income distribution but, as shown in Table 2-2, the Gini coefficient in recent years still remains high at around the peak of Kuznets curve, and it is not certain yet for the distribution to move towards betterment. Poverty incidence, though reversed during the period of Asian crisis, is now on the trend of steady improvement in association with income growth. Poverty ratio is now around 10%, so that the lowest decile may be considered as the poor. Poverty reduction will improve further when income distribution begins to get better.

(Table 2-1), (Table 2-2)

Distribution and poverty in Vietnam[7]

When Vietnam started economic reforms 20 years ago, it was a very poor country with income per capita of less than 200 $US. Most Vietnamese people then lived under the poverty line with the estimated poverty incidence of over 70%. As seen in Table 3-1, the rapid economic growth over the last decade has not only increased national income, but also sharply reduced the incidence of poverty. The percentage of poor people fell sharply to 50% in 1993, 37% in 1998 and 28% in 2002. The absolute poverty incidence based on the food poverty line also fell from 25% to less than 10% between 1993 and 2002.

By international standards, Vietnam has remained a relatively equitable country. However, inequality has increased slightly during the years of rapid economic growth. Gini coefficient increased from 0.33 to 0.35 and then to 0.41 from 1993 to 1998 and then to 2002. The income ratio between the poorest and the richest quintiles also rose from 4.9 to 5.5 and then to 8.1 during the same period

Table 3-2 provides a profile of income distribution with respect to income, expenditure and employment. The table is processed using the new household survey conducted by

[7] See Nguyen and Ezaki (2005, 2007).

Vietnam's General Statistical office in 2002. The survey data, which cover 30000 households, is aggregated into 20 household groups based on the level of expenditure. Among these 20 groups, there are 10 urban groups and 10 rural groups. As can be seen in the table there are larger income gaps among household groups. Income per capita of the richest urban group is almost 8 times higher than that of the urban poorest, while the figure for rural areas is 6.4. The share of the poorest decile groups in total income is only 3.4%, while the richest decile accounts for nearly 27% of total income.

Poor households tend to rely more on agriculture and informal sectors, while the rich have their income mostly sourced from wage-earning jobs and non-agricultural activities. The urban lowest income group spends nearly 70% of their working time on agriculture, while the figure for the rural lowest income group is 88%. Low-income groups also involve more in trade and other low-productivity services in the informal sector. By contrast, higher income groups tend to work more in industries and formal services[8]. The average wage rates of poor groups are considerable low compared to high income groups. For example, the average wage rate of the rural lowest income group is around 40% of the national average wage, and the figure for the urban lowest income group is only 30%.

Unemployment in Vietnam is also moderate, compared to the level in industrial countries. According to the official statistics, the unemployment rate is around 7% of labour force. The Living Standard Survey 1997/1998 shows even a lower rate, at 1.6% of labour force[9] (GSO, 2000). This figure is much lower when compared to other developing countries like China or Indonesia (Haughton 2001, p. 18). Despite the low unemployment rate, under employment is a serious problem in Vietnam. Based on the full-time annual work of 2000 hours, around 50% of urban workers and 70% of rural workers can be seen as underemployed[10]. On average, a Vietnamese worker works only less than 1600 hours a year, suggesting an underemployment rate of more than 20%. The incidence of underemployment varies across regions and household groups. Reflecting the limited availability of arable land and off-farm jobs, underemployment is particularly high in rural areas where an average worker uses only three-fourths of his working time. In urban areas, underemployment is generally less serious, with the average year-round number of working hours amounting to over 2000. However urban low-income groups have less working time than high-income

[8] The formal sector consists of the state sectors and foreign-invested sector, while the rest of the economy can be considered as informal.

[9] This is based on the common definition of unemployment that classifies as unemployed any person of working ages, who doesn't have jobs and is seeking for jobs during the last seven days before the interview.

[10] This is calculated based on the assumption of full-time work of 40 hours per week and 50 working weeks a year.

groups. A similar trend is also observed in rural areas, where underemployment mainly affects low-income groups.

(Table 3-1), (Table 3-2)

Distribution and poverty in China[11]

As China's economy has been growing substantially, residents' income has increased tremendously and their living standard also improved. China has achieved a great success in poverty reduction. Poor population was reduced by 200 million to 161 million in 1990-2002, and poor population ratio fell down by 19.0% from 31.5% to 12.5% during the same period (World Bank (2003)). On the other hand, income inequality increased during the 1990s and the Gini coefficient rose from 0.382 in 1988 to 0.454 in 2002 (Kato et. al. (2004)). As seen in Table 4-1, worsened income distribution in the national level has been caused by widening rural-urban disparity of income and worsening income equality within rural and urban areas in addition to widening income disparity between regions. In other words, income distribution in China continues to worsen due to, first, the widening regional disparity, second, widening rural-urban disparity within regions, and third increasing inequality within rural and urban areas.

The wide rural-urban income disparity in China is closely related to the enormous manpower in the rural area. Table 4-2 indicates sources of labor income in the agricultural sector. From this table, we can see that increase in rural per capita income accompanies decrease in the share of agricultural income, and increase in the share of wage income (of the workers with rural registration). We can see also that rural low income households show higher share of agricultural income, while rural high income households show higher share of wage income. This structure of rural income or rural employment is a crucial factor in considering trade liberalization and income distribution.

4. Framework of Global CGE Model

This paper analyzes regional integration in East Asia and its impacts on growth, distribution and poverty based on global CGE model, which links country or regional models all over the world through trade and investment. Its framework and database are basically the same as GTAP (Global Trade Analysis Project)[12], but it incorporates household data of income and expenditures for the four countries and extends the model accordingly in framework to combine micro households and macro industries. Our global CGE model consists of 16 countries or regions, and 20 industries.

[11] See Wang and Ezaki (2006).

[12] See, for example, Hertel for GTAP model. See Nguyen and Ezaki (2005, 2007) for our global CGE model.,

Countries or regions (16): Thailand, Vietnam, Indonesia, Malaysia, Philippines, Singapore, China, Korea, Hong Kong, Taiwan, Japan, India, Oceania, USA, EU, ROW (rest of the world).

Industries (20): crops, livestock, forestry, fishing, mining, food processing, beverage, wood, chemical, automobile, transportation, electronics, machines, metal, textile, leather, other manufacturing, utility, construction, services

The regional classification is focused on East Asia, consisting of all major economies in the region as well as the US, the EU and Oceania. Industrial activities are specified with an emphasis on the agricultural and manufacturing sectors, taking into consideration the diversified pattern of production and comparative advantage as well as the structure of protection in each individual country and region.

The global CGE model consists of 16 country models, which are linked together through international trade and foreign investment. Country models generally follow the standard neoclassical CGE model (Dervis et al. (1982)). Output is a CES function of composite labor and capital with the assumption of imperfect substitutability. Sectoral output is supplied to foreign and domestic markets to maximize revenue with the assumption of the CET functional form. Product differentiation is also imposed on the demand side, in which domestically produced goods and imports are imperfectly substituted. This is modelled using the Armington structure, with the composite goods are CES functions of domestic goods and imports. The demand for imports is then derived from the cost minimization condition based on the relative prices of imports and domestic goods.

For countries and regions, the factor markets are modelled with the assumption of factor mobility and full employment. Three production factors are specified, consisting of capital, skilled labor and unskilled labor. Skilled and unskilled labor are combined in a Constant Elasticity of Substitution (CES) function to form a composite labor input. The factor demand is first derived for capital and composite labor, and the latter is further divided into the demand for skilled and unskilled labor. With the assumption of full employment and factor mobility, the model is long-run in nature.

In each country model, nine kinds of taxes and subsidies were specified, consisting of tariffs, export duties, production taxes, capital and output subsidies, and sales taxes imposed on consumer goods, intermediate inputs and capital goods. The detailed treatment of taxes and subsidies makes it possible to analyze other policy instruments in addition to tariffs. Government collects revenue from taxes and spends on investment and consumption in fixed proportions. One representative household is specified for each country and region rather than

Vietnam. Household income consists of labor and capital income, and is allocated to savings and consumption using exogenous shares.

For the four countries of Vietnam, Thailand, China and Indonesia, 20 household groups are classified to analyze the impact of regional integration on income distribution.[13] Among these 20 groups, there are 10 urban groups and 10 rural groups, which are classified based on the level of income. Households of the four countries receive fixed proportions of sectoral capital income based on their initial supply of capital services. Labor income is determined based on the household supply of labor in each industry and corresponding wage rates. The household composition of sectoral labor income would change as labor moves between industries during trade liberalization.

Country models are linked together through trade and investment flows. Domestic consumers and producers differentiate imports by sources, and this characteristic is also modeled with the Armington structure. At the aggregate level, total imports is a CES function of imports from different sources, and then the demand for imports from each sources is derived from the cost minimization condition. On the export side, exporters do not differentiate exports by countries of destination, that is, commodities supplied to foreign countries are seen as perfectly homogenous and are sold at the same price. The trade consistency is held so that total exports supplied by home countries are equal to the sum of imports by foreign countries. International transportation services are incorporated, creating a wedge between the f.o.b prices in exporting countries and the c.i.f. prices in importing countries.

Trade liberalization changes the relative prices of production factors, thereby affecting foreign capital inflows. In this model, we employed an approach in the line with Hertel (1997) to account for the link between trade and investment. In this approach, the expected return on capital is assumed to decline with the addition to the capital stock at the rate determined by a flexibility parameter. Investment decisions are made in such a way that the rates of return on capital are equalized across countries and regions. Thus the change in global savings is allocated across country and regions to equalize the regional expected rates of return. In this treatment, investment only partially adjusts in response to the changes in the rate of return caused by trade liberalization. At a low value of the flexibility parameter in the absolute term, the expected rate of return to capital is not very sensitive to the change in capital stock, thus a large change in investment is required to equalize the expected rate of return to capital. A low flexibility parameter means a greater capital mobility and vice versa.

Equilibrium conditions consist of the conditions in factor, commodity and foreign exchange markets. In the factor market, we adopted the assumption of full employment, and

[13] No disaggregation of rural households is made for China. Classification of households for Indonesia is functional, not based on the level of income. See Table 8.

factor prices serve as equilibrating variables. In the country model for Vietnam, the equilibrium in the labor market equates the demand for and the supply of labor for each industry and economic sector. Equilibrium in product markets equates the supply of domestic goods in each sector to the demand for domestically produced products, with domestic prices serving as equilibrating variables. The fiscal balance is implied in the treatment of the government sector, in which government consumption and savings are determined as fixed shares of government revenue.

In the foreign exchange market, the exchange rates are fixed for all countries and regions, and foreign savings are assumed to adjust to the change in demand for and supply of the foreign exchanges. Savings and investment are determined independently in each country or region but the savings-investment identity is guaranteed automatically by the local Walras' Law. We do not introduce the general price equation for each country or region to control its price level except for the United States, in which the general price level is fixed as the world numeraire by allowing for the global Walras' Law. All the exchange rates are fixed but the real exchange rates change because of the flexible domestic price levels relative to the world numeraire.

5. Impact Analysis: East Asian Economic Community (EAC)

Based on the global CGE model above, we will quantify impacts of the institution-led regional integration in East Asia on regional growth, industrial structure, income distribution and poverty, focusing on "East Asian Economic Community (EAC)" or East Asian FTA. We will employ the framework of comparative statics in measuring the impacts, in which free mobility of capital and labor is assumed between industries within countries while elastic mobility (or allocation) of capital is allowed for between countries, depending on the differences in the rates of return to capital. Our measurement indicates the long-run impacts of free trade area in this sense, but it does not allow for international labor mobility and changes in technology and productivity.

Tariff barriers to be abolished for trade liberalization are shown in Table 5, where tariff rates are averaged across industries. EAC here is defined as "ASEAN + China, Korea, Japan + HK, Taiwan". Common to these EAC countries, tariff barriers are generally high for agriculture, food and drinking, textiles and leather, to which metal and machinery industries are added in the case of ASEAN and China. Hong Kong and Singapore are the free economies of almost no tariffs. Average tariff rates are 50-60% at the maximum. Non-tariff barriers are not allowed for here, and EAC here is nearer to the Economic Partnership Agreement (EPA) rather than the Free Trade Agreement (FTA) in that elastic capital movement is assumed between countries.

(Table 5)

Macroeconomic impacts of EAC are summarized in Table 6, which indicates % deviation from base run or actual values. Impacts on growth are all positive for the inside member countries (i.e., increase in real GDP) though their magnitude is different, while all negative (i.e., decrease in real GDP) for the outside non-member countries and regions. This result is generally expected from the trade creation and trade diversion effects of FTA. The magnitude of impacts to the inside countries differ, depending first on their size and comparative advantage (resource endowments) and also on the other factors such as demand structure, employment structure, distribution structure, and so on.

It is noticeable that the impacts on real GDP are positive all for the inside countries. The main reason is that EAC is the scenario derived under the assumption of internationally mobile capital which is elastic to some extent to the difference in profit rates. In other words, the scenario EAC here assumes regional economic integration of the EPA type. EAC* (the case of inelastic capital mobility or capital immobility) in Table 6 indicates the decrease in the magnitude of positive impacts to a considerable extent. The difference between EAC and EAC* may be said to be the effect of elastic capital mobility.[14]

(Table 6)

Impact on growth for China becomes negative (i.e., decrease in real GDP) in the case of inelastic capital mobility. Considering that the growth impact to China is the second smallest (next to Japan) even in the case of elastic capital mobility, EAC does not become a big merit for China at least in terms of growth effect. The reason of macroeconomic level is that EAC causes far bigger increase in imports than in exports, small increases in private consumption and investment, and decrease in government consumption (Table 6).

Behind this macroeconomic reason, we can see the change in industrial structure in China (Table 7). In other words, due to the formation of EAC, exports of agricultural commodities, food, and beverages increase on a large scale (relative to their imports), but imports of heavy and chemical industries (except electronics) increase on a large scale (relative to their exports). Imports of light industry products such as textiles and leather also increase on a large scale (compared to their exports). Export destinations of agricultural products are high income countries such as Japan and Korea, while import suppliers of heavy industry and chemical products are again industrialized countries such as Korea and Japan. This reflects the division of labor between China, Korea and Japan in the East Asian region. Namely, Japan and Korea export to China investment goods, parts and industrial raw materials, while China exports to the world industrial final goods consisting mainly of electronics. Exports of textiles

[14] The base run for EPA scenario is common and same (i.e., bench mark actual values) for two different frameworks of elastic capital mobility and no capital mobility.

and leather from Vietnam increase remarkably, and China loses its international competitiveness in this field. Due to these effects in trade, EAC will cause China to change its industrial structure in the direction of expanding agriculture and food processing industries, reducing textile industries, expanding electronics industries, reducing other heavy-chemical industries, and expanding other light manufacturing industries.

(Table 7)

EAC is not the regional economic integration that brings about big growth effect to China. Wider integration gives China bigger and firmer growth benefits. Impacts on real GDP increase remarkably to 0.7% for FTA of the APEC level (i.e., EAC + Oceania + USA), while to 1.3% for FTA of WTO level (i.e., the whole world). In both cases, structural changes in trade and industry are of the same direction as in the case of EAC, expanding electronics and labor intensive industries, while reducing capital intensive industries. As a result, income distribution in China improves as shown in Table 8. In other words, EAC or its extension of wider scope (APEC or WTO) decreases the urban-rural income disparity in China remarkably, increasing rapidly (decreasing more slowly) the income of poor households in the urban area. EAC will, finally, contribute to poverty reduction in China as a result of reducing poor households, many of which concentrate in the rural area.

(Table 8)

So far is concerned about China on the effects and factors of EAC formation. Almost similar results are obtained for Thailand (Table 6). A big difference is observed on the impact on growth of EAC which is fairly high, i.e., 1.8%, for Thailand. The most important factor is the high rate of private consumption (55% of GDP). Trade liberalization causes first increase in private consumption and also increase in capital formation financed by limited domestic saving and large capital inflow (corresponding to bigger increase in imports than in exports), resulting in the increase in production capacity or real GDP. In China, private consumption is only 43 % of GDP and large saving does not necessarily need large capital inflow (but may cause capital outflow), so that FTA is not a key factor to realize growth effect.

Facing EAC, Thailand changes its industrial structure in accordance with the changes in export and import structures, expanding agriculture, food processing, and machinery industries except automobiles, in the direction towards the expansion of labor intensive industries under a more advanced industrial structure than in China (Table 7). As a result, income of low-income households increases more rapidly than that of high-income households in both rural and urban areas (except for urban top decile) and, at the same time, urban-rural income disparity tends to decline. EAC firmly contributes not only to improving income distribution in Thailand but also to poverty reduction in Thailand when the first decile is seen as poor under the poverty line (Table 8).

Vietnam is the opposite extreme to China with Thailand in-between. This is because EAC has the highest growth impact on real GDP (4.2%) and the ratios of private consumption and imports to GDP are extremely high (82% and 46% respectively, Table 6) for Vietnam. In other words, EAC causes Vietnam to increase private consumption and imports remarkably but to expand also production and real GDP through capital formation financed by extremely limited domestic savings and big inflow of foreign capital.

Change in industrial structure by EAC is also extreme for Vietnam. Impacts on agriculture and food processing are positive but not so large as for Thailand and China. Positively big impacts are expected for such manufacturing industries as textiles, leather and other machinery, while negatively large in general for all of the other manufacturing industries. Under EAC, Vietnam expands production and exports mainly of labor intensive manufacturing industries such as textiles and leather with moderate expansion of agriculture-related industries (Table 7). Such change in industrial structure accompanies moderate improvement in income distribution. Urban-rural disparity in income tends to decline, and low income households increase their income faster than high income households. Rural income relatively increases under moderate expansion of agricultural sectors and rapid expansion of urban labor intensive industries. This is because rapid growth of real GDP causes rise in wage and labor income faster than rise in production for agricultural sector with the biggest weight in the economy. Rise in income of the lowest deciles in both urban and rural sectors is remarkable, so that EAC contributes firmly to poverty reduction in Vietnam.

As for Indonesia, impacts of EAC are in-between Thailand and China with small effects on growth and small shifts in industrial structure to agriculture, food processing, electronics and other machinery.

Let us look at impacts finally on the Japanese economy, though no analysis is made for Japan on the distribution aspect using micro data. Impact of EAC on real GDP is positive but only 0.1% due to the large size of the Japanese economy. By industry, imports of food processing products expand in a large scale to be followed by imports of textiles and leather. Correspondingly, agriculture-related production declines to some extent with fairly big decline in leather. When agricultural subsidy is abolished in addition to tariff abolishment for EAC or East Asian FTA, agricultural production declines by -4.9% increasing from -0.4%, while livestock by -3.5% increasing from -1.9%. Subsidy rate in agriculture is 4.6% and that of livestock is 2.1%. In value, the former is about 2.5 billion dollars and the latter is about 0.4 billion dollars.[15] Reading the results in the opposite way means that production of agriculture and livestock in Japan can be maintained by increasing subsidies of these industries under the

[15] According to GDP data for Japan, average tariff rate for agriculture is 23.1%, that of livestock is 3.8%, subsidy of agriculture (sum of subsidies to production and capital) is 4.6% of production, and that of live stock is 2.1%.

East Asian FTA with zero tariff rates for all industries. Replacing tariffs by subsidies is, of course, against the spirit of East Asian FTA though it may be permissible for short period of transition or restructuring to competitive agriculture.

6. Concluding Remarks

The impact analysis based on the world CGE model indicates that the East Asian FTA or East Asian Community generally has positive effects on growth, improves income distribution, and results in poverty reduction, though the impacts on China are a little bit exceptional. The results indicate positive potential or long-run positive effects of the East Asian Community, but its requirement of structural adjustment is the actual problem to be overcome in the short run.

As for China, its growth effect is not so large or possibly negative. The direction of industrial development is only towards agriculture and electronics with heavy and chemical industries and other machinery being suppressed. The East Asian FTA, therefore, may not be so attractive to China economically. Regional integration of wider scope such as APEC will have far bigger growth impacts on China, but the direction of industrial development will remain the same.[16]

As for Vietnam, on the contrary, the East Asian FTA is expected to have high growth effect, suggesting strategic role of textiles and leather industries. It is expected also to promote the structural change from agriculture to labor intensive light manufacturing together with the improvement of income distribution within rural and urban areas as well as between them.

Thailand is in-between position of China and Vietnam in terms of growth effect of the East Asian FTA, expanding agriculture and labor intensive manufacturing under more advanced industrial structure than China. Impacts of the East Asia FTA on Indonesia are generally small.

Positive potential of the East Asian FTA, universally good effect on income distribution in particular, depends heavily on tariff abolition and free trade in agriculture and, in this respect, Japan is expected to play an active and positive role. The problem here is that of restructuring and employment adjustment of the Japanese agriculture. The case of subsidy abolition is presented here, suggesting the increase in subsidy temporarily to realize smooth transition, restructuring, revival, regeneration of the Japanese agriculture.

The East Asian Community is a grand design covering political, economic, social, cultural, and security elements with various expectations mixed.[17] This paper has focused only on the real economic aspect of EAC, trying to provide the grand design with supporting

[16] The analysis here has a limitation of not allowing for the technology change which may accompany FTA.

[17] See the essays of East Asian leaders such as former Korean President Kim Dae Jung, former Malaysian Prime Minister Mohamed Mahatir, former Japanese Prime Minister Yasuhiro Nakasone in the first issue of Global Asia (East Asia Foundation (2006), pp.10-18).

evidences and analyses. The EAC is discussed here as economic union but it has another important aspect as monetary union as seen from the historical development of the European Union. ACU (Asian Currency Unit) is now a hot issue as ECU (European Currency Unit) in the 1970s and 1980s. The analysis of this paper needs to be extended to cover the monetary union, especially, the common currency unit for Asia.

This paper is based on the analysis of comparative statics for the benchmark year 2001. The static analysis can clarify the direction and degree of changes but not the process and range of changes over time. Our next task is to investigate the time profiles based on the dynamic simulation of the period, say, 2001-2025 by allowing for capital mobility, labor migration, productivity growth, etc. as well as by incorporating the aspect of common currency unit to make implications of the East Asian Community more comprehensive and definite as the economic and monetary union.

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Table 1-1 Growth, Distribution and Poverty in East Asia (1)

	GDP 2004 ($billion)	Growth rate 2000-2004 (%)	Income per capita 2004 ($)	Growth rate 2000-2004 (%)	Population 2004 (million)
Thailand	158.7	5.1	2540	4.2	62.4
Vietnam	45.1	6.6	550	5.1	82.2
Indonesia	248.0	4.6	1140	3.1	217.6
Malaysia	117.1	5.1	4650	2.7	25.2
Philippine	96.9	4.3	1170	2.2	83.6
Cambodia	4.4	5.9	320	4.0	13.6
Laos	2.2	6.0	390	4.8	5.8
Singapore	105.0	4.2	24220	2.7	4.3
China	1676.8	8.5	1290	7.9	1296.5
Hong Kon	183.5	4.8	26810	4.0	6.8
Taiwan	319.8	3.3	14092	2.8	22.7
Korea	673.0	5.4	13980	4.8	48.1
Japan	4749.9	0.9	37180	0.9	127.8

Note: World Bank, *World Development Report 2005, 2006.*
Asian Development Bank, *ADB Key Indicators 2005.*

Table 1-2 Growth, Distribution and Poverty in East Asia (2)

	Poverty incidence						Inequality			
	National pverty line			Less than $1 per day				Share of income (or		
	Year	Rural (%)	Urban (%)	National (%)	Year	National (%)	Year	Gini	Bottom 20% (%)	Top 20% (%)
Thailand	1992	15.5	10.2	13.1	2000	<2.0	2000	0.432	6.1	50.0
Vietnam	1993	57.2	25.9	50.9	1998	17.7	1998	0.361	8.0	44.5
Indonesia	1999	–	–	27.1	2002	7.5	2002	0.343	8.4	43.3
Malaysia	1989	–	–	15.5	1997	<2.0	1997	0.492	4.4	54.3
Philippine	1997	50.7	21.5	36.8	2000	14.6	2000	0.461	5.4	52.3
Cambodia	1997	40.1	21.1	36.1	1997	34.1	1997	0.404	6.9	47.6
Laos	1998	41.0	26.9	38.6	1998	26.3	1997	0.370	7.6	45.0
Singapore	–	–	–	–	–	–	1998	0.425	5.0	49.0
China	1998	4.6	<2.0	4.6	2001	16.6	2001	0.447	4.7	50.0
Hong Kon	–	–	–	–	–	–	1996	0.434	5.3	50.7
Taiwan	2002	–	–	0.8	–	–	2003	0.345	–	–
Korea	2000	–	–	3.6	1998	<2.0	1998	0.316	7.9	37.5
Japan	–	–	–	–	–	–	1993	0.249	10.6	35.7

Note: World Bank, *World Development Report 2005.* Taiwan: Asian Development Bank, *ADB Key Indicators 2005.*

Table 2-1 Distribution and poverty in Thailand (1)

	Bangkok	Central	East	Northeast	North	South	West	Kingdom
Av inc/person,month (THB	6643	4040	4117	3081	3411	3815	3746	3888
Bottom quintile	956	936	946	823	886	868	958	862
Top quintile	12573	12664	11722	12425	11800	12301	12433	12293
Income ratio (top/bottom)	8	11.1	10.4	15.7	12.7	13.5	10	14.3
Urban household	7722	5124	5691	5129	5341	5819	5463	5902
Rural household	4715	3476	3245	2180	2542	2870	3193	2796
Income ratio (urban/rural)	1.6	1.5	1.8	2.4	2.1	2	1.7	2.1
Gini coefficient	0.339	0.367	0.348	0.456	0.421	0.396	0.359	0.418
Av con/prrson,month (THB	4539	2815	2957	2109	2388	2606	2461	2677

Note: Bhuvapanich (2006). Based on socio-economic survey 2000. $1= about 40 bahts (THBs).

Table 2-2 Distribution and poverty in Thailand (2)

National average	1990	1992	1994	1996	1998	1999
Poverty line (BHT/person,month)	522	600	636	728	911	–
Poverty incidence (%)	27.2	23.2	16.3	11.4	12.9	–
Gini coefficient	0.429	0.445	0.431	0.429	0.421	0.444

Note: JBIC (2001). Based on socio-economic survey. $1 = about 40 bahts (THBs).

Table 3-1 Distribution and Poverty in Vietnam (1)

	rural			urban			national		
	1993	1998	2002	1993	1998	2002	1993	1998	2002
Poverty rate, food (%)	29	18	12	8	2	4	25	13	10
Poverty rate, general (%)	66	45	36	25	7	7	50	37	28
Gini coefficient	0.28	0.28	0.33	0.34	0.35	0.38	0.33	0.35	0.42

Note: JBIC(2005), GSO(2005).

Table 3-2 Distribution and Poverty in Vietnam (2)

		total	urban			rural		
	unit		total	botomn 10%	top 10%	total	botomn 10%	top 10%
Average household income	1000 VND	20972	33444	9009	53329	17050	8336	36319
Income share	%	100	38.1	0.2	20.9	61.9	3.2	5.9
Source of income	%	100	100	100	100	100	100	100
Self-employed, agr	%	31.4	6.9	44.4	2.7	46.5	66.6	25.5
Self-employed, non-agr	%	21.7	30.6	25.5	30.3	16.2	5.2	26.4
Wage income	%	30.5	42.3	20	42.8	23.2	19.8	21
Transfer income	%	16.4	20.2	10.1	24.2	14.1	8.4	27.2
Annual per capita income	1000 VND	4510	7469	1651	12906	3625	1520	9791
Income share	1	1	1.7	0.4	2.9	0.8	0.3	2.2
Annual per capita expend	1000 VND	3414	5830	1120	10580	2691	1100	9265
Share of expenditure	1	1	1.7	0.3	3.1	0.8	0.3	2.7
Annual working hours per year	hours	1583	2035	1341	2277	1475	1405	1747
Av wage per hour	VND	3841	5537	1157	7810	2855	1613	5182
Wage ratio	1	1	1.4	0.3	2	0.7	0.4	1.3
Employment by sector	%	100	100	100	100	100	100	100
Formal	%	14.8	29.5	6.1	38.8	10	2.7	24.8
Informal	%	85.2	70.5	93.9	61.2	90	97.3	75.2
Employment by industry	%	100	100	100	100	100	100	100
Agriculture	%	51.3	13.7	69.7	3.6	63.9	87.7	30.2
Manuf and construction	%	19.5	27.3	10.3	27.4	16.8	7.1	21.7
Services	%	29.2	59	19.9	68.9	19.3	5.1	48.1

Note: Nguyen and Ezaki (2005). Based on Vietnamese Living Standard Survey 2002. $1 = 15300 VND.

Table 4 Distribution and Poverty in China

	1997	1998	1999	2000	2001	2002	2003	2004
Urban income (yuan/person)	5160	5425	5854	6280	6860	7703	8472	9422
Rural income (yuan/person)	2090	2162	2210	2253	2366	2476	2622	2936
Income ratio (urban/rural)	2.47	2.51	2.65	2.79	2.9	3.11	3.23	3.21
Urban Gini coefficient	0.29	0.30	0.30	0.32	0.32	0.32	0.33	0.33
Rural Gini coefficient	0.33	0.34	0.34	0.35	0.36	0.37	0.37	0.35
Urban bottom 10% income	–	2505	2647	2678	2835	3186	2762	–
Urban inc ratio (top/bottom)	–	4.4	4.6	5.0	5.6	5.8	8.5	–
Rural bottom 20% income	–	–	–	802	818	857	866	1007
Rural inc ratio (top/bottom)	–	–	–	6.5	6.8	6.9	7.3	6.9

	1995	2000	2002	Rural households income 2002				
Source of rural income				low	ow-middle	middle	iddle-high	high
Rural per capita income, CHY	1578	2253	2476	802	1440	2004	2767	5196
Share of agricutural income	71	63	60	70	67	63	59	51
Share of wage income	22	31	34	26	29	33	36	41
Share of non-agr income	6	6	6	4	4	4	4	8

Note: Wang and Ezaki (2006). $1 = about 8.3 yuan.

Table 5 Average Tariff Rates (20 industries, 2001)

	thl	vnm	ind	mal	phl	sgp	chn	kor	hkg	twn	jpn	indi	ocn	usa	eu	row	av
crop	13.9	11.2	1.7	22.4	5.6	0.0	40.7	66.1	0.0	5.7	23.1	21.9	2.2	1.4	3.9	9.0	13.0
livestock	4.6	2.8	2.4	0.2	5.5	0.0	5.6	3.6	0.0	2.9	3.8	12.4	1.4	0.1	1.2	5.5	2.8
forestry	1.3	1.0	0.2	0.1	0.1	0.0	0.3	1.9	0.0	0.5	0.1	6.4	0.5	0.0	0.0	2.5	0.9
fishing	32.5	10.0	2.8	0.3	3.1	0.0	10.3	13.5	0.0	15.9	3.5	3.5	0.5	0.2	1.2	3.3	2.5
mining	0.2	3.7	0.3	1.5	3.1	0.0	0.3	3.6	0.0	1.8	0.0	13.9	3.7	0.0	0.0	1.4	1.1
foodp	27.2	18.7	7.8	1.9	11.0	0.0	14.0	20.3	0.0	17.4	25.0	42.9	4.5	3.8	5.3	13.1	11.0
beverage	36.0	45.5	14.9	53.2	5.5	2.1	29.2	24.1	0.0	15.0	13.1	55.5	18.3	1.3	1.4	22.0	9.9
wood	9.9	12.8	3.3	6.2	4.5	0.0	8.2	3.9	0.0	3.2	1.1	18.1	4.8	0.2	0.1	4.7	1.9
chemical	10.5	7.2	4.2	5.5	4.3	0.0	11.5	6.2	0.0	4.1	1.1	22.3	2.9	1.9	0.5	4.8	3.1
automobile	26.7	31.8	13.8	32.2	11.7	0.0	27.6	7.3	0.0	25.5	0.0	28.7	12.9	1.3	0.9	6.5	3.6
trasportm	4.9	32.0	3.2	2.9	7.9	0.0	4.4	1.2	0.0	1.2	0.0	15.9	3.5	0.4	0.7	5.6	2.6
electronics	4.4	8.1	2.0	0.4	0.1	0.0	9.2	1.1	0.0	0.3	0.0	13.1	1.2	0.2	0.4	3.7	1.6
machine	7.6	7.4	3.0	3.8	2.2	0.0	11.6	5.7	0.0	2.9	0.1	20.3	3.3	0.9	0.4	4.5	2.7
metal	8.5	4.8	5.6	7.9	3.8	0.0	7.0	3.7	0.0	3.3	0.5	25.1	3.3	1.1	0.7	4.4	2.8
textile	15.6	23.8	7.9	10.9	6.1	0.0	17.0	9.1	0.0	8.4	8.3	21.0	13.5	8.4	2.4	12.1	7.9
leather	10.2	16.9	2.6	4.7	6.1	0.0	9.1	6.6	0.0	4.2	11.2	20.9	8.6	10.9	2.7	9.4	6.6
omanf	5.9	16.5	8.3	7.1	5.6	0.0	14.9	8.7	0.0	3.6	1.2	25.5	4.1	1.2	0.7	9.9	4.0
utility	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.4	0.2
construction	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
service	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
av	8.1	9.3	3.5	4.5	2.7	0.0	10.4	7.8	0.0	3.3	4.0	17.9	4.2	1.5	0.8	5.2	3.1

Note: calculated from GTAP 6 data base.

Table 6 Impacts of East sian Community (EAC): Macro-economy (% deviation from bas

			Real GDP				Household Consumption			
	Actual	EAC	EAC*	APEC	WTO	Actual	EAC	EAC*	APEC	WTO
thl	113.7	1.8	0.3	2.1	2.7	62.6	8.0	6.7	8.1	10.9
vnm	32.4	2.8	1.1	3.5	4.6	26.8	10.8	8.0	11.1	12.9
ind	144.7	0.3	0.1	0.3	0.4	88.2	1.4	1.2	1.4	2.2
mal	85.4	1.8	1.3	2.2	2.5	18.2	9.4	9.0	10.9	12.9
phl	70.8	0.5	0.3	0.8	0.7	52.9	1.6	1.2	2.3	2.3
sgp	79.2	0.3	-0.1	0.1	-0.2	44.0	1.6	1.2	1.2	1.6
chn	1155.1	0.2	-0.1	0.8	1.3	495.5	4.1	3.8	4.2	5.6
kor	413.0	2.8	2.5	4.0	4.5	243.9	5.2	4.9	8.4	10.4
hkg	154.9	-0.1	-0.1	-0.1	-0.7	106.6	0.3	0.4	0.6	1.5
twn	279.3	0.3	0.1	0.3	0.5	168.7	1.4	1.2	1.6	2.1
jpn	4152.2	0.1	0.0	0.2	0.2	2237.0	0.4	0.4	0.8	0.8
indi	475.2	-0.1	0.0	-0.1	1.0	303.6	-0.1	-0.1	-0.2	3.7
ocn	420.0	-0.1	0.0	0.3	0.3	236.2	-0.2	-0.2	2.0	2.3
usa	10063.5	0.0	0.0	0.0	-0.1	6925.9	-0.1	0.0	0.2	0.2
eu	7836.2	-0.1	0.0	-0.1	-0.1	4258.0	-0.1	0.0	-0.1	0.3
row	5568.4	-0.1	0.0	-0.2	0.5	3306.9	-0.1	0.0	-0.3	2.3
		Government Consumption					Capital Formation			
	Actual	EAC	EAC*	APEC	WTO	Actual	EAC	EAC*	APEC	WTO
thl	11.6	-24.9	-26.0	-27.5	-34.0	23.1	30.3	4.8	30.4	36.8
vnm	2.6	-45.1	-45.8	-46.2	-47.5	12.7	12.7	-6.4	13.3	13.9
ind	10.2	-11.0	-11.3	-12.0	-14.0	23.4	4.3	2.9	4.6	4.3
mal	5.5	-63.2	-63.5	-68.3	-78.0	12.9	18.9	20.3	20.6	25.7
phl	9.5	-6.2	-6.0	-7.9	-10.2	14.0	5.3	0.4	9.2	7.8
sgp	12.2	0.3	-0.2	0.1	-0.1	29.0	4.3	1.2	3.6	4.2
chn	147.6	-11.7	-11.9	-13.7	-16.3	408.8	3.9	0.4	4.8	6.1
kor	42.3	-16.4	-17.0	-18.8	-22.5	107.1	4.2	0.0	5.2	7.3
hkg	18.3	0.4	0.3	1.0	0.4	47.2	0.0	-0.2	0.1	1.1
twn	35.9	-7.9	-8.1	-10.1	-14.0	51.3	3.8	3.9	4.3	4.4
jpn	718.0	-0.6	-0.7	-1.3	-1.6	1029.0	0.8	0.2	0.7	-0.4
indi	60.8	-0.3	-0.1	-0.5	-35.9	106.1	-0.5	-0.1	-0.7	7.0
ocn	75.5	-0.2	-0.1	-6.3	-8.4	88.1	-1.0	-0.2	4.9	5.0
usa	1528.6	-0.1	-0.1	-1.5	-2.5	1990.6	-0.7	-0.1	0.2	-1.3
eu	1626.0	-0.1	0.0	-0.2	-1.1	1534.5	-0.8	-0.1	-1.0	-1.2
row	897.1	-0.2	-0.1	-0.2	-8.7	1103.7	-0.6	0.0	-1.2	6.0
			Exports					Imports		
	Actual	EAC	EAC*	APEC	WTO	Actual	EAC	EAC*	APEC	WTO
thl	80.0	4.7	6.1	6.1	7.1	69.5	3.1	11.1	18.5	23.7
vnm	15.0	14.4	19.2	16.3	24.1	27.7	17.5	13.2	21.7	27.9
ind	68.2	2.0	1.9	2.6	4.2	47.0	21.9	4.1	5.5	9.1
mal	125.4	4.3	3.7	4.7	5.3	80.3	4.6	7.2	8.6	10.3
phl	38.2	1.6	2.3	1.2	1.4	45.0	7.5	2.0	4.1	3.5
sgp	111.3	0.2	0.3	-0.1	-1.0	124.5	1.7	1.0	1.1	0.8
chn	379.5	4.9	6.3	8.7	12.5	313.8	12.1	10.0	17.2	25.7
kor	176.9	8.2	9.4	10.3	12.1	176.4	16.4	15.1	27.0	33.7
hkg	97.1	0.3	0.3	0.4	3.4	114.4	0.5	0.6	1.2	5.6
twn	136.8	2.8	2.5	3.5	4.8	120.7	4.0	3.9	4.7	6.0
jpn	453.0	1.7	2.2	3.9	5.4	430.1	4.8	3.7	8.2	7.7
indi	60.6	0.0	-0.3	-0.3	25.9	75.9	-1.1	-0.7	-2.0	18.9
ocn	96.0	0.0	-0.2	3.9	5.2	100.3	-1.2	-0.8	8.0	8.8
usa	888.9	0.1	-0.3	1.6	2.7	1321.0	-1.1	-0.5	1.1	-1.2
eu	2514.6	0.0	-0.1	-0.1	0.7	2592.3	-0.5	-0.2	-0.7	0.2
row	1656.3	0.1	-0.1	-0.1	3.3	1737.0	-0.4	-0.1	-1.2	6.7

Note: EAC is the FTA of ASEAN, China, NIEs, and Japan. EAC* means the FTA of EAC countries and economies under perfectly inelastic capital mobility. APEC means the FTA of EAC, Oceania and USA. WTO is the FTA of all countries in the world. Units of actual data is US$1 million (2001).

Table 7 Impacts of East Asian Community (EAC): Industry (% deviation from base run)

Output	thl	vnm	ind	chn	jpn	(EAC＋α)
crop	12.4	2.1	0.4	7.0	−0.4	−4.9
livestock	20.9	1.6	0.1	2.5	−1.9	−3.5
forestry	−5.0	−3.3	3.3	0.3	−0.6	−0.6
fishing	15.9	2.8	0.7	2.1	−1.5	−2.0
mining	−12.1	−1.3	−0.1	−0.7	−2.0	−1.3
foodp	27.3	0.8	0.6	4.0	−2.6	−3.4
beverage	4.3	0.7	1.7	2.5	0.3	0.0
wood	−9.2	−7.6	3.7	−1.5	−0.3	−0.3
chemical	0.3	−0.6	0.8	−1.6	0.5	0.5
automobile	−6.3	−41.7	−5.8	−10.5	1.6	1.8
trasportm	23.1	−44.0	−0.6	3.6	−0.2	0.1
electronics	1.1	−15.4	2.9	8.6	−0.5	−0.3
machine	7.2	4.4	6.4	−2.6	1.8	2.2
metal	−6.8	−14.3	−2.2	−1.2	1.0	1.1
textile	−12.0	83.0	0.0	−3.6	−3.4	−3.2
leather	−8.1	20.9	−2.5	6.2	−11.7	−11.7
omanf	−7.6	−8.1	−2.4	−0.1	−0.1	0.0
utility	0.7	2.3	0.2	−0.4	0.1	0.1
construction	27.8	12.2	3.7	3.6	0.7	0.6
service	−2.2	−4.6	−0.7	−2.4	−0.1	0.0
Exports	**thl**	**vnm**	**ind**	**chn**	**jpn**	**(EAC＋α)**
crop	18.5	2.9	1.6	88.5	−0.5	−8.1
livestock	19.1	−0.6	1.9	2.9	2.8	−1.1
forestry	−7.2	−3.8	2.9	0.9	1.4	1.6
fishing	11.4	−0.6	2.5	5.1	5.3	4.9
mining	−14.1	−4.3	−0.5	0.9	−0.4	0.4
foodp	41.8	6.0	4.2	17.7	6.4	5.1
beverage	8.3	7.1	21.9	13.4	10.9	10.6
wood	−9.5	−5.3	4.7	0.5	2.6	2.8
chemical	4.6	14.6	3.2	1.0	2.7	2.9
automobile	−3.7	−33.8	−2.3	−5.5	2.7	3.0
trasportm	24.9	−30.4	2.1	6.3	−0.2	0.3
electronics	1.7	−12.6	3.1	13.1	−0.7	−0.3
machine	8.2	10.4	7.2	0.1	3.0	3.5
metal	−4.7	−12.5	−1.4	1.2	3.5	3.8
textile	−11.8	94.2	1.7	2.8	4.0	4.3
leather	−9.2	24.7	−3.0	8.8	−8.3	−8.1
omanf	−8.4	−4.5	−1.8	1.8	0.8	1.0
utility	−3.9	0.8	−0.5	0.6	−0.7	−0.5
construction	18.4	8.2	2.9	3.8	−0.1	0.0
service	−5.5	−8.3	−1.4	−1.2	−0.9	−0.7
Imports	**thl**	**vnm**	**ind**	**chn**	**jpn**	**(EAC＋α)**
crop	37.0	10.3	−2.5	−0.6	−3.8	3.0
livestock	24.9	29.3	4.7	2.6	1.1	5.9
forestry	10.8	17.6	5.9	2.4	1.4	1.1
fishing	43.9	15.2	2.4	4.9	0.6	0.0
mining	7.3	54.9	5.1	−2.4	1.0	0.9
foodp	32.4	39.8	9.7	11.4	22.7	23.5
beverage	28.9	88.6	10.1	15.0	3.1	3.0
wood	20.2	33.2	2.0	8.8	2.9	2.4
chemical	14.9	15.7	3.3	19.0	1.0	0.5
automobile	66.1	64.3	24.9	42.5	1.5	0.9
trasportm	24.7	14.0	4.5	1.3	2.5	1.7
electronics	8.5	22.5	3.6	5.8	4.2	3.5
machine	16.8	14.1	3.7	17.4	0.7	−0.1
metal	9.8	10.2	6.5	6.4	2.1	1.6
textile	52.0	60.9	13.3	37.1	18.0	17.5
leather	56.4	31.9	5.6	18.8	21.4	21.0
omanf	22.4	60.1	18.1	28.9	3.6	3.1
utility	14.9	11.2	2.4	−1.8	2.9	2.3
construction	33.3	18.4	4.0	1.6	2.1	1.7
service	7.1	10.4	0.7	−3.8	1.6	1.3

Note: (EAC+α) for Japan means abolition of tariffs (FTA) and agricultural subsidies.

Table 8a Impacts of East Asian Community (EAC): Household Income (% deviation from base rur

(Vietnam)

	EAC	APEC	WTO
Rural	11.3	11.2	15.1
Urban	9.9	10.2	14.4
Rural			
1st decile	12.4	11.2	13.5
2nd decile	12.7	11.8	15.0
3rd decile	12.6	12.0	15.3
4th decile	12.9	12.5	16.1
5th decile	12.4	12.1	16.4
6th decile	11.9	11.6	15.6
7th decile	11.1	11.0	15.1
8th decile	11.8	11.9	16.8
9th decile	9.3	9.4	13.5
10th decil	9.9	10.1	13.9
Urban			
1st decile	14.2	13.9	18.7
2nd decile	11.5	11.5	15.4
3rd decile	12.1	11.9	15.5
4th decile	12.7	13.0	18.7
5th decile	12.4	12.7	17.1
6th decile	11.0	11.4	15.2
7th decile	10.1	10.4	14.2
8th decile	12.0	12.5	17.0
9th decile	10.0	10.5	14.8
10th decil	9.2	9.6	13.7

(Thailand)

	EAC	APEC	WTO
Rural	10.6	8.5	12.7
Urban	6.7	6.6	9.6
Rural			
1st decile	17.0	11.0	16.8
2nd decile	15.8	11.1	16.7
3rd decile	14.4	10.5	15.8
4th decile	11.1	9.3	14.3
5th decile	11.6	9.6	13.9
6th decile	11.2	9.4	14.3
7th decile	10.2	8.4	12.4
8th decile	9.4	8.3	12.2
9th decile	9.9	8.2	12.2
10th decil	9.0	7.3	10.9
Urban			
1st decile	8.4	8.5	12.3
2nd decile	8.7	8.5	12.3
3rd decile	5.3	6.2	9.6
4th decile	8.2	7.5	11.2
5th decile	6.0	6.5	9.5
6th decile	5.1	5.4	8.0
7th decile	6.2	6.2	9.1
8th decile	5.1	5.6	8.4
9th decile	6.6	6.0	8.3
10th decil	7.7	7.1	10.2

(China)

	EAC	APEC	WTO
Rural	4.6	1.9	3.3
Urban	1.0	1.4	3.6
1st decile	1.2	1.8	4.2
2nd decile	1.3	1.8	4.1
3rd decile	1.3	1.8	4.1
4th decile	1.0	1.3	3.3
5th decile	1.1	1.5	3.6
6th decile	1.1	1.6	3.9
7th decile	1.0	1.3	3.5
8th decile	1.1	1.3	3.6
9th decile	0.6	1.1	3.6
10th decil	0.6	0.9	2.9

(Indonesia)

	EAC	APEC	WTO
AGEMPL	2.4	3.2	7.1
SMLFARM	2.4	3.3	7.2
MEDFARM	2.2	2.9	6.4
LARFARM	1.9	2.5	5.4
RURLOW	1.7	2.3	5.0
RURNLAB	1.9	2.4	5.3
RURHIGH	1.8	2.3	5.0
URBLOW	1.7	2.3	5.0
URBNLAB	1.7	2.3	5.0
URBHIGH	1.7	2.2	4.7

Table 8b Impacts of East Asian Community (EAC): Household Consumption (% deviation from base ru

(Vietnam)

	EAC	APEC	WTO
Rural	11.6	11.7	13.4
Urban	9.8	10.4	12.3
Rural			
1st decile	12.6	11.6	11.7
2nd decile	12.6	12.0	13.0
3rd decile	12.3	11.9	13.0
4th decile	12.4	12.3	13.6
5th decile	11.9	11.9	13.9
6th decile	11.8	11.7	13.5
7th decile	11.6	11.7	13.6
8th decile	13.0	13.3	16.0
9th decile	9.0	9.4	11.2
10th decil	10.8	11.3	12.8
Urban			
1st decile	13.6	13.6	16.1
2nd decile	11.0	11.2	12.9
3rd decile	11.8	11.8	13.1
4th decile	11.9	12.4	15.7
5th decile	12.4	12.9	15.1
6th decile	9.8	10.5	11.9
7th decile	9.4	9.9	11.4
8th decile	10.8	11.5	13.6
9th decile	9.3	10.0	12.0
10th decil	9.7	10.3	12.1

(Thailand)

	EAC	APEC	WTO
Rural	10.3	9.3	12.9
Urban	5.9	6.9	9.1
Rural			
1st decile	16.1	11.3	16.3
2nd decile	15.0	11.5	16.3
3rd decile	13.6	10.9	15.3
4th decile	10.3	9.7	13.9
5th decile	10.9	10.1	13.6
6th decile	10.7	10.0	14.2
7th decile	10.0	9.3	12.8
8th decile	9.1	9.0	12.3
9th decile	9.5	9.0	12.3
10th decil	8.4	7.9	10.7
Urban			
1st decile	8.0	9.1	12.3
2nd decile	8.2	9.1	12.2
3rd decile	5.1	7.0	9.9
4th decile	7.7	8.0	11.1
5th decile	5.4	7.0	9.3
6th decile	4.3	5.7	7.5
7th decile	5.5	6.6	8.7
8th decile	4.3	5.9	7.9
9th decile	5.6	6.1	7.5
10th decil	6.6	7.2	9.4

(China)

	EAC	APEC	WTO
Rural	6.1	4.6	5.6
Urban	2.4	3.8	5.5
1st decile	2.5	4.1	5.9
2nd decile	2.6	4.2	5.9
3rd decile	2.6	4.1	6.0
4th decile	2.4	3.7	5.2
5th decile	2.5	3.9	5.5
6th decile	2.5	4.0	5.8
7th decile	2.5	3.8	5.5
8th decile	2.5	3.8	5.6
9th decile	2.1	3.6	5.6
10th decil	2.1	3.4	5.0

(Indonesia)

	EAC	APEC	WTO
AGEMPL	1.8	1.8	3.3
SMLFARM	1.8	1.9	3.5
MEDFARM	1.7	1.8	3.1
LARFARM	1.3	1.3	2.1
RURLOW	1.3	1.3	1.9
RURNLAB	1.6	1.6	2.4
RURHIGH	1.4	1.4	2.0
URBLOW	1.2	1.2	1.8
URBNLAB	1.4	1.4	2.0
URBHIGH	1.2	1.1	1.6

Appendix The Global CGE Model

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1. Equations of the Model

Price Relations

(1) $PMS_{irk} = PM\$_{irk} \times ER_r \times (1 + tm_{irk})$

(2) $PM_{ir} = a_{S_{ir}}^{-1} (\sum_k \omega_{S_{irk}}^{1/(1+\theta_{ir})} PMS_{irk}^{\theta_{ir}/(1+\theta_{ir})})^{(1+\theta_{ir})/\theta_{ir}}$

$$where \quad M_{ir} PM_{ir} = \sum_k MS_{irk} PMS_{irk}$$

(3) $PE_{ir} = PE\$_{ir} \times ER_r / (1 + te_{ir})$

(4) $P_{ir} = a_{M_{ir}}^{-1} (\omega_{M_{ir}}^{1/(1+\delta_{ir})} PM_{ir}^{\delta_{ir}/(\delta_{ir}+1)} + (1-\omega_{M_{ir}})^{1/(1+\delta_{ir})} PD_{ir}^{\delta_{ir}/(\delta_{ir}+1)})^{(\delta_{ir}+1)/\delta_{ir}}$

$$where \quad P_{ir} Q_{ir} = PM_{ir} M_{ir} + PD_{ir} D_{ir}$$

(5) $PX_{ir} = a_{E_{ir}}^{-1} (\omega_{E_{ir}}^{1/(1-\gamma_{ir})} PE_{ir}^{\gamma_{ir}/(\gamma_{ir}-1)} + (1-\omega_{E_{ir}})^{1/(1-\gamma_{ir})} PD_{ir}^{\gamma_{ir}/(\gamma_{ir}-1)})^{(\gamma_{ir}-1)/\gamma_{ir}}$

$$where \quad PX_{ir} X_{ir} = PE_{ir} E_{ir} + PD_{ir} D_{ir}$$

(6) $WM_{ir} = a_{L_{ir}}^{-1} (\sum_l \omega_{L_{lir}}^{1/(1+\lambda_{ir})} WKM_{lir}^{\lambda_{ir}/(\lambda_{ir}+1)})^{(\lambda_{ir}+1)/\lambda_{ir}}$

$$where \quad WM_{ir} L_{ir} = \sum_l WKM_{lir} LK_{lir}$$

(7) $PVA_{ir} = PX_{ir}(1 - tp_{ir}) - \sum_j iocf_{jir} PNM_{jir}$

(8) $PINDEX_r = \sum_i cpcf_{ir} \times P_{ir}$

Definition of Market Prices

(9) $PCM_{ir} = P_{ir}(1 + tc_{ir})$

(10) $PGM_{ir} = P_{ir}(1 + tg_{ir})$

(11) $PNM_{ijr} = P_{ir}(1 + tn_{ijr})$

(12) $PKM_{ir} = P_{ir}(1+tk_{ir})$

(13) $WKM_{lir} = WK_{lir}(1+tw_{lir})$

(14) $RM_{ir} = R_{ir}(1+tr_{ir})$

Production and factor demand

(15) $X_{ir}^{S} = a_{X_{ir}} (\omega_{X_{ir}} L_{ir}^{-\rho_{ir}} + (1- \omega_{X_{ir}}) K_{ir}^{-\rho_{ir}})^{-1/\rho_{ir}}$

(16) $L_{ir} = a_{X_{ir}}^{-\rho_{ir}/(1+\rho_{ir})} (\omega_{X_{ir}} PVA_{ir} / WM_{ir})^{1/(1+\rho_{ir})} \times X_{ir}^{S}$

(17) $LK_{lir} = a_{L_{ir}}^{-\lambda_{ir}/(1+\lambda_{lir})} (\omega_{L_{lir}} WM_{ir} / WKM_{lir})^{1/(1+\lambda_{ir})} \times L_{ir}$

where $L_{ir} = a_{L_{ir}} (\sum_{l} \omega_{L_{lir}} LK_{lir}^{-\lambda_{ir}})^{-1/\lambda_{ir}}$

(18) $WK_{lir} = wagecf_{lir} WK_{lr}^{e}$, where $wagecf_{lir}$ = constant

(19) $K_{ir} = a_{X_{ir}}^{-\rho_{ir}/(1+\rho_{ir})} ((1- \omega_{X_{ir}}) PVA_{ir} / RM_{ir})^{1/(1+\rho_{ir})} X_{ir}^{S}$

(20) $R_{ir} = rentcf_{ir} R_{r}^{e}$, where $rentcf_{ir}$ = constant

Supply

(21) $D_{ir}^{S} = a_{E_{ir}}^{\gamma_{ir}/(1-\gamma_{ir})} ((1-\omega_{E_{ir}}) PX_{ir} / PD_{ir})^{1/(1-\gamma_{ir})} \times X_{ir}^{S}$

where $X_{ir} = a_{E_{ir}} (\omega_{E_{ir}} E_{ir}^{\gamma_{ir}} + (1-\omega_{E_{ir}}) D_{ir}^{\gamma_{ir}})^{1/\gamma_{ir}}$

(22) $E_{ir} = a_{E_{ir}}^{\gamma_{ir}/(1-\gamma_{ir})} (\omega_{E_{ir}} \times PX_{ir} / PE_{ir})^{1/(1-\gamma_{ir})} \times X_{ir}^{S}$,

Income and saving

(23) $YH_{r} = \sum_{i} K_{ir} \times R_{ir} + \sum_{li} LK_{lir} \times WK_{lir} + \sum_{i} PR_{ir}$

for r≠Thailand, Vietnam, China, Indonesia

(24) $YH_{hr} = (\sum_{i} ykcf_{hir} \times R_{ir} \times K_{ir} + \sum_{i} ylcf_{hlir} \times WK_{lir} \times LK_{lir})$

for r = Thailand, Vietnam, China, Indonesia

(25) $YG_r = \sum_i tp_{ir} PX_{ir} X_{ir} + \sum_i tc_{ir} P_{ir} C_{ir} + \sum_i tg_{ir} P_{ir} G_{ir} +$

$\sum_{ij} tn_{ijr} P_{ir} iocf_{ijr} X_{jr} + \sum_i tk_{ir} P_{ir} ID_{ir} +$

$\sum_{ik} tm_{irk} PM\$_{irk} MS_{irk} ER_r + \sum_i te_{ir} PE\$_{ir} E_{ir} +$

$\sum_{li} tw_{lir} WK_{lir} LK_{lir} + \sum_i tr_{ir} R_{ir} K_{ir}$

(26) $SH_r = s_{P_r} \times YH_r$ for r ≠ Thailand, Vietnam, China, Indonesia

(27) $SH_r = \sum_h s_{P_{hr}} \times YH_{hr}$ for r = Thailand, Vietnam, China, Indonesia

(28) $SG_r = s_{G_r} \times YG_r$

(29) $S_r = SH_r + SG_r$

Consumers

(30) $C_{ir} = bshr_{ir} \lfloor (1 - s_{P_r}) YH_r / PCM_{ir} \rfloor$ r ≠ Thailand, Vietnam, China, Indonesia

(31) $C_{hir} = bshr_{hir} \lfloor (1 - s_{P_{hr}}) YH_{hr} / PCM_{ir} \rfloor$ r = Thailand, Vietnam, China, Indonesia

(32) $C_{ir} = \sum_h C_{hir}$ for r = Thailand, Vietnam, China, Indonesia

(33) $C_r = \sum_i C_{ir}$

(34) $PC_r = (1 - s_{P_r}) YH_r / C_r$

Government

(35) $G_r = (YG_r - SG_r) / PG_r$

(36) $G_{ir} = cgcf_{ir} G_r$

(37) $PG_r = \sum_i cgcf_{ir} PGM_{ir}$

External sectors

(38) $Q_{ir} = \sum_j X^S_{jr} \times iocf_{ijr} + C_{ir} + G_{ir} + ID_{ir} + V_{ir} + TMQ_{i'r}$ (*i'* = service industry)

where $Q_{ir} = a_{M_{ir}} (\omega_{M_{ir}} M_{ir}^{-\delta_{ir}} + (1-\omega_{M_{ir}}) D_{ir}^{-\delta_{ir}})^{-1/\delta_{ir}}$

(39) $D_{ir} = a_{M_{ir}}{}^{-\delta_{ir}/(1+\delta_{ir})} ((1-\omega_{M_{ir}})\ P_{ir} / PD_{ir})^{1/(1+\delta_{ir})} \times Q_{ir}$

(40) $M_{ir} = a_{M_{ir}}{}^{-\delta_{ir}/(1+\delta_{ir})} (\omega_{M_{ir}}\ P_{ir} / PM_{ir})^{1/(1+\delta_{ir})} \times Q_{ir}$

Linkage between Countries or Regions

(41) $MS_{irk} = a_{S_{ir}}{}^{-\theta_{ir}/(1+\theta_{ir})} (\omega_{S_{irk}} PMS_{irk} / PM_{ir})^{1/(1+\theta_{ir})} M_{ir}$

where $M_{ir} = a_{S_{ir}} (\sum_l \omega_{S_{irk}} MS_{irk}^{-\theta_{ir}})^{-1/\theta_{ir}}$

(42) $E_{ir}^{S} = \sum_k M_{ikr}$

(43) $PM\$_{irk} = PE\$_{ik} (1 + tmr_{irk})$

(44) $\sum_r F\$_r = 0$

International transportation services

(45) $PTM.TMG = \sum_{irk} \frac{tmr_{irk}}{1+tmr_{irk}} PM\$_{irk} MS_{irk}$

(46) $TMQ_{i'r} = a_T{}^{1/(1+r)} \left[\omega_{Ti'r} (P_{i'r} / ER_r) / PTM\right]^{1/(1+\tau)} TMG$ (i'= service industry)

(47) $PTM = a_T{}^{-1} \left[\sum_r \omega_{Ti'r}{}^{1/(1+\tau)} (P_{i'r} / ER_r)^{\tau/(1+\tau)}\right]^{(1+\tau)/\tau}$ (i'= service industry)

Capital formation

(48) $I_r^n = PIM_r\ I_r$

(49) $ID_{ir} = invcf_{ir}\ I_r$

(50) $V_{ir} = invtr_{ir}\ X_{ir}^{S}$

(51) $DEP_r = depr_r K_r^S$

(52) $PIM_r = \sum_i invcf_{ir} PKM_{ir}$

(53) $PI_r = \sum_i invcf_{ir} P_{ir}$

International capital mobility

(54) $RA_r = R_r^e / PI_r - depr_r$

(55) $RE_r = RA_r (K_r^S / KLAG_r^S)^{\phi}$

(56) $RE_r = recf_r RGE$

(57) $K_r^S = KLAG_r^S - DEP_r + I_r$

GDP Indentities

(58) $GDPR_r = \sum_i C_{ir} PCM0_{ir} + \sum_i G_{ir} PGM0_{ir} + \sum_i iocf_{ijr} X_{jr} PNM0_{ir}$

$$+ \sum_i V_{ir} PX0_{ir} + \sum_i ID_{ir} PKM0_{ir}$$

$$- \sum_{ik} MS_{irk} PM\$0_{irk} + \sum_i E_{ir} PE\$0_{ir}$$

(59) $GDPN_r = \sum_i C_{ir} PCM_{ir} + \sum_i G_{ir} PGM_{ir} + \sum_i iocf_{ijr} X_{jr} PNM_{ir}$

$$+ \sum_i V_{ir} PX_{ir} + \sum_i ID_{ir} PKM_{ir}$$

$$- \sum_{ik} MS_{irk} PM\$_{irk} + \sum_i E_{ir} PE\$_{ir}$$

Equilibrium conditions

(60) $\sum_i K_{ir} = K_r^S$

(61) $\sum_i L_{lir} = \overline{L_{lr}^S}$

(62) $D_{ir} = D_{ir}^S$

(63) $\sum_{ik} MS_{irk} \times PM\$_{irk} - \sum_i E_{ir} PE\$_{ir} - TMQ_{i'r} P_{i'r} / ER_{i'r} - F\$_r = 0$

(i'= service industry)

Walrasian law

Local:

(64) $\sum_i PD_{ir} \times (D_{ir} - D_{ir}^S) + (S_r + F_r - I_r^n - \sum_i P_{ir} \times V_{ir})$

$$+ ER_r \times (\sum_{ik} MS_{irk} \times PM\$_{irk} - \sum_i E_{ir} PE\$_{ir} - TMQ_{i'r} P_{i'r} / ER_r - F\$_r) = 0$$

Global:

(65) $\sum_r \sum_i PD_r \times (D_{ir} - D_{ir}^S) / ER_r + \sum_r (S_r + F_r - I_r^n - \sum_r P_{ir} \times V_{ir}) / ER_r$

$$+ \sum_{ri} PE\$_{ir} (\sum_k MS_{irk} - E_{ir}) + (PTM \times TMG - \sum_r (P_{i'r} / ER_r) TMQ_{i'r}) - \sum_r F\$_r = 0$$

N.B.

$$\sum_r F\$_r = 0 \text{ if } \sum_{ri} (\sum_k MS_{irk} - E_{ir}) = 0 \text{ and } PTM \times TMG = \sum_r (P_{i'r} / ER_r) TMQ_{i'r}$$

2. Model Notation

Sets

i,j	industries
r, k	countries or regions
l	labor types
h	households

Price Variables

$PM\$_{irk}$	world price of imports
PMS_{irk}	domestic prices of imports by sources of imports
PM_{ir}	domestic prices of imports
$PE\$_{ir}$	world price of exports
PE_{ir}	domestic prices of exports
PX_{ir}	output prices
PD_{ir}	domestic prices of domestically produced products
P_{ir}	prices of composite goods
PN_i	value added prices by sectors
PCM_{ir}	market prices of consumer's goods
PGM_{ir}	market prices of public goods
PNM_{ir}	market prices of intermediate inputs
PKM_{ir}	market prices of capital goods
PI_r	investment price index
PIM_r	investment price index
PC_r	consumer price index
PG_r	price index of public goods
PTM	price index of international transportation services

W_{ir}	wage rates by sectors
WK_{lir}	wage rates by sectors and types of labour
WM_{ir}	composite market wage rates
WKM_{lir}	composite market wage rates by sectors and types of labour
WK^{e}_{lr}	equilibrium wage rates by types of labour
R_{ir}	capital rents
RM_{ir}	market capital rents
R^{e}_{r}	equilibrium capital rent
RA_{r}	net real rate of return to capital
RE_{r}	expected rate of return to capital
RGE	global expected rate of return to capital
ER_{r}	exchange rate

Quantity variables

X^{S}_{ir}	domestic output
L_{ir}	composite labor demand
LK_{lir}	labor demand by types of labor
$\overline{L^{S}_{lr}}$	supply of labor by types
K_{ir}	capital demand by sector
K^{S}_{r}	total supply of capital
$KLAG^{S}_{r}$	total capital stock in the previous period
Q_{ir}	composite good demand
D_{ir}	domestic supply of domestically produced products
E_{ir}	export supply
M_{ir}	imports
MS_{ir}	imports by country of origin
TMG	total demand for international transportation services
TMQ_{ir}	demand for international transportation services by countries
C_{ir}	household consumption by sectors
C_{r}	total demand for household consumption
G_{ir}	demand for government consumption
G_{r}	total demand for government consumption
$F\$_{r}$	foreign savings

I_r	total real fixed investment
ID_{ir}	demand for capital goods
V_{ir}	demand for inventory investment
DEP_r	total depreciation expenditure
$GDPR_r$	Real GDP by countries

Nominal variables

YH_r	household income
YG_r	government revenue
SH_r	household savings
SG_r	government savings
S_r	domestic savings
I_r^n	nominal fixed investment
$GDPN_r$	nominal GDP by countries

Parameters

$a_{X_{ir}}$	scale parameters in production functions
$\omega_{X_{ir}}$	share parameters in production functions
ρ_{ir}	exponent parameters in production functions
$a_{L_{ir}}$	scale parameters in labour demand functions
$\omega_{L_{lir}}$	share parameters in labour demand functions
λ_{ir}	exponents in labour demand functions
$a_{M_{ir}}$	scale parameters in composite goods functions
$\omega_{M_{ir}}$	share parameters in composite goods functions
δ_{ir}	exponents in composite goods functions
$a_{S_{ir}}$	scale parameters in import demand functions
$\omega_{S_{irk}}$	share parameters in import demand functions
θ_{ir}	exponents in import demand functions

$a_{E_{ir}}$	scale parameters in export supply functions
$\omega_{E_{ir}}$	share parameters in export supply functions
γ_{ir}	exponents in export supply functions
$iocf_{ijr}$	intermediate input coefficient of good j in industry i
$ykcf_{hir}$	share of capital income accrued to household h
$ylcf_{hlir}$	share of labor income accrued to household h
$subs_{ir}$	subsistence consumption (for other countries rather than Thailand)
$subs_{hir}$	subsistence consumption (for Thailand)
$bshr_{ir}$,	marginal budget shares
$cgcf_{ir}$	government consumption shares
$invcf_{ir}$	fixed investment shares
$invtr_{ir}$	ratios of inventory investment to real production
s_{P_r} , $s_{P_{hr}}$	private saving rate
s_{G_r}	government saving rate
tm_{ir}	import tariff rates
te_{ir}	export duty rates
tc_{ir}	sale taxes on consumers' goods
tg_{ir}	sale taxes on public goods
tn_{ijr}	sale taxes on intermediate inputs
tk_{ir}	sale taxes on capital goods
tp_{ir}	production taxes/subsidies
tw_{lir}	labor taxes/subsidies
tr_{ir}	capital taxes/subsidies

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