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Regional Economic Integration and its Impacts on Growth, Poverty and Income Distribution: The Case of China *

by

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Abstract

By using a global linkage Computable General Equilibrium (CGE) model with the block of Chinese households' income and expenditure inside，the ongoing and potential FTAs of East Asia are simulated to evaluate their impacts on Asia, especially on China's growth, poverty reductions and income distribution. The results reveal that ASEAN countries (small countries) will almost benefit from all kinds of FTAs. The poor people in China will benefits more from liberalization than rich ones. We suggest that the policies to reduce poverty should be focused more on the domestic causes, and when the FTA of ASEAN+3 (China, Japan and Korea) is in progress, the attention to the trade relations between China, USA and EU should be paid enough.

Key words: FTA, CGE model, China, Poverty
JEL classification: D19, D39, F13, F15

1. Introduction

Since the implementation of the reform and open-door policies, its target has been to construct a socialism market economy, and China has achieved a sustained rapid growth. The causes of rapid growth are the transformation from planning to market, and trade reform especially trade liberalization which also makes a great contribution to the Chinese economy. But in the process of transition to the market economy, China also faces many challenges. One of them is the widening gap of incomes. In the end of the 1990s, the gap between urban and rural incomes, and that between urban households began to increase. And in the beginning of 21st century, they are still

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keeping on widening. How to narrow the widened gap simultaneously in the liberalization or transition to market economy is a critical issue for China in 21st century. It's an important work to investigate the causes. Many fear liberalization especially the trade liberalization will impoverish China's poor people, especially rural people. In the paper, it is the main purpose to check if the trade liberalization really impoverishes China's poor people, especially rural people. The answer will affect the direction of the policies in poverty reduction.

Bhattasali et al. (2004) analyzed the impacts that China's accession to WTO has on poverty. This paper attempts to analyze the impacts of ongoing or potential regional economic integration on China, focusing on growth, poverty reductions and income distribution. FTAs of ASEAN, ASEAN+1(China), ASEAN+1(Japan), ASEAN+2(Japan, Korea), ASEAN+3(China, Japan, Korea), ASEAN+3+3(China, Japan, Korea, Australia, India, New Zealand), and WTO (global FTA) are simulated to evaluate their impacts on Asia, especially on China's growth, poverty reductions and income distribution. For this purpose, we construct a global linkage Computable General Equilibrium (CGE) model, using data from GTAP database 6.0 and incomes and expenditures surveys of China's households (2001). In the model, households of China are classified into two kinds: rural households (only one kind) and urban households (deciles). And two equations are established to describe the two types of rural labors' migrations: one is from agriculture into non-agriculture; another is from agriculture to casual employment. These mechanisms represent some important characteristic of china's labor market and will have a major influence on residents' income.

The paper proceeds as follows. The trade liberalization in China and ASEAN is introduced in section 2. The trends of China's poverty and income distribution are covered in section 3. The structure of the global linked CGE model is presented in section 4, and the simulation design and scenarios are introduced in section 5. Implications and conclusion are summarized in section 6.

2. Trade Liberalization in China and ASEAN

The trade liberalization and regional economic integration have been recently accelerated in East Asia, with several free trade areas being established or under negotiation. ASEAN Free Trade Area (AFTA) became effective on January 1, 2002, for the original six ASEAN members, and longer timetables apply to the four new ASEAN members: 2004 for Vietnam, 2006 for Laos and Myanmar, and 2008 for Cambodia.[1]

After being accepted as a member of WTO at the Doha ministerial meeting in

[1] Krumm et al. (2004), p.44.

November 2001, China has been playing an active and prominent role in the WTO, and sharply increased its share of world trade. China and the Association of Southeast Asian Nations (ASEAN) certainly realize the importance of economic co-operation and regional integration. In November 2002, a Framework Agreement on Comprehensive Economic Co-operation (FACEC) between ASEAN and China was signed in Cambodia, with the aim to set up an ASEAN-China Free Trade Area (FTA) within ten years (by 2010). In November, 2004, they subsequently signed the Agreement on Trading in Goods of the Framework Agreement on Comprehensive Economic Cooperation. Now, China and ASEAN have begun all-around tariff reduction process since July 20th, 2005, and are speeding up negotiations on service trade and investment. Not until 2010 there will be built the free trade area covering a population of 1,850 million, with GDP of $2 trillion (US), and a total trade amount of $2.3 trillion (US).[2] China-ASEAN FTA will be the biggest free trade area not only in Asia but also among the developing countries. It will effectively promote China-ASEAN economic development and co-operation in all kinds of fields.

Followed by China, FTAs of ASEAN with other Asian countries are under active discussions and negotiations. In November 2002, ASEAN-Korea FTA was proposed in the Cambodia's meeting. Besides, FTA arrangements between Japan and several Asian-Pacific countries are now under negotiation after the signing of the Japan-Singapore Economic Partnership Agreement (JSEPA). Early in 2000, the proposal of establishing the ASEAN+3(China, Japan, Korea) Free Trade Area was discussed and negotiated among government officials. In September 2002, ASEAN reached a framework agreement with Australia and New Zealand, to promote the integration in trade, investment and economic co-operation. In the same year, India also initiated to establish free trade area with ASEAN at the Phnom Penh ASEAN Summit. Bilaterally, Singapore has initiated FTAs with the European Free Trade Area (EFTA), and the United States.

In December 2005, China, Japan, Korea, India, New Zealand and Australia together with 10 members of ASEAN attended the summit, and a dispute occurred on the acceptable cooperation format of ASEAN. ASEAN countries and China support ASEAN +3 while Japan, Australia and New Zealand agree with the ASEAN +3+3.

In practice, ASEAN +3 is considered as a better co-operation, but it remains an unsettled question that China, Korea and Japan still have a great conflict in non-economic fields. So, in a short term, it is unrealistic for China, Korea and Japan to reach an agreement of FTA. It is feasible to first establish FTAs between ASEAN and

[2] MOFCOM (2006).

individual economies in Northeast Asia (China, Japan and Korea), or rather, the ASEAN +1 format. Based on that, ASEAN +3 then ASEAN +3+3 arrangements can be discussed and negotiated amongst all members.

As a result of the ongoing liberalization initiatives, the share of internal trade among East Asia to trade of the whole region has now sharply increased up to over 50% from 30% in the 1970s. During the first five years of the 21st century, ASEAN trade value increased at the rate of 7.4% in imports and 6.2% in exports per year. In 2004, its imports and exports respectively reached to US $4.6 billion and 5.2 billion, of which ASEAN members, Japan, USA, EU, and China were its major importing and exporting regions and countries.

Table 1 Value of imports and its growth rate for ASEAN and other countries

Unit: US$ million, %

	1993	1995	1999	2000	2004	1993-99	2000-04
ASEAN Members	38,763	53,602	57,771	73,466	101,797	8.3	8.5
China	4,336	7,130	12,332	18,137	43,211	23.2	24.2
Japan	55,703	78,535	51,466	65,631	72,498	-1.6	2.5
Korea	7,148	11,346	12,278	15,181	20,727	11.4	8.1
Total of three	67,187	97,011	76,076	98,949	136,435	2.5	8.4
Hong Kong	-	-	7,083	8,419	9,007	9.8	1.7
Taiwan	8,160	11,241	7,429	8,661	19,760	-1.9	22.9
India	1,430	1,838	2,194	3,210	6,730	8.9	20.3
Australia	5,392	7,173	6,093	8,695	9,144	2.5	1.3
New Zealand	723	866	752	1,035	1,350	0.8	6.9
EU (15countries)	31,822	46,393	34,712	39,093	51,804	1.8	7.3
USA	33,713	46,435	45,991	48,448	54,584	6.4	3.0
Others	36,121	53,996	43,245	55,881	69,335	3.0	5.5
Total	223,311	318,555	281,346	345,857	459,945	4.7	7.4

Source : Author's calculation based on *ASEAN Statistical Yearbook, 2005*

Though China was ASEAN's fifth largest trading partner, both its imports from China and exports to China grow most rapidly, respectively at the average rate of 24.2% and 28.6% during the first five years of the 21st century. In 2004, its imports from China and exports to China rose to US $43,211 million and 38,544 million from US $18,137 million and 14,117 million in 2000. Therefore, it is predictable that such an increase trend will continue with the establishment of ASEAN+China FTA by 2010.

These FTAs schemes will also force China to liberalize its agriculture with the commitment to gradually reduce tariffs on agricultural products. In 2001, nominal rates of protection on maize, cotton and sugar are still high, respectively 32%, 17% and 40%.[3] The ongoing FTAs schemes and negotiations will promote China's agriculture liberalization, and this will influence rural residents' income.

Table 2 Value of exports and its growth rate for ASEAN and other countries

Unit: US$ million, %

	1993	1995	1999	2000	2004	1993-99	2000-04
ASEAN Members	43,681	70,179	74,699	92,911	117,090	11.3	6.0
China	4,529	6,201	9,564	14,117	38,554	16.1	28.6
Japan	30,952	42,681	37,629	50,484	63,613	4.0	5.9
Korea	6,126	8,574	10,878	14,435	19,771	12.2	8.2
Total of three	41,607	57,456	58,071	79,036	121,938	6.9	11.4
Hong Kong	-	-	16,843	21,749	29,669	16.8	8.1
Taiwan	6,144	8,761	8,933	10,289	17,538	7.8	14.3
India	1,484	2,821	5,577	6,199	10,610	30.3	14.4
Australia	3,697	5,179	7,854	8,883	16,171	16.3	16.2
New Zealand	565	762	892	1,212	2,114	9.6	14.9
EU (15countries)	31,392	44,286	55,651	62,567	68,666	12.1	2.4
USA	42,008	54,994	70,003	72,856	73,961	10.8	0.4
Others	36,060	52,259	42,543	51,879	61,469	2.8	4.3
Total	206,637	296,697	341,067	407,579	519,225	10.5	6.2

Source : Author's calculation based on data from *ASEAN Statistical Yearbook, 2005*

3. Poverty and income distribution in China

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, for example, poor population was reduced by 200 million to 161 million in 1990-2002, and poor population ratio down by 19.0% from 31.5% to 12.5% during the same period.[4] However, the income gap began to increase from the end of the 1990s. Actually, in a sense poverty in China seems to be more deteriorated rather than ameliorated. Before turning to analyzing the impacts of the

[3] Bhattasali et al. (2004), p.88.

[4] See the World Bank (2003) , p.6. The poverty line set by World Bank: per capita consumption less than US $1 per day.

ongoing regional economic integration on China, the recent income and poverty in China must be clarified.

3.1 Urban

Personal Disposable Income (PDI) per capita of urban households increased to 9,422 yuan in 2004, more than two times of that in 1995. Removing the factors of price change, it increased faster at a real growth rate of 9.6% in 2000-2004, compared with 5.6% in the late 1990s (table 3).

Table 3 Urban PDI per capita and its growth rate Unit: Yuan, %

Year	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
PDI per Capita	4,283	4,839	5,160	5,425	5,854	6,280	6,860	7,703	8,472	9,422
Real growth rate	4.9	3.9	3.4	5.8	9.3	6.4	8.5	13.4	9.0	7.7
Average growth rate	5.6					9.6				

Source: Author's calculation based on data from *China Statistical Yearbook, 2005.*

Notes: PDI is in the current prices; Real growth rate and average growth rate are calculated in the constant prices.

Table 4 Gini coefficients in urban areas

1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
0.28	0.28	0.29	0.30	0.30	0.32	0.32	0.32	0.33	0.33

Source: Data for 1995 - 2003 are from *Annual Report on Chinese Residents' Income Distribution (2004)*; and data for 2004 is provided by the Urban Survey Organization of the State Statistical Bureau of China.

Despite the great rise in their incomes, income gap within urban households is steadily widening in general. Although the Gini coefficient in urban areas is still below 0.40, it keeps on rising obviously (table 4). According to Kong Jingyuan et al. (2005), there are three characteristics in urban income distribution. First, the per capita income gap between the rich group and the poor group between urban households is gradually expanding (figure 1). Second, more and more urban incomes are being occupied by the richest groups, while the poorest groups only take a small share of the urban income. In 2003, 15% of urban incomes was held by only 5% of the richest urban

population, a quarter was held by the richest 10%, and about half of incomes was occupied by the richest 25%, while the poorest 10% earned only 3.10% of the total income, and the poorest 5% was just 1.24%. Third, the higher the group's income is, the faster its income grows. In 2003, PDI per capita growth rate of the richest 10% reached to 15.0%, 5 centigrade higher than the national average growth rate; while the poorest 10% was 7.5%, only half of the former.

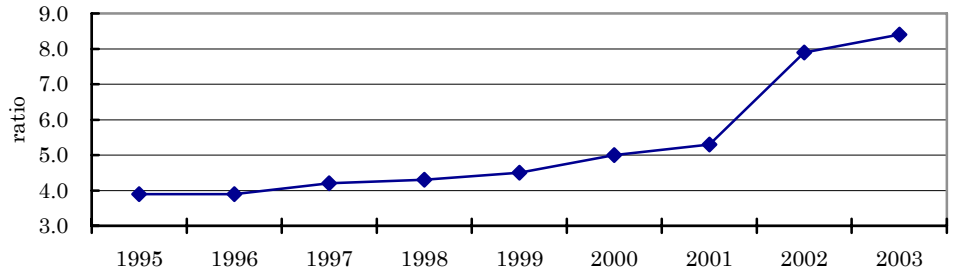

Figure 1 Income ratio of the richest 10% to the poorest 10% from 1995 to 2003
Source: Annual Report on Chinese Residents' Income Distribution (2004)

In 2003, the total income of the low-income urban residents declined at the rate of 13.3% instead of rising in 2002. Its income grows more slowly than that of the whole country and the highest-income residents, and their differences are still expanding compared to the former years (table 5). Moreover, the low-income urban residents earn less than 1/3 of the whole country on average, only 1/10 of the high-income residents in 2003 (table 6).

Table 5 Income growth of the urban poorest 10% Unit: %

	1999	2000	2001	2002	2003
Income growth rate of the lowest-income residents	5.7	1.2	5.8	12.4	-13.3
Difference to the whole country	-2.0	-6.2	-3.3	-6.7	-24.1
Difference to the highest-income residents	-4.6	-9.0	-7.8	-7.8	-41.7

Source: *Annual Report on Chinese Residents' Income Distribution (2004)*

Table 6 Income of the lowest-income urban residents Unit: Yuan, %

	1998	1999	2000	2001	2002	2003
Annual income of the lowest-income residents	2,505	2,647	2,678	2,835	3,186	2,762
Income ratio of the lowest-income residents to the whole country	46.0	45.1	42.5	41.3	39.0	30.5
Income ratio of the lowest-income residents to	22.7	21.8	20.0	18.6	17.4	11.8

highest-income residents						

Source: *Annual Report on Chinese Residents' Income Distribution (2004)*

3.2 Rural

Rural net income per capita in 2003 was 2,622 Yuan, far lower than the urban one 8,472 Yuan. Gini coefficients in rural areas are higher than those in urban areas. The Gini coefficients in rural areas in the beginning of 21st century became a bit higher than in the late 1990s (table 7).

Table 7 Gini coefficients in rural areas

1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
0.34	0.32	0.33	0.34	0.34	0.35	0.36	0.37	0.37	0.35	0.36

Source: Data for 1995 to 2003 are from *Annual Report on Chinese Residents' Income Distribution (2004)*; Data for 2004 from The State Statistical Bureau of China (2005); Data for 2005 from Rural Department of the State Statistical Bureau of China (2006).

Rural residents' income consists of returns to the agriculture and non-agriculture employments (RETURNS), wages from casual employment (WAGES), and property revenue and transferred revenue (OTHERS). The basic characteristic of rural income structure is that RETURNS are still the major income source of rural residents by now, but WAGES account for an increasing portion of the total income while RETURNS' share keeps shrinking. Compared with the year of 1990, the share of RETURNS dropped by 16.8 centigrade to 58.8% in 2003, and the share of WAGES rose by 14.8 centigrade to 35.0% in 2003 (table 8). This can also explain that the rural income growth in recent years is mainly driven by the increase in wages of casual employment (WAGES), especially of working out of home and working in township and village enterprises (TVEs).

Table 8 Rural income distribution by sources Unit: Yuan, %

Structure of Income sources	1990	1995	2000	2002	2003
Rural income per capita	686	1,578	2,253	2,476	2,622
Share of RETURNS to rural income per capita	75.6	71.4	63.3	60.0	58.8
Share of WAGES to rural income per capita	20.2	22.4	31.2	33.9	35.0
Share of OTHERS to rural income per capita	4.2	6.2	5.5	6.0	6.2

Source: *Annual Report on Chinese Residents' Income Distribution (2004)*

Concretely speaking, rural income distribution has the following characteristics: First, the higher income rural households earn, the larger portion their WAGES account for (table 9). Second, the lower income rural households earn, the larger extent their income relies on agriculture and non-agriculture returns (table 9). Third, considering the income ratio between high income group and low income group, income disparity among rural residents keeps widening (table 10). Fourth, a large part of rural incomes is being occupied by the richest groups. The richest 20% (high income group) accounted for 39.5% of total rural income, while the poorest 20% (low income group) only 7.5% (table 10).Last, the higher the group's income is, the faster its income grows. In 2000-2004, the income of the richest 20% grew at the rate of 7.5%, while the poorest 20% only 5.9% (table 10).

Table 9 Rural income distribution by sources and groups Unit: %

Groups / Income Sources	Low income		Low and medium income		Medium income		Medium and high income		High income	
	2002	2004	2002	2004	2002	2004	2002	2004	2002	2004
Share of WAGES	26	26	29	29	33	33	36	36	41	40
Share of RETURNS	70	68	67	66	63	62	59	59	51	51
Share of OTHERS	4	6	4	5	4	5	4	5	8	8

Source: Author's calculation based on data from *China Statistical Yearbook(2003&2005).*

Table 10 Rural income distribution by groups Unit: Yuan

Years / Quintile groups	2000	2001	2002	2003	2004	Income share of each group in 2004 (%)	2000-2004 growth rate (%)
Per capita income	2,253	2,366	2,476	2,622	2,936		6.8
Low income	802	818	857	866	1,007	7.5	5.9
Low-medium income	1,440	1,491	1,548	1,607	1,842	13.0	6.3
Medium income	2,004	2,081	2,164	2,273	2,578	17.2	6.5
Medium-high income	2,767	2,891	3,031	3,207	3,608	22.7	6.9
High income	5,196	5,534	5,903	6,347	6,931	39.5	7.5
Ratio of low income to high income	6.5	6.8	6.9	7.3	6.9		

Source: Author's calculation based on data from *China Statistical Yearbook (2001-2005).*

3.3 The rural-urban income gap

In recent years, as while the income disparity within urban households keeps on widening, the rural-urban income gap has become the major problem of income distribution. Table 11 shows that the rural residents' net income is markedly smaller than the PDI in urban areas during 1997 to 2004. As for the growth rate of urban PDI were faster than that of rural net income, the urban-rural income ratio is in a gradually rising trend, from 2.47 to 3.21 during the recent years. As a result, the income gap between rural and urban residents keeps on widening.

Table 11 Urban and rural incomes and their growth rates

	1997	1998	1999	2000	2001	2002	2003	2004
Urban PDI (per capita, Yuan)	5,160	5,425	5,854	6,280	6,860	7,703	8,472	9,422
Rural net income (per capita, Yuan)	2,090	2,162	2,210	2,253	2,366	2,476	2,622	2,936
Ratio of urban/rural income	2.47	2.51	2.65	2.79	2.9	3.11	3.23	3.21
Growth rate of urban PDI (%)	3.4	5.8	9.3	6.4	8.5	13.4	9.0	8.0
Growth rate of net rural income (%)	4.6	4.3	3.8	2.1	4.2	4.8	4.3	6.8
Growth rate of per capita GDP (%)	8.2	6.8	6.7	7.6	7.5	8.4	9.3	9.4

Source: Author's calculation based on data from *China Statistical Yearbook (2005).*

Notes: Urban PDI and rural net income are in the current prices, and the growth rates of them are calculated in the constant prices; The growth rate of per capita GDP is calculated by the revised historical data of GDP (SSBC, 2006).

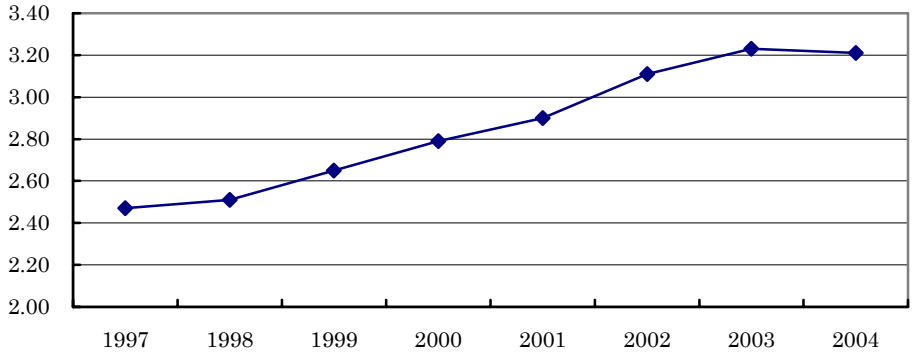

Figure 2 Ratio of Urban-rural income from 1997 to 2004
Source: Author's calculation based on data from China Statistical Yearbook (2005).

In fact, the gap between rural and urban incomes should be wider than that the above ratio indicates. The rural residents' income includes not only cash revenue but

also revenue in kind, and some of their income must be used to purchase inputs for production. Therefore, if only considering cash as farmers' income, the urban-rural income gap will be as large as 4. Moreover, the welfare difference between rural and urban residents is not taken into account. Urban citizens have been subsidized by government in the public welfare services, for example, housing allowance, social security, public health and education, etc. If considering the welfare difference, the urban-rural gap will expand to 6 times.[5]

It should be concluded, from what has been said above, that in China the rural residents earn less than 1/3 of the urban residents and the low-income urban residents earn only 1/10 of the high-income residents. And the income gap between urban and rural residents and that between urban households are keeping on widening. The poor people in China get less and less from the high economic growth than rich ones, and they are far away from the benefits of economic growth.

In the recent years, many policies are implemented to promote the growth of economy, but few policies for poor people especially rural ones are considered. As a result of those policies, the Gini coefficients in rural areas are higher than those in urban areas all along, and the Gini coefficients among urban residents are increasing quickly and becoming more closely to those in rural areas.

Although income inequality among different regions is also an important aspect of income distribution, it is not the focus of this paper. China is considered as a whole region to discuss its income distribution in this paper.

4. Overview of the Model

The model used in this study, known as the Global linkage CGE model, is a static global CGE model. We construct the model and compute it using data from GTAP database V6.0 and incomes and expenditures surveys of China's households (2001). Our model generally follows the standard neoclassical CGE model (Dervis et al., 1982), but extends the standard model by allowing for several countries and regions and international link mechanisms. Specifically, our model specifies 10 industries and 16 countries or regions. 10 industries consist of crops, other agricultural activities, mining, food processing, light manufactures, heavy manufactures, machinery and equipment, public utilities, construction and services. The specification of countries or regions in the model is chosen with the focus on the East Asian region. 16 countries or regions are China, Indonesia, Malaysia, Philippines, Thailand, Vietnam, Singapore, RoASEAN (the

[5] Kong et al. (2005), p.62.

Rest of ASEAN countries), Japan, Korea, Australia, New Zealand, India, USA(America), EU(the European Union) and ROW(the rest of the world).

4.1 Model's framework

For each country or region, firms (producers), private household, and government are represented as economic agents. Private household supply productive factors (labor and capital) to producers and obtain factor income in return. Government revenues come from household income taxes, producers' taxes, and taxes on international transactions (minus subsidies if exits). The private household consumption and savings are determined as fixed share of income. And so are for government consumption and savings. As for the savings-investment identity, a so-called savings-driven closure is adopted, so the local total nominal investment is determined by available savings in the country or region.

The factor market is modeled with the assumption of full employment to evaluate the long-term impact of regional integration; labor and capital are mobile across domestic sectors but not mobile across borders. In the model, there are two kinds of labor, that is, skilled labor and unskilled labor. And the sectoral labor demand is a CES function of skilled and unskilled labor.

The intermediate input demand is satisfied by composite goods which are composed of domestic and imported goods by using a CES function in which domestic and imported goods are imperfect substitutes (Armington Assumption). The CES assumption is general for private household's consumption, government's expenditure, and investment demand. On the demand side, household consumption is based on a Cobb-Douglas utility function, with fixed shares for sectoral composite goods. The government demand for sectoral composite goods is defined by using fixed shares of government real expenditure. And the real demand for sectoral capital goods is computed through exogenous share coefficients to the total real investment.

There is a global transportation sector to implement bilateral trade flows. The global transportation sector provides services that account for the difference between FOB and CIF values for a particular commodity shipped along a specific route. Since the model allows for different tariffs on imports by countries of origin, the prices of imports varies with import sources. Domestic consumers and producers differentiate imports by sources, that is, imports coming from different countries are considered as imperfect substitutes. This characteristic is also modeled with the Armington assumption. At the aggregate level, total import is a CES function of imports from different sources. On the export side, exporters do not differentiate exports by countries

of destination, that is, commodities supplied to foreign countries are treated as perfectly homogenous and sold at the same price. If there is a (destination-specific) export tax, it is necessary to be added to convert exports to FOB values.

For the whole system, the consumer price index of USA is selected as the numeraire. Since foreign savings are fixed exogenously in the model, capital is also immobile across borders. Thus trade flows provide the only channel, by which any change in the economic policy or economic environment in one country transmit its effects to other countries. The nominal exchange rates of all countries are also fixed.

4.2 Parts for China

In the model, the private households in China are different from other countries. Chinese households are classified into two kinds: rural households (only one kind) and urban households (deciles). For rural households, there are three choices or destinations to allocate their labor. They are agriculture employment, non-agriculture employment (self-employment), and casual employment. The third one is directly competitive with labors from the urban households. Therefore, in the model, two equations are established to describe the two types of rural labors' migrations: one is from agriculture into non-agriculture (see equation 69 in appendix A); another is from agriculture to casual employment (see equation 68 in appendix A). The elasticity of labor to the relative wage are 0.017 and 2.165 respectively (Sicular and Zhao，2004). Recently, gain from casual employment is fast growing and increasing rural households' income greatly. The urban households are classified into deciles, from the poorest 10% to the richest 10%. In regards to urban households, all of their labors are considered as formal labor to distinguish the labor from rural household.[6] Household income consists of labor and capital income, which is allocated to each household by using fixed coefficients.

5. Static simulations

To evaluate the FTAs' impacts on Asia, especially on China's growth, poverty reductions and income distribution, the seven policy scenarios in table 12 are considered. Simulation results are shown in tables 13-17.

Table 12　Policy Scenarios

S0	Base line. The real economic structure for all regions in 2001.
S1	ASEAN FTA. Free trade among the ASEAN countries. (AFTA)

[6] Of course, there are casual employment and self-employment for urban households, but it is more formal than rural ones. The classifications of formal and informal labor, employment and self-employment are relative ones.

S2	ASEAN+China. Free trade among the ASEAN countries and China. (ASEAN+1)
S3	ASEAN+Japan. Free trade among the ASEAN countries and Japan.(ASEAN+1)
S4	ASEAN+(Japan, Korea). Free trade among the ASEAN countries, Japan and Korea. (ASEAN+2)
S5	ASEAN+(China, Japan, Korea). Free trade among the ASEAN countries, China, Japan and Korea. (ASEAN+3)
S6	ASEAN+(China, Japan, Korea) + (Australia, India, New Zealand). Free trade among the ASEAN countries, China, Japan, Korea, Australia, India and New Zealand. (ASEAN+3+3) S6= S1＋(China, Japan, Korea) + (Australia, India, New Zealand)
S7	Global FTA. Complete abolition of import tariffs.

In scenario 1 (ASEAN FTA), all tariff between ASEAN countries are removed to evaluate the impacts of the ASEAN free trade area. Because of all tariff removal, both exports and imports increase for all of ASEAN countries (table 13). The extent which exports or imports increase, however, depends on the structure of protection and the composition of trade in these countries. For almost all ASEAN countries, both private consumption and real GDP increase. In Thailand, the private consumption increases, but the real GDP decreases because its import increases greatly. The results mean that these countries will benefit from ASEAN FTA. For other countries, although in some countries the private consumptions decrease, the real GDPs almost do not vary.

In regards to China (tables 14-17), all of the urban households' incomes decrease, their consumptions increase. The income and consumption of rural household decrease slightly, but the income from employment increases. This reveals there will be a remedy to increase rural household's income then consumption, if some policies to facilitate the migration to employment market in urban area are implemented.

In scenario 2 (ASEAN+China), all tariff between ASEAN countries and China are removed. For all of ASEAN countries, both private consumption and real GDP increase, and its increasing extent is bigger than that in S 1. The biggest increase can be observed in Vietnam and Malaysia.

For China, not only private consumption and real GDP increase, but also both income and consumption of urban and rural households increase. The increasing extent of rural households is bigger than that of urban ones; and the increasing extent of poorer rural households is bigger than that of urban richer ones. For rural households, labor being engaging both in agriculture and non-agriculture (self-employment) decrease and the labor in employment increases. But an increase in the wage of

agriculture is observed opposite to the decrease in the wage of non-agriculture (self-employment). And the increasing extent of income from employment is the biggest one than all other resources of income.

Except for USA, EU and ROW (Rest of the World) whose economic scales are bigger than others, the private consumptions and real GDPs in Japan, Korea, Australia, New Zealand, and India decrease to some extent. This is due to the entrance of China, the big economy.

In scenario 3 (ASEAN+Japan) and 4 (ASEAN+(Japan, Korea)), all tariff between ASEAN countries and Japan, and then between ASEAN countries, Japan and Korea are removed. For all of ASEAN countries, both private consumption and real GDP increase, but its increasing extent is smaller or similar to that in S 2 (except for Thailand).

There is a positive effect on China's real GDP but a negative effect on China's total consumption. For the rural households, both income and consumption decrease, and for urban households, income decrease but consumption increase. In the two cases, a large trade diversion can be seen. Exports from China to ASEAN countries fall sharply, but exports from China to non-ASEAN countries (except for Japan and Korea) rise slightly. Imports from ASEAN countries and Japan to China decline by several percent respectively from the base line, and the imports from non-ASEAN countries (not including Japan and Korea) to China rise about one percent or less respectively. The large trade diversion can be considered as the main causes that reduce the wages then the incomes of Chinese labor. This result suggests that China should be very keen on joining the free trade arrangements.

In scenario 5 (ASEAN+(China, Japan, Korea), all tariff between ASEAN countries, China, Japan, and Korea are removed to evaluate the impacts of ASEAN+3 free trade area. By comparing the results of S5 with S2 (ASEAN+China), we can know what impacts to China and ASEAN countries will emerge from the acceding of Japan and Korea.

The acceding of Japan and Korea almost brings the same effects on ASEAN countries as ASEAN+CHINA, although the rising extent of private consumption and real GDP in S5 is a little bigger than in S2.

In China, the private consumption rises 2.40% (bigger than 0.51% in S2), and imports and exports rises respectively 17.39% and 12.49% (extremely higher than 5.46% and 4.26% in S2). But as a result, the real GDP decreases 1.07%. That's mainly due to the huge increase of imports. As shown in table 16, imports from Japan and Korea keep the biggest shares and increase respectively 71.93% and 77.52% opposite to the decreases in S2. Although imports from ASEAN countries increase largely but the

extent is smaller than in S2 and keep smaller shares. The imports by commodities are shown in table 17, the imports of heavy manufactures and machinery have the biggest shares and increase respectively 18.33% and 16.27% (bigger than 8.89% and 5.36% in S2). Although imports of other commodities increase largely, they have little shares. It seems reasonable to conclude that the increase of imports of heavy manufactures and machinery is mainly from Japan and Korea, and it mainly causes the huge rising of imports of China then leads the real GDP of China to decreases 1.07%.

The exports of crops and food processing in China have little shares but increase respectively 252.35% and 40.82% opposite to the decreases in S2. The exports to Japan and Korea not only have bigger shares but also increase respectively 18.33% and 16.27% (bigger than 0.19% and 0.20% in S2). By comparing these results in table 16 and 17, we can conclude that the increasing exports of crops and food processing are mainly exported to Japan and Korea. As a result, the wage of agriculture increases 30.89% (lager than 0.74% in S2) and this is considered as the main cause that leads to the increase of rural households' income and consumption. Opposite to rural households, both income and consumption of urban households decrease respectively 0.36% and 2.32% (table 15).

For urban households in China, as a result of the changes in trade of China mentioned above, the decreasing extent of income of low-income households is smaller than that of high-income households. This is because the income sources by sectors are different. But the consumptions of low-income households decrease larger than that of high-income households. As a suggestion to prevent the decreases in urban households' income and consumption and then the negative effects on China's real GDP, the competitive power of China's production, especially heavy manufactures and machinery, should be strengthened.

In scenario 6 (ASEAN+3+3, i.e., ASEAN+(China, Japan, Korea)+(Australia, India, New Zealand), the results almost reveals the same effects as in S5. China's real GDP still decreases but its extent becomes smaller and the total private consumption increases little more than in S5 (table 13). It should be specially mentioned that in ASEAN+3+3 the effect on the poorer urban households' incomes becomes positive, and the decreasing extent of consumption also becomes smaller. In a word, the acceding of India, Australia and New Zealand will lighten the loss of real GDP and private consumption of China in S5, but it is limited.

In scenario 7 (the global FTA), ASEAN countries and China get respectively 2.51% and 4.31% positive effects in real GDP and private consumption. For rural households, both income and consumption increase. And the income from employment increases

greatly 10.46%. For urban households, the increasing extent of poorer urban households' income and consumption is larger than that of richer urban households (table 15). By comparing the results in S7 with those in S5, we can find the main causes that raise China's real GDP and private consumption largely. The exports of China to USA and EU have the biggest shares and increase respectively 19.62% and 27.43% in S7 and are extremely bigger than in S5,[7] therefore, they should be considered as the main causes to lead the exports of light manufactures of China to increase 39.19% in S7 (it's bigger than in S5, and the exports of light manufactures has the biggest share) and then lead to the bigger increase of real GDP and private consumption of China in S7.

From the analyzing above, one of the important characteristics of China's trade should be specially noticed. That is, China mainly imports products of heavy manufactures and machinery from Japan and Korea and mainly exports products of light manufactures to USA and EU. This characteristic is an important factor that will determine China and her households whether benefit from FTAs or not.

6. Summary and conclusion

This study used a global linkage CGE model to analyze the possible impacts of ongoing and potential FTAs, i.e., ASEAN, ASEAN+1(China), ASEAN+1(Japan), ASEAN+2(Japan, Korea), ASEAN+3(China, Japan, Korea), ASEAN+3+3(China, Japan, Korea, Australia, India, New Zealand), and WTO (global FTA), especially to evaluate their impacts on China's growth, poverty reductions and income distribution. The strategic implications of the study are as follows.

The results reveal that ASEAN countries (small countries) will almost benefit from all kinds of FTAs. In the case of ASEAN+China, China gets positive effect on real GDP and consumption, and the poor households (rural households, and poor urban households) will benefit more than rich ones.

In the cases of ASEAN, ASEAN+Japan, ASEAN+ (Japan, Korea), not including China, there are positive effects on China's real GDP but negative effects on China's private consumption. For the rural households, both income and consumption decrease, and for urban households, income decrease but consumption increase.

In the case of ASEAN+3 (China, Japan, Korea), because imports increases greatly, China's real GDP decreases but private consumption increases. From ASEAN+3 (China, Japan, Korea) to ASEAN+3+3 (China, Japan, Korea, Australia, India, New Zealand), China's real GDP still decreases but its extent becomes smaller and the consumption

[7] The share of exports to ROW (Rest of The World) is larger than EU and it increases 27.77%, but too many countries are included in ROW. Therefore they are ignored in the analysis.

increases more. In both cases, rural household gets great benefits in income and consumption. The poor urban households get negative effect and that is smaller than rich urban households, but their consumptions decrease more than that of rich urban households. It should be specially mentioned that in ASEAN+3+3 the effect on the poor urban households' incomes becomes positive, and the decreasing extent in consumption also becomes smaller.

Finally, in the global FTA (WTO), China and ASEAN countries obtain profits in many aspects.

Many fear liberalization will impoverish China's poor people, especially rural people. According to our results, except for the case of ASEAN+3 (China, Japan and Korea), poor people in China will benefit more from liberalization than rich ones. We suggest that the policies to reduce poverty should be focused more on the domestic causes.

The income from employment for rural households is an important source, and the policies to facilitate the migration to employment market in urban area should be implemented.

As some suggestions to prevent the negative effects on China's real GDP and private consumption that emerge from ASEAN+3 (China, Japan and Korea), the competitive power of China's products, especially heavy manufactures and machinery, should be strengthened to substitute the imports from Japan and Korea. Further, when the negotiation of ASEAN+3 (China, Japan and Korea) is in progress, the attention to the trade relations between China, USA and EU should be paid enough and the trade liberalization among China, USA and EU is simultaneously necessary to increase the export of China.

The findings and implications of this study should, however, be carefully interpreted. The conclusions above are drawn from the model framework that follows the neoclassical economy. But, in China, there are or will be many factors that are anti-market economy. These factors should be cleared to ensure that poor people will benefit from liberalization.

In the scenario 7 (S7), the USA gets negative effect on its real GDP, this maybe because that the foreign saving is fixed in our model. If so, what is the response of USA? Will the appreciating of RMB be required? Maybe the domestic demand of China should be increased to cut down the immense I-S imbalance. And, in scenario 5 (S5), the acceding of Japan and Korea is a factor that will prevent the growth of China. Is it really so? It is necessary for us to discuss these questions further in a dynamic CGE model in the future.

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Table 13 Impacts of regional economic integrations on countries or regions Unit: US$ million, %

		S0	S1	S2	S3	S4	S5	S6	S7
China	Real GDP	1159031	0.02	0.17	0.03	0.02	-1.07	-0.78	2.51
	GDP deflator	1.00	-0.06	-0.18	-0.13	-0.18	1.30	1.20	-1.11
	Private consumption	494964	-0.01	0.51	-0.04	-0.05	2.40	2.44	4.31
	CPI	1.00	-0.07	0.00	-0.12	-0.15	3.01	2.70	-0.96
	Imports	278168	-0.14	5.46	-0.40	-0.64	17.39	18.89	37.84
	Exports	382540	-0.05	4.26	-0.16	-0.26	12.49	13.72	28.72
	Total Output	3106208	0.03	0.32	0.05	0.06	-1.18	-0.82	2.15
Indonesia	Real GDP	145306	0.05	0.10	0.06	0.06	0.10	0.09	0.24
	GDP deflator	1.00	0.61	1.42	0.52	0.67	1.04	2.14	3.09
	Private consumption	86946	0.37	0.69	0.56	0.73	0.90	1.20	1.83
	CPI	1.00	0.46	1.15	0.49	0.64	1.00	1.88	2.60
	Imports	45807	2.90	6.25	4.34	5.54	7.53	8.85	15.01
	Exports	70462	1.41	3.02	2.45	3.14	4.23	4.26	7.39
	Total Output	286699	0.41	0.96	0.56	0.51	0.77	0.63	2.00
Malaysia	Real GDP	88041	0.78	1.02	0.97	1.00	1.20	1.34	1.74
	GDP deflator	1.00	-0.65	0.43	-1.37	-1.36	-0.85	0.26	-1.10
	Private consumption	18315	4.27	5.90	5.19	5.41	6.51	7.42	9.20
	CPI	1.00	-2.17	-2.12	-2.42	-2.41	-2.46	-1.96	-3.32
	Imports	77056	3.11	6.12	5.29	5.62	7.32	8.14	9.73
	Exports	125650	1.95	3.10	3.62	3.80	4.49	4.31	5.60
	Total Output	219275	1.10	1.72	1.58	1.57	1.92	2.07	2.76
Philippines	Real GDP	71438	0.18	0.30	0.21	0.21	0.26	0.32	0.60
	GDP deflator	1.00	0.76	1.65	0.88	1.10	1.37	1.24	1.15
	Private consumption	52781	0.81	1.19	1.01	1.15	1.31	1.32	2.17
	CPI	1.00	0.56	1.33	0.87	1.10	1.38	1.32	1.32
	Imports	43681	2.49	4.02	3.06	3.29	4.08	4.55	6.48
	Exports	38280	2.57	4.11	3.48	3.74	4.68	5.36	7.59
	Total Output	152631	0.16	0.42	0.21	0.16	0.30	0.51	0.92
Thailand	Real GDP	114681	-0.01	0.29	0.48	0.50	0.68	0.75	1.48
	GDP deflator	1.00	0.37	2.33	3.06	3.13	3.94	3.20	2.74
	Private consumption	62375	1.73	2.96	4.17	4.46	5.17	5.21	7.64
	CPI	1.00	0.27	1.64	2.48	2.55	3.08	2.61	2.22
	Imports	63493	6.57	11.93	11.83	12.41	16.43	17.66	24.33
	Exports	80187	4.96	7.98	7.47	7.89	10.54	12.07	17.28
	Total Output	254576	0.48	1.13	1.07	0.97	1.55	1.84	2.70
Vietnam	Real GDP	32723	0.86	2.07	1.29	2.07	3.29	3.39	5.58
	GDP deflator	1.00	-3.31	-2.54	-3.05	-3.50	-2.75	-2.69	-2.69
	Private consumption	27209	3.94	7.20	5.31	6.67	9.19	9.35	11.80
	CPI	1.00	-2.45	-1.28	-1.95	-1.79	-0.81	-0.70	-0.29
	Imports	24879	7.72	13.76	11.51	14.49	18.12	18.71	26.50
	Exports	14522	14.34	23.97	21.25	27.10	32.47	33.62	47.62
	Total Output	65548	1.13	2.53	2.12	2.87	3.52	3.58	5.78
Singapore	Real GDP	84853	0.04	0.05	0.04	0.03	0.01	-0.03	-0.01
	GDP deflator	1.00	2.77	4.81	2.47	2.40	3.71	4.37	4.68
	Private consumption	50979	1.60	2.65	1.40	1.34	1.94	2.16	2.43
	CPI	1.00	1.31	2.35	1.19	1.18	1.90	2.32	2.38
	Imports	129553	1.62	3.86	0.78	0.59	1.87	2.21	0.05
	Exports	114922	0.87	2.75	0.01	-0.18	0.83	1.02	-2.17
	Total Output	230235	0.45	1.33	0.10	0.02	0.51	0.56	-0.79
RoASEAN	Real GDP	79053	0.02	0.05	0.03	0.04	0.05	0.03	0.10
	GDP deflator	1.00	-2.18	-1.40	-1.94	-2.05	-1.42	-0.24	1.28
	Private consumption	51261	0.42	0.57	0.44	0.47	0.60	0.72	1.13
	CPI	1.00	-2.05	-1.30	-1.78	-1.86	-1.26	-0.18	1.16
	Imports	7003	9.88	13.88	11.16	12.19	15.71	18.33	31.52
	Exports	6196	13.32	17.60	14.85	16.22	20.00	21.75	34.36
	Total Output	138698	0.14	0.12	0.03	0.03	0.00	-0.30	0.13

Notes: S0 represents the levels of real economies of these countries in 2001;

S1~S7 represent the percent changes from S0. They are same for table14-17.

Table 13 (Concluded) Unit: US$ million, %

		S0	S1	S2	S3	S4	S5	S6	S7
Japan	Real GDP	4177569	0.00	-0.01	0.01	0.02	0.02	0.10	0.20
	GDP deflator	1.00	-0.04	-0.14	0.35	0.54	1.48	1.46	1.21
	Private consumption	2334107	-0.01	-0.03	0.17	0.21	0.46	0.68	1.16
	CPI	1.00	-0.03	-0.12	0.28	0.44	1.24	1.17	0.74
	Imports	412970	-0.15	-0.56	2.51	3.28	7.86	9.83	14.58
	Exports	453305	-0.10	-0.34	1.97	2.49	5.60	7.55	10.84
	Total Output	7316225	0.00	-0.01	0.04	0.05	0.11	0.19	0.30
Korea	Real GDP	427646	0.00	-0.03	-0.02	0.09	3.37	3.37	4.65
	GDP deflator	1.00	-0.07	-0.32	-0.17	0.49	-2.52	-2.26	-1.77
	Private consumption	245793	-0.03	-0.13	-0.08	0.70	7.29	7.55	10.83
	CPI	1.00	-0.05	-0.23	-0.11	0.50	-2.85	-2.69	-2.44
	Imports	161289	-0.16	-0.70	-0.45	4.51	15.68	16.62	24.10
	Exports	176676	-0.12	-0.46	-0.30	3.94	15.57	16.05	20.63
	Total Output	964025	-0.02	-0.07	-0.03	0.30	3.46	3.49	4.04
Australia	Real GDP	357365	0.00	0.00	-0.01	-0.01	-0.04	0.08	0.20
	GDP deflator	1.00	-0.08	-0.06	-0.16	-0.21	-0.34	5.71	2.33
	Private consumption	215858	-0.02	-0.04	-0.05	-0.07	-0.14	1.84	1.53
	CPI	1.00	-0.06	-0.04	-0.12	-0.15	-0.24	4.75	2.05
	Imports	73405	-0.20	-0.41	-0.48	-0.64	-1.15	14.25	13.07
	Exports	71886	-0.12	-0.30	-0.28	-0.38	-0.67	9.38	11.01
	Total Output	655456	-0.01	-0.04	-0.04	-0.05	-0.08	0.10	0.39
New Zealand	Real GDP	50569	-0.01	-0.01	-0.01	-0.01	-0.03	0.03	0.06
	GDP deflator	1.00	-0.27	-0.30	-0.33	-0.36	-0.56	2.47	3.53
	Private consumption	28525	-0.08	-0.11	-0.11	-0.12	-0.18	0.84	1.53
	CPI	1.00	-0.20	-0.21	-0.23	-0.26	-0.41	1.99	2.65
	Imports	15814	-0.39	-0.57	-0.53	-0.64	-1.03	4.88	8.78
	Exports	18473	-0.12	-0.23	-0.18	-0.23	-0.46	2.29	3.85
	Total Output	102565	-0.06	-0.09	-0.08	-0.09	-0.17	0.26	0.67
India	Real GDP	477342	0.01	0.00	0.00	-0.01	-0.02	0.49	1.76
	GDP deflator	1.00	-0.06	-0.05	-0.09	-0.11	-0.15	-4.60	-5.93
	Private consumption	307329	0.00	-0.02	-0.01	-0.02	-0.04	1.49	3.18
	CPI	1.00	-0.06	-0.04	-0.08	-0.10	-0.13	-4.02	-4.63
	Imports	58043	-0.18	-0.39	-0.34	-0.45	-0.80	25.10	55.48
	Exports	60186	-0.12	-0.27	-0.22	-0.29	-0.57	29.51	60.92
	Total Output	854470	0.00	-0.01	-0.01	-0.01	-0.02	0.88	1.48
USA	Real GDP	10082153	0.00	0.00	0.00	0.00	0.00	0.00	-0.02
	GDP deflator	1.00	0.00	-0.01	-0.01	-0.01	-0.02	-0.03	0.00
	Private consumption	6945724	0.00	-0.01	-0.01	-0.01	-0.03	-0.04	0.26
	CPI	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Imports	1284835	-0.04	-0.13	-0.19	-0.27	-0.62	-0.80	4.63
	Exports	888720	-0.05	-0.14	-0.19	-0.27	-0.65	-0.83	6.25
	Total Output	18028212	0.00	0.00	0.00	0.00	-0.01	-0.01	-0.02
EU	Real GDP	7929525	0.00	0.00	0.00	0.00	-0.01	-0.01	0.06
	GDP deflator	1.00	0.00	0.00	0.01	0.02	0.02	0.03	0.41
	Private consumption	4651218	0.00	-0.01	-0.01	-0.01	-0.03	-0.04	0.52
	CPI	1.00	0.01	0.01	0.02	0.03	0.04	0.07	0.25
	Imports	2566750	-0.04	-0.11	-0.07	-0.09	-0.23	-0.30	2.86
	Exports	2516383	-0.04	-0.11	-0.07	-0.10	-0.26	-0.36	2.12
	Total Output	14567195	-0.01	-0.02	-0.01	-0.02	-0.03	-0.05	0.12
ROW	Real GDP	6001339	0.00	0.00	0.00	-0.01	-0.02	-0.03	0.31
	GDP deflator	1.00	0.00	0.00	0.00	0.00	-0.03	-0.01	-1.03
	Private consumption	3755513	0.00	-0.01	-0.01	-0.02	-0.06	-0.07	1.87
	CPI	1.00	0.00	0.01	0.01	0.02	0.01	0.04	-0.90
	Imports	1883642	-0.03	-0.12	-0.09	-0.14	-0.40	-0.48	11.61
	Exports	1875089	-0.04	-0.12	-0.08	-0.12	-0.35	-0.45	11.75
	Total Output	11556739	-0.01	-0.03	-0.02	-0.02	-0.06	-0.08	0.51

Table 14 Impacts of regional economic integrations on China Unit: US$ million, 10 thousands person, 100 US$/person, %

	S0	S1	S2	S3	S4	S5	S6	S7
GDP deflator	1.00	-0.06	-0.18	-0.13	-0.18	1.30	1.20	-1.11
Consumption Price Index	1.00	-0.07	0.00	-0.12	-0.15	3.01	2.70	-0.96
Average WAGE of China	7.35	-0.07	0.57	-0.13	-0.19	3.68	3.77	4.34
Average WAGE of urban	16.87	-0.04	0.20	-0.10	-0.16	-0.01	0.43	3.02
Average WAGE of rural	2.78	-0.21	0.80	-0.34	-0.41	15.81	14.09	2.98
Agriculture	1.90	-0.42	0.74	-0.63	-0.70	30.89	26.65	-2.62
Non-agriculture	5.03	0.01	-0.09	-0.04	-0.10	-3.36	-2.55	2.56
Employment	5.95	-0.34	0.77	-0.51	-0.59	24.68	21.50	-0.42
Total Labor of Countryside	49368	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Agriculture	37707	-0.03	-0.01	-0.04	-0.04	1.64	1.41	-0.78
Non-agriculture	3914	-0.02	-0.02	-0.03	-0.03	1.12	0.96	-0.69
Employment	7747	0.15	0.05	0.22	0.22	-8.56	-7.35	4.15
Capital Rental	0.16	-0.02	0.54	-0.07	-0.12	0.37	1.01	4.94
Consumption of Urban Hhlds	257853	0.05	0.39	0.06	0.06	-2.32	-1.66	4.40
Consumption of rural Hhlds	237111	-0.09	0.63	-0.15	-0.17	7.54	6.90	4.22
Government Income	88051	-0.06	-5.16	-0.27	-0.50	-22.51	-22.10	-22.77
Government Consumption	147473	-0.03	-5.21	-0.21	-0.39	-22.54	-22.36	-23.69
Investment	408353	0.04	1.49	0.06	0.06	2.31	2.90	9.17
Rural Hhlds' Income	218262	-0.17	0.67	-0.28	-0.35	11.64	10.54	3.11
From Self-Employment	91377	-0.33	0.65	-0.52	-0.60	24.02	20.87	-0.80
Aagriculture	71696	-0.42	0.81	-0.64	-0.71	30.89	26.73	-1.85
Nonagriculture	19681	-0.03	0.09	-0.10	-0.17	-1.00	-0.48	3.04
From Employment	46101	0.03	1.09	0.01	-0.05	-0.47	0.63	10.46
From Capital	77547	-0.09	0.46	-0.18	-0.24	4.75	4.69	3.47
Urban Hhlds' Income	852719	-0.01	0.35	-0.04	-0.07	-0.36	0.15	3.41
From Labor	399176	-0.01	0.49	-0.06	-0.11	-0.50	0.22	4.81
From Capital	188469	-0.01	0.56	-0.04	-0.10	-0.59	0.20	5.26

Table 15 Impacts of regional economic integrations on China's households

Household Income Unit: US$ million, %

	S0	S1	S2	S3	S4	S5	S6	S7
Rural Hhld	218262	-0.17	0.67	-0.28	-0.35	11.64	10.54	3.11
Urban Hhlds	852719	-0.01	0.35	-0.04	-0.07	-0.36	0.15	3.41
Group 01	46472	-0.01	0.47	-0.04	-0.08	0.00	0.55	4.09
Group 02	59821	-0.01	0.50	-0.04	-0.07	-0.01	0.53	3.98
Group 03	66490	-0.01	0.45	-0.04	-0.08	-0.04	0.49	3.99
Group 04	72421	-0.01	0.41	-0.03	-0.07	-0.17	0.36	3.48
Group 05	74539	-0.01	0.43	-0.04	-0.07	-0.21	0.33	3.68
Group 06	83380	-0.01	0.40	-0.04	-0.08	-0.19	0.33	3.76
Group 07	85648	-0.01	0.34	-0.04	-0.08	-0.34	0.18	3.50
Group 08	95829	-0.01	0.31	-0.04	-0.08	-0.44	0.06	3.43
Group 09	107046	-0.01	0.26	-0.03	-0.07	-0.66	-0.17	3.16
Group 10	161072	-0.01	0.22	-0.03	-0.07	-0.75	-0.29	2.55

Household Consumption Unit: US$ million, %

	S0	S1	S2	S3	S4	S5	S6	S7
Rural Hhld	237111	-0.09	0.63	-0.15	-0.17	7.54	6.90	4.22
Urban Hhlds	257853	0.05	0.39	0.06	0.06	-2.32	-1.66	4.40
Group 01	13688	0.06	0.46	0.08	0.08	-2.91	-2.09	5.17
Group 02	17353	0.06	0.49	0.07	0.08	-2.68	-1.90	5.03
Group 03	19944	0.06	0.45	0.07	0.07	-2.52	-1.77	5.02
Group 04	21682	0.05	0.42	0.07	0.07	-2.49	-1.76	4.49
Group 05	23402	0.05	0.45	0.07	0.06	-2.39	-1.67	4.68
Group 06	25794	0.05	0.43	0.06	0.06	-2.27	-1.58	4.74
Group 07	28575	0.05	0.38	0.06	0.05	-2.23	-1.57	4.47
Group 08	30696	0.05	0.36	0.05	0.05	-2.20	-1.57	4.37
Group 09	33247	0.05	0.32	0.06	0.05	-2.28	-1.68	4.10
Group 10	43472	0.04	0.29	0.05	0.05	-2.00	-1.49	3.41

Table 16 Impacts of regional economic integrations on imports and exports of China by countries

Imports of China by origins Unit: US$ million, %

	S0	S1	S2	S3	S4	S5	S6	S7
Indonesia	4633	-3.21	85.86	-2.61	-3.01	52.84	44.27	14.04
Malaysia	9070	-0.32	80.32	2.48	2.48	52.52	45.53	20.98
Philippines	1490	-1.72	79.69	-0.29	-0.42	51.07	48.55	10.50
Thailand	5030	-1.03	169.48	-7.21	-7.13	120.57	121.54	78.49
Vietnam	675	1.73	310.18	-1.90	-3.22	271.71	257.90	167.18
Singapore	9366	-4.94	73.36	-4.08	-3.92	42.86	40.77	14.54
RoASEAN	292	10.32	202.51	8.69	9.32	176.47	153.44	83.80
Japan	50105	0.29	-7.11	-2.19	-3.09	71.93	71.91	39.03
Korea	28377	0.26	-7.13	0.83	-0.70	77.52	75.76	41.05
Australia	5287	0.27	-4.51	0.81	1.05	-5.79	58.54	17.08
New Zealand	1085	0.82	-4.63	1.24	1.45	-8.51	52.14	5.49
India	2183	0.32	-4.87	0.67	0.82	-14.06	77.25	69.57
USA	29767	0.04	-6.70	0.30	0.49	-20.13	-20.64	48.96
EU	48681	0.03	-6.27	0.19	0.33	-21.66	-21.18	37.31
ROW	82126	0.00	-5.26	0.15	0.26	-15.62	-15.70	35.85
Total	278168	-0.14	5.46	-0.40	-0.64	17.39	18.89	37.84

Exports of China by destinations Unit: US$ million, %

	S0	S1	S2	S3	S4	S5	S6	S7
Indonesia	2930	-0.08	57.96	-4.88	-6.90	43.73	43.46	46.10
Malaysia	3744	-8.91	51.04	-15.73	-16.29	38.53	40.23	35.64
Philippines	1530	-1.42	48.01	-3.65	-4.70	39.67	39.23	38.89
Thailand	3257	-8.49	94.62	-20.82	-22.48	66.81	65.91	49.52
Vietnam	2180	-17.72	179.95	-22.84	-30.18	132.10	131.19	122.11
Singapore	7554	1.75	6.77	1.00	1.22	7.35	7.74	7.99
RoASEAN	878	-18.23	36.32	-18.94	-21.09	26.10	28.27	29.29
Japan	57508	0.19	0.92	-0.60	-0.65	28.20	25.55	24.76
Korea	13365	0.20	0.76	0.59	-5.14	148.96	147.70	103.79
Australia	5726	0.15	1.20	0.43	0.63	0.21	57.82	44.35
New Zealand	823	-0.10	0.67	0.10	0.21	-1.43	40.86	39.57
India	2402	0.38	1.54	0.65	0.95	1.02	205.78	70.50
USA	109385	0.25	1.33	0.66	0.92	1.61	0.81	19.62
EU	73014	0.23	1.13	0.53	0.75	0.73	-0.15	27.43
ROW	98241	0.26	1.12	0.59	0.84	0.18	-0.55	27.77
Total	382540	-0.05	4.26	-0.16	-0.26	12.49	13.72	28.72

Table 17 Impacts of regional economic integrations on imports and exports of China by commodities

Imports of China by commodities Unit: US$ million, %

	S0	S1	S2	S3	S4	S5	S6	S7
Crops	6013	-0.93	10.61	-2.30	-2.65	36.85	64.14	278.83
Other Agriculture	4355	-0.12	1.28	-0.32	-0.47	14.57	12.69	12.86
Mining	9405	-0.19	-0.02	-0.39	-0.64	-1.91	-1.26	6.63
Food Processing	5744	0.52	14.59	-0.15	-0.41	39.18	42.50	53.40
Light Manufacture	34353	-0.13	5.49	-0.47	-0.88	39.56	40.82	67.03
Heavy Manufacture	66046	-0.18	8.89	-0.44	-0.70	18.33	19.96	35.32
Machinery	113050	-0.12	5.36	-0.31	-0.52	16.27	16.90	33.56
Utility	45	-0.18	-0.19	-0.37	-0.53	-1.73	-1.26	2.87
Construction	1282	-0.06	1.16	-0.30	-0.44	2.78	3.51	8.02
Services	37875	-0.14	-0.47	-0.28	-0.40	-1.82	-1.43	-0.47
Total	278168	-0.14	5.46	-0.40	-0.64	17.39	18.89	37.84

Exports of China by commodities Unit: US$ million, %

	S0	S1	S2	S3	S4	S5	S6	S7
Crops	4970	-4.64	-0.54	-4.12	-3.88	252.35	247.89	194.16
Other Agriculture	2403	0.22	0.40	0.58	0.80	-13.06	-7.55	13.88
Mining	4967	1.23	2.99	2.02	2.36	7.95	20.44	-6.46
Food Processing	9057	-0.49	10.68	-6.37	-7.35	40.82	28.49	52.98
Light Manufacture	151672	0.16	2.26	0.23	0.07	5.37	7.69	39.19
Heavy Manufacture	52765	-0.14	4.55	-0.07	-0.34	6.62	11.17	18.44
Machinery	134294	-0.16	6.94	-0.29	-0.29	14.65	14.31	19.84
Utility	310	0.23	0.10	0.56	0.88	2.17	0.41	-5.91
Construction	738	0.36	0.80	1.07	1.40	-1.04	-1.18	3.36
Services	21365	0.27	0.19	0.61	0.90	0.69	-0.09	-2.03
Total	382540	-0.05	4.26	-0.16	-0.26	12.49	13.72	28.72

Appendix A: Equations of Global Linkage CGE Model

Prices Block

Demand Prices for Domestic Goods

（1） $PHD_{i,r} = PX_{i,r}(1+thd_{i,r})$

（2） $PGD_{i,r} = PX_{i,r}(1+tgd_{i,r})$

（3） $PID_{i,r} = PX_{i,r}(1+tid_{i,r})$

（4） $PFD_{i,j,r} = PX_{i,r}(1+tfd_{i,j,r})$

Demand Prices for Imported Goods

（5） $PHM_{i,r} = PX_{i,r}(1+thm_{i,r})$

（6） $PGM_{i,r} = PX_{i,r}(1+tgm_{i,r})$

（7） $PIM_{i,r} = PX_{i,r}(1+tim_{i,r})$

（8） $PFM_{i,j,r} = PX_{i,r}(1+tfm_{i,j,r})$

Demand Prices for Composite Goods

（9） $PH_{i,r} = (PHM_{i,r}QHM_{i,r} + PHD_{i,r}QHD_{i,r})/QH_{i,r}$

（10） $PG_{i,r} = (PGM_{i,r}QGM_{i,r} + PGD_{i,r}QGD_{i,r})/QG_{i,r}$

（11） $PI_{i,r} = (PIM_{i,r}QIM_{i,r} + PID_{i,r}QID_{i,r})/QI_{i,r}$

（12） $PF_{i,j,r} = (PFM_{i,j,r}QFM_{i,j,r} + PFD_{i,j,r}QFD_{i,j,r})/QF_{i,j,r}$

Prices for Export and Import

（13） $PFOB_{i,r,s}EXR_{r} = PX_{i,r}(1+te_{i,r})(1+tes_{i,r,s})$

（14） $PCIF_{i,r,s}=(PFOB_{i,r,s} + PT/atr_{i,r,s})$

（15） $PEM_{i,r,s}=PCIF_{i,r,s}EXR_{r}(1+tm_{s})(1+tms_{i,r,s})$

（16） $PM_{i,r} = \sum_{s}(PEM_{i,s,r}QEM_{i,s,r})/QM_{i,r}$

Prices of Net Added Value

（17） $PVA_{i,r}=PX_{i,r}(1\text{-}tp_{i,r})-\sum_{j} iocf_{j,i,r}PF_{j,i,r}$

Average Prices for Final Demand

（18） $PPH_{r}=\sum_{i} QH_{i,r}PH_{i,r}\Big/\sum_{i} QH_{i,r}$

（19） $PGOV_{r}=\sum_{i} QG_{i,r}PG_{i,r}\Big/\sum_{i} QG_{i,r}$

（20） $PCGDS_{r}=\sum_{i} QI_{i,r}PI_{i,r}\Big/\sum_{i} QI_{i,r}$

Indices of Prices

（21） $CPI_{r}=\sum_{i} cwts_{i,r}PH_{i,r}$

（22） $GPI_{r}=\sum_{i} gwts_{i,r}PG_{i,r}$

（23） $IPI_{r}=\sum_{i} iwts_{i,r}PI_{i,r}$

Production and Factors' Markets

（24） $QX_{i,r}=A_{X_{i,r}}(\sum_{l}\delta_{X_{i,l,r}}QL_{i,l,r}^{\rho_{X_i}}+(1\text{-}\sum_{l}\delta_{X_{i,l,r}})QK_{i,r}^{\rho_{X_i}})^{1/\rho_{X_i}}$ where $r \neq china$

（24′） $QX_{i}=A_{X_{i}}(\delta_{X_{i,}}QL_{i}^{\rho_{X_i}}+(1\text{-}\delta_{X_i})QK_{i}^{\rho_{X_i}})^{1/\rho_{X_i}}$ where $r = china$

（25） $PL_{i,l,r}=distort_{w_{i,l,r}}WAGE_{l,r}$ where $r \neq china$

（26） $PK_{i,r}=distort_{R_{i,r}}RENTAL_{r}$

（27） $QL_{i,l,r}=A_{X_{i,r}}^{\rho_{X_i}\sigma_{X_i}}\left(\delta_{X_{i,l,r}}PVA_{i,r}\Big/PL_{i,l,r}\right)^{\sigma_{X_i}}QX_{i,r}$ where $r \neq china$

（28） $QK_{i,r}=A_{X_{i,r}}^{\rho_{X_i}\sigma_{X_i}}\left((1-\sum_{l}\delta_{X_{i,l,r}})PVA_{i,r}\Big/PK_{i,r}\right)^{\sigma_{X_i}}QX_{i,r}$ where $r \neq china$

Demand Block

Intermediate Demand by Firms

（29） $QF_{i,j,r}=iocf_{i,j,r}QX_{j,r}$

（30） $QFD_{i,j,r}=A_{F_{i,j,r}}^{\rho_{F_i}\sigma_{F_i}}\left(\delta_{F_{i,j,r}}PF_{i,j,r}\Big/PFD_{i,j,r}\right)^{\sigma_{F_i}}QF_{i,j,r}$

（31） $QFM_{i,j,r}=A_{F_{i,j,r}}^{\rho_{F_i}\sigma_{F_i}}\left((1-\delta_{F_{i,j,r}})PF_{i,j,r}/PFM_{i,j,r}\right)^{\sigma_{F_i}}QF_{i,j,r}$

Final Demand by Household

（32） $QH_{i,r}=\theta_{HHLD_{i,r}}YH_r(1-MPSH_r)/PH_{i,r}$ where $r \neq china$

（33） $QHD_{i,r}=A_{H_{i,r}}^{\rho_{H_i}\sigma_{H_i}}\left(\delta_{H_{i,r}}PH_{i,r}/PHD_{i,r}\right)^{\sigma_{H_i}}QH_{i,r}$

（34） $QHM_{i,r}=A_{H_{i,r}}^{\rho_{H_i}\sigma_{H_i}}\left((1-\delta_{H_{i,r}})PH_{i,r}/PHD_{i,r}\right)^{\sigma_{H_i}}QH_{i,r}$

Final Demand by Government

（35） $QG_{i,r}=\theta_{GOV_{i,r}}YG_r(1-MPSG_r)/PGOV_r$

（36） $QGD_{i,r}=A_{G_{i,r}}^{\rho_{G_i}\sigma_{G_i}}\left(\delta_{G_{i,r}}PG_{i,r}/PGD_{i,r}\right)^{\sigma_{G_i}}QG_{i,r}$

（37） $QGM_{i,r}=A_{G_{i,r}}^{\rho_{G_i}\sigma_{G_i}}\left((1-\delta_{G_{i,r}})PG_{i,r}/PGM_{i,r}\right)^{\sigma_{G_i}}QG_{i,r}$

Demand for Capital Goods

（38） $QI_{i,r}=\theta_{INV_{i,r}}INVR_r$

（39） $QID_{i,r}=A_{INV_{i,r}}^{\rho_{INV_i}\sigma_{INV_i}}\left(\delta_{INV_{i,r}}PI_{i,r}/PID_{i,r}\right)^{\sigma_{INV_i}}QI_{i,r}$

（40） $QIM_{i,r}=A_{INV_{i,r}}^{\rho_{INV_i}\sigma_{INV_i}}\left((1-\delta_{INV_{i,r}})PI_{i,r}/PIM_{i,r}\right)^{\sigma_{INV_i}}QI_{i,r}$

Demand for Imported Goods

（41） $QM_{i,r}=QHM_{i,r}+QGM_{i,r}+QIM_{i,r}+\sum_j QFM_{i,j,r}$

（42） $QEM_{i,r,s}=A_{M_{i,s}}^{\rho_{M_i}\sigma_{M_i}}\left(\delta_{M_{i,r,s}}PM_{i,s}/PEM_{i,r,s}\right)^{\sigma_{M_i}}QM_{i,s}$

Total Demand for Domestic Goods

（43） $QX_{i,r}=QHD_{i,r}+QGD_{i,r}+QID_{i,r}+\sum_j QFD_{i,j,r}+\sum_s QEM_{i,r,s}$

if $i \neq mi$

（43′） $QX_{i,r}=QHD_{i,r}+QGD_{i,r}+QID_{i,r}+\sum_j QFD_{i,j,r}+\sum_s QEM_{i,r,s}+QST_{i,r}$

if $i = mi$

Income of Household and Government

（44） $YH_r=\sum_i\left(\sum_l(1\text{-}tl_{i,l,r})(PL_{i,l,r}QL_{i,l,r})+(1\text{-}tk_{i,r})(PK_{i,r}QK_{i,r})\right)$ where $r \neq china$

（45） $$YG_r = \sum_i tp_{i,r} PX_{i,r} QX_{i,r} + \sum_i \left(\sum_l tl_{i,l,r} PL_{i,l,r} QL_{i,l,r} + tk_{i,r} PK_{i,r} QK_{i,r} \right)$$

$$+ \sum_i \left(thd_{i,r} PHD_{i,r} QHD_{i,r} + thm_{i,r} PHM_{i,r} QHM_{i,r} \right)$$

$$+ \sum_i \left(tgd_{i,r} PGD_{i,r} QGD_{i,r} + tgm_{i,r} PGM_{i,r} QGM_{i,r} \right)$$

$$+ \sum_i \left(tid_{i,r} PID_{i,r} QID_{i,r} + tim_{i,r} PIM_{i,r} QIM_{i,r} \right)$$

$$+ \sum_{i,j} \left(tfd_{i,j,r} PX_{i,r} QFD_{i,j,r} + tfm_{i,j,r} PM_{i,r} QFM_{i,j,r} \right)$$

$$+ \sum_{i,s} (te_{i,r} + tes_{i,r,s} + te_{i,r} tes_{i,r,s}) PX_{i,r} QEM_{i,r,s}$$

$$+ \sum_{i,s} (tm_{i,r} + tms_{i,s,r} + tm_{i,r} tms_{i,s,r}) PCIF_{i,s,r} QEM_{i,s,r} EXR_r$$

where $r \neq china$

International Transport Block

（46） $$QTS_{i,r,s} = QEM_{i,r,s} / atr_{i,r,s}$$

（47） $$QT = \sum_{i,r,s} QTS_{i,r,s}$$

（48） $$QST_{mi,r} = \theta_{TR\,mi,r} QT \cdot PT \cdot EXR_r / PX_{mi,r}$$

（49） $$PT = A_{TR} \prod_{mi,r} \left(PX_{mi,r} / EXR_r \right)^{\theta_{TR\,mi,r}}$$

System Constrain Block

（50） $$\sum_i QL_{i,l,r} = TQL_{l,r}$$ where $r \neq china$

（51） $$\sum_i QK_{i,r} = TQK_r$$

（52） $$FSAV_r = \sum_i \left(PCIF_{i,s,r} QEM_{i,s,r} - PFOB_{i,r,s} QEM_{i,r,s} \right) + \sum_{mi} QST_{mi,r} PX_{mi,r} / EXR_r$$

（53） $$YH_r MPSH_r + YG_r MPSG_r + FSAV_r EXR_r = \sum_i QI_{i,r} PI_{i,r} + WALRAS_r$$

where $r \neq china$

（53′） $\sum_{h} \mathrm{MPSH}_{h,r}\mathrm{YHH}_{h,r} + \mathrm{MPSG}_{r} \cdot \mathrm{YG}_{r} + \mathrm{FSAV}_{r} \cdot \mathrm{EXR}_{r} = \sum_{i} \mathrm{QI}_{i,r}\mathrm{PI}_{i,r} + \mathrm{WALRAS}_{r}$

where r=china

GDP Block

（54） $$\mathrm{GDPR}_{r} = \sum_{i} (\mathrm{QH}_{i,r}\mathrm{PH}^{0}_{i,r} + \mathrm{QG}_{i,r}\mathrm{PG}^{0}_{i,r} + \mathrm{QI}_{i,r}\mathrm{PI}^{0}_{i,r}) + \sum_{i,s} \mathrm{QEM}_{i,r,s} \cdot \mathrm{PFOB}^{0}_{i,r,s} - \sum_{i,s} \mathrm{QEM}_{i,s,r} \cdot \mathrm{PCIF}^{0}_{i,s,r} + \sum_{mi} \mathrm{QST}_{mi,r} \cdot \mathrm{PX}^{0}_{mi,r}$$

where r ≠ china

mi = International Transportation

“ 0 ” above the letter denotes the price of base year

（54′） $$\mathrm{GDPR}_{r} = \sum_{i} (\sum_{h} \mathrm{QHH}_{i,h,r}\mathrm{PH}^{0}_{i,r} + \mathrm{QG}_{i,r}\mathrm{PG}^{0}_{i,r} + \mathrm{QI}_{i,r}\mathrm{PI}^{0}_{i,r}) + \sum_{i,s} \mathrm{QEM}_{i,r,s} \cdot \mathrm{PFOB}^{0}_{i,r,s} - \sum_{i,s} \mathrm{QEM}_{i,s,r} \cdot \mathrm{PCIF}^{0}_{i,s,r} + \sum_{mi} \mathrm{QST}_{mi,r} \cdot \mathrm{PX}^{0}_{mi,r}$$

where r = china

mi = International Transportation

“ 0 ” above the letter denotes the price of base year

（55） $$\mathrm{GDPN}_{r} = \sum_{i} (\mathrm{QH}_{i,r}\mathrm{PH}_{i,r} + \mathrm{QG}_{i,r}\mathrm{PG}_{i,r} + \mathrm{QI}_{i,r}\mathrm{PI}_{i,r}) + \sum_{i,s} \mathrm{QEM}_{i,r,s} \cdot \mathrm{PFOB}_{i,r,s} - \sum_{i,s} \mathrm{QEM}_{i,s,r} \cdot \mathrm{PCIF}_{i,s,r} + \sum_{mi} \mathrm{QST}_{mi,r} \cdot \mathrm{PX}^{0}_{mi,r}$$

where r ≠ china

mi = International Transportation

（55′） $$\mathrm{GDPN}_{r} = \sum_{i} (\sum_{h} \mathrm{QHH}_{i,h,r}\mathrm{PH}_{i,r} + \mathrm{QG}_{i,r}\mathrm{PG}_{i,r} + \mathrm{QI}_{i,r}\mathrm{PI}_{i,r}) + \sum_{i,s} \mathrm{QEM}_{i,r,s} \cdot \mathrm{PFOB}_{i,r,s} - \sum_{i,s} \mathrm{QEM}_{i,s,r} \cdot \mathrm{PCIF}_{i,s,r} + \sum_{mi} \mathrm{QST}_{mi,r} \cdot \mathrm{PX}^{0}_{mi,r}$$

where r = china

mi = International Transportation

（56） $PGDP_r = GDPN_r / GDPR_r$

China Households Block

Wage and Demand for Composite Labor

（57） $PL_i = (QLH_{i,R01} PLH_{i,R01} + QLM_i PLM_i) / QL_i$

（58） $QL_i = A_{X_i}^{\rho_{X_i} \sigma_{X_i}} \left(\delta_{X_i} PVA_i / PL_i \right)^{\sigma_{X_i}} QX_i$

Self-employment for Rural Household

（59） $PLH_{i,R01} = distort_{i,AGR} WAGE_{AGR}$ *where* $i = agriculture$

（60） $PLH_{i,R01} = distort_{i,NAGR} WAGE_{NAGR}$ *where* $i \neq agriculture$

（61） $QLH_{i,R01} = A_{L_i}^{\rho_{L_i} \sigma_{L_i}} \left(\delta_{L_{i,R01}} PL_i / PLH_{i,R01} \right)^{\sigma_{L_i}} QL_i$

Wage and Demand for Composite Labor in Employment-Market

（62） $PLM_i = (QLH_{i,R02} PLH_{i,R02} + PLU_i QLU_i) / QLM_i$

（63） $QLM_i = A_{L_i}^{\rho_{L_i} \sigma_{L_i}} \left(\delta_{L_i} PL_i / PLM_i \right)^{\sigma_{L_i}} QL_i$

Wage and Demand for Urban Labor in Employment-Market

（64） $PLU_i = distort_{i,URBAN} WAGE_{URBAN}$

（65） $QLU_i = A_{LM_i}^{\rho_{LM_i} \sigma_{LM_i}} \left((1 - \delta_{LM_{i,R02}}) PLM_i / PLU_i \right)^{\sigma_{LM_i}} QLM_i$

Wage and Demand for Rural Labor in Employment-Market

（66） $PLH_{i,R02} = distort_{i,EMP} WAGE_{EMP}$

（67） $QLH_{i,R02} = A_{LM_i}^{\rho_{LM_i} \sigma_{LM_i}} \left(\delta_{LM_{i,R02}} PLM_i / PLH_{i,R02} \right)^{\sigma_{LM_i}} QLM_i$

Migration From rural household to Employment-Market

（68） $LMIG_{EMP} / (TQLS_{rural} - LMIG_{EMP}) = A_{MIG_{EMP}} \left(WAGE_{EMP} / WAGE_{AGR} \right)^{\sigma_{MIG_{EMP}}}$

Rural Labor Supply for Non-agriculture Self-employment

（69） $LMIG_{NAGR}/(TQLS_{rural}-LMIG_{EMP}-LMIG_{NAGR})$

$$=A_{MIG_{NAGR}}\left(WAGE_{NAGR}/WAGE_{AGR}\right)^{\sigma_{MIG_{NAGR}}}$$

Constrain for Rural Labor

（70） $\sum_{i} QLU_i = TQLS_{URBAN}$

（71） $\sum_{i=agr} QLH_{i,R01} + LMIG_{NAFR} + LMIG_{EMP} = TQLS_{rural}$

（72） $\sum_{i\neq agr} QLH_{i,R01} = LMIG_{NAGR}$

（73） $\sum_{i} QLH_{i,R02} = LMIG_{EMP}$

Income of Households and Government

（74） $YH_{RURAL} = \sum_{i,hr}(1\text{-}tlh_{i,hr})(PLH_{i,hr}QLH_{i,hr}) + \sum_{i}\theta_{R_i}(1\text{-}tk_i)(PK_iQK_i) + TRANFER_{RURAL}$

（75） $YH_{URBAN_{hu}} = \sum_{i}\theta_{LU_{i,hu}}(1\text{-}tlh_{i,URBAN})(PLU_iQLU_i) + \theta_{KU_{hu}}\sum_{i}(1-\theta_{R_i})(1\text{-}tk_i)(PK_iQK_i)$

$$+ TRANFER_{hu}$$

（76） $YG_{china} = \sum_{i} tp_{i,r}PX_{i,r}QX_{i,r}$

$$\sum_{i,hr} tlh_{i,hr}PLH_{i,hr}QLH_{i,hr} + \sum_{i} tlh_{i,URBAN}PLU_iQLU_i + \sum_{i} tk_iPK_iQK_i$$

$$+\sum_{i}\left(thd_iPHD_iQHD_i + thm_iPHM_iQHM_i\right)$$

$$+\sum_{i}\left(tgd_iPGD_iQGD_i + tgm_iPGM_iQGM_i\right)$$

$$+\sum_{i}\left(tid_iPID_iQID_i + tim_iPIM_iQIM_i\right)$$

$$+\sum_{i,j}\left(tfd_{i,j}PX_iQFD_{i,j} + tfm_{i,j}PM_iQFM_{i,j}\right)$$

$$+\sum_{i,s}(te_i + tes_{i,s} + te_i tes_{i,s})PX_iQMS_{i,s}$$

$$+\sum_{i,s}(tm_i + tms_{i,s} + tm_i tms_{i,s})PCIF_{i,s}QMS_{i,s}EXR$$

$$+(1-\sum_{hu}\theta_{U_{hu}})\sum_{i}(1-\theta_{R_i})(1\text{-}tk_i)(PK_iQK_i)$$

$$-\mathrm{TRANFER}_{\mathrm{RURAL}}-\sum_{hu}\mathrm{TRANFER}_{hu}$$

Expenditure of Households

（77） $\mathrm{QHH}_{i,h}=\beta_{\mathrm{H}_{i,h}}(1\text{-}\mathrm{MPSH}_{h})\mathrm{YHH}_{h}\big/\mathrm{PH}_{i}$

（78） $\mathrm{QH}_{i}=\sum_{h}\mathrm{QHH}_{i,h}$

Appendix B: Notations of Global Linkage CGE Model

Sets

i, j sectors (firms) or goods

mi international transportation sectors

r, s countries or regions

l labor types

h household types

hu city household types

Price Variables

(1) $PX_{i,r}$ price (at agent's price) for output in sector i of region r

(2) $PHD_{i,r}$ price for domestic goods i by private household of region r

(3) $PGD_{i,r}$ price for domestic goods i by government of region r

(4) $PID_{i,r}$ price for domestic goods i by investor's agency of region r

(5) $PFD_{i,j,r}$ price for domestic goods i used in firm (sector) j of region r

(6) $PHM_{i,r}$ price for imported goods i by private household of region r

(7) $PGM_{i,r}$ price for imported goods i by government of region r

(8) $PIM_{i,r}$ price for imported goods i by investor's agency of region r

(9) $PFM_{i,j,r}$ price for imported goods i used in firm (sector) j of region r

(10) $PH_{i,r}$ price for composite goods i by private household of region r

(11) $PG_{i,r}$ price for composite goods i by government of region r

(12) $PI_{i,r}$ price for composite goods i by investor's of region r

(13) $PF_{i,j,r}$ price for composite goods i used in firm (sector) j of region r

(14) $PFOB_{i,r,s}$ price in FOB for export goods from region r to s

(15) $PCIF_{i,r,s}$ price in CIF for imported goods from region r to s

(16) $PEM_{i,r,s}$ market price for imported goods from region r to s

(17) $PM_{i,r}$ price for composite imported goods i of region r

(18) $PVA_{i,r}$ firm's price of value-added in sector i of region r

(19) PHH_{r} average price for composite goods by household of region r

(20) $PGOV_{r}$ average price for composite goods by government of region r

(21) $PCGDS_{r}$ average price for composite goods by investor's of region r

(22) CPI_{r} consumer price index of region r

(23) GPI_{r} government price index of region r

(24) IPI_{r} capital goods price index of region r

(25) PSAVE the price for saving

(26) $WAGE_{l,r}$ average wage for labor l of region r

(27) $PL_{l,i,r}$ wage for labor l in sector i of region r

(28) $RENTAL_{r}$ average return for capital of region r

(29) $PK_{i,r}$ return for capital in sector i of region r

(30) PT the price for composite service of global transport

(31) EXR_{r} exchange rate of region r

Quantity variables

(32) $QX_{i,r}$ output in sector i of region r

(33) $QD_{i,r}$ supply for domestic market by sector i of region r

(34) $QE_{i,r}$ supply for foreign market by sector i of region r

(35) $QEM_{i,r,s}$ export for goods i from region r to region s

(36) $QL_{l,i,r}$ demand for labor l in sector i of region r

(37) $TQL_{l,r}$ total labor supply for labor l in region r

(38) $QK_{i,r}$ capital demand in sector i of region r

(39) TQK_{r} total capital supply of region r

(40) $QF_{i,j,r}$ intermediate demand for composite goods i in sector j of region r

(41) $QFD_{i,j,r}$ intermediate demand for domestic goods i in sector j of region r

(42) $QFM_{i,j,r}$ intermediate demand for (composite) imported goods i in sector j of region r

(43) $QH_{i,r}$ final demand for composite goods i by private household of region r

(44) $QHD_{i,r}$ final demand for domestic goods i by private household of region r

(45) $QHM_{i,r}$ final demand for (composite) imported goods i by private household of region r

(46) $QG_{i,r}$ final demand for composite goods i by government of region r

(47) $QGD_{i,r}$ final demand for domestic goods i by government of region r

(48) $QGM_{i,r}$ final demand for (composite) imported goods i by government of region r

(49) $INVR_{r}$ real investment of region r

(50) $QI_{i,r}$ investment demand for composite goods i of region r

(51) $QID_{i,r}$ investment demand for domestic goods i of region r

(52) $QIM_{i,r}$ investment demand for (composite) imported goods i of region r

(53) $QM_{i,r}$ demand for (composite) imported goods i of region r

(54) $QK_{i,r}$ capital stock in sector i of region r

(55) QT the composite service for the global transport

(56) $QTS_{i,r,s}$ amount of the global service used in shipping goods i from region r to region s

(57) $QST_{mi,r}$ demand for the international transport sector mi of region r

Nominal variables

(58) YH_r household's income of region r

(59) YG_r government's income of region r

(60) $FSAV_r$ foreign saving of region r

(61) $MPSH_r$ marginal propensity to save for household of region r

(62) $MPSG_r$ marginal propensity to save for government of region r

(63) $WALRAS_r$ dummy variable in WALRAS's LAW of region r (zero at equilibrium)

GDP Block

(64) $GDPR_r$ real GDP of region r

(65) $GDPN_r$ nominal GDP of region r

(66) $PGDP_r$ GDP deflator of region r

Policy Variables

(67) $thd_{i,r}$ tax rate on domestic goods i purchased by private household of region r

(68) $tgd_{i,r}$ tax rate on domestic goods i purchased by government of region r

(69) $tid_{i,r}$ tax rate on domestic goods i purchased by investor in region r

(70) $tfd_{i,j,r}$ tax rate on domestic goods i purchased by sector j in region r

(71) $thm_{i,r}$ tax rate on imported goods i purchased by private household in region r

(72) $tgm_{i,r}$ tax rate on imported goods i purchased by government in region r

(73) $tim_{i,r}$ tax rate on imported goods i purchased by investor of region r

(74) $tfm_{i,j,r}$ tax rate on imported goods i purchased by sector j of region r

(75) $te_{i,r}$ export tax (subsidy) rate goods i from r

(76) $tes_{i,r,s}$ combined tax rate on goods i from region r bound for region s (destination generic)

(77) tm_{s} import levy rate on goods i into region s

(78) $tms_{i,r,s}$ import tax rate on goods i imported from region r to s (source generic)

(79) $tp_{i,r}$ production tax rate on sector i of region r

(80) $tl_{i,l,r}$ tax or subsidy rate for labor l in sector i of region r

(81) $tk_{i,r}$ tax or subsidy rate for capital in sector i of region r

Parameters

(82) $iocf_{j,i,r}$ co-efficiency of intermediate input

(83) $A_{X_{i,r}}$ efficiency parameter in the production functions (CES)

(84) $\delta_{X_{l,i,r}}$ share parameter of labor l in production functions

(85) ρ_{X_i} exponent parameter in production functions

(86) σ_{X_i} elasticity of substitution between labors and capital for sector i

(87) $distort_{w_{l,i,r}}$ distortion of wage for sector i of region r

(88) $distort_{R_{i,r}}$ distortion of return for sector i of region r

(89) $A_{F_{i,j,r}}$ scale parameter in the combined function of intermediate input

(90) $\delta_{F_{i,j,r}}$ share parameter in combined functions of intermediate input

(91) ρ_{F_i} exponent parameter in combined functions of intermediate input

(92) σ_{F_i} elasticity of substitution between domestic and imported goods i

(93) $\theta_{HHLD_{i,r}}$ share for composite goods i in household's consumption of region r

(94) $A_{H_{i,r}}$ scale parameter in the combined function of household's consumption

(95) ρ_{H_i} elasticity of substitution between domestic and imported goods i

(96) σ_{H_i} exponent parameter in combined functions of household's consumption

(97) $\delta_{H_{i,r}}$ share parameter in combined functions of household's consumption

(98) $\theta_{GOV_{i,r}}$ share for composite goods i in government's consumption of region r

(99) $A_{G_{i,r}}$ scale parameter in the combined function of government 's consumption

(100) ρ_{G_i} exponent parameter in combined functions of government 's consumption

(101) σ_{G_i} elasticity of substitution between domestic and imported goods i

(102) $\delta_{G_{i,r}}$ share parameter in combined functions of government 's consumption

(103) $\theta_{INV_{i,r}}$ investment share for goods i of region r

(104) $A_{INV_{i,r}}$ scale parameter in the combined function of investor's consumption

(105) ρ_{INV_i} exponent parameter in combined functions of investor's consumption

(106) σ_{INV_i} elasticity of substitution between domestic and imported goods i

(107) $\delta_{INV_{i,r}}$ share parameter in combined functions of investor's consumption

(108) $A_{M_{i,s}}$ scale parameter in the import function

(109) ρ_{M_i} exponent parameter in import functions

(110) σ_{M_i} elasticity of substitution for imported goods from different regions

(111) $\delta_{M_{i,r,s}}$ share parameter in import functions

(112) A_{TR} scale parameter for the function of international-transport service

(113) $\theta_{TR_{mi,r}}$ share in the global transport sector mi for region r

(114) $atr_{i,r,s}$ technical coefficient in shipping goods i from region r to region s

(115) $cwts_{i,r}$ weight of goods i in the CPI of region r

(116) $gwts_{i,r}$ weight of goods i in the GPI of region r

(117) $iwts_{i,r}$ weight of goods i in the IPI of region r

China Households Block

(118) QL_i demand for composite labor

(119) PL_i wage for composite labor

(120) QLM_i demand for composite labor in employment-market

(121) PLM_i wage for composite labor in employment-market

(122) $WAGE_{AGR}$ average wage for labor in agriculture (self-employment)

(123) $distort_{i,AGR}$ distortion of wage in agriculture for rural household

(124) $WAGE_{NAGR}$ average wage for labor in non-agriculture (self-employment)

(125) $distort_{i,NAGR}$ distortion of wage in non-agriculture for rural household

(126) A_{L_i} scale parameter for the composite labor CES function in china

(127) σ_{L_i} elasticity of substitution between labors from different households

(128) ρ_{L_i} exponent parameter of the composite labor CES function

(129) $\delta_{L_{i,R01}}$ share parameter of the composite labor CES function

(130) $QLH_{i,hr}$ labor in sector i from rural household (hr=R01, R02)

$QLH_{i,R01}$ self-employment labor in sector i from rural household

$QLH_{i,R02}$ employment-market labor in sector i from rural household

(131) $PLH_{i,hr}$ return rate in sector i for labor from rural household (hr=R01, R02)

$PLH_{i,R01}$ return rate in sector i for self-employment labor from rural household

$PLH_{i,R02}$ return rate in sector i for employment-market labor from rural household

(132) PLU_i wage in sector i for labor from urban households

(133) QLU_i labor in sector i from urban households

(134) $distort_{i,URBAN}$ distortion of wage in employment-market for urban labors

(135) $WAGE_{URBAN}$ average wage for labor from urban households (employment-market)

(136) A_{LM_i} scale parameter for the composite labor CES function in employment-market

(137) σ_{LM_i} elasticity of substitution between labors from different households

(138) ρ_{LM_i} exponent parameter of the composite labor CES function

(139) δ_{LM_i} share parameter of the composite labor CES function

(140) $WAGE_{EMP}$ average wage for labor (employment-market) from rural household

(141) $distort_{i,EMP}$ distortion of wage in employment-market for rural household

(142) $LMIG_{EMP}$ migration from rural household to employment-market

(143) $LMIG_{NAGR}$ migration from rural household to non-agriculture (self-employment)

(144) $TQLS_{rural}$ total supply from rural household

(145) $A_{MIG_{EMP}}$ scale parameter for migration function (from rural to employment-market)

(146) $\sigma_{MIG_{EMP}}$ elasticity for migration (from rural to employment-market)

(147) $A_{MIG_{NAGR}}$ scale parameter for migration function (from agriculture to non-agriculture self-employment)

(148) $\sigma_{MIG_{NAGR}}$ elasticity for migration (from agriculture to non-agriculture self-employment)

(149) $WAGE_{NAGR}$ average wage for labor in non-agriculture (self-employment)

(150) $WAGE_{AGR}$ average wage for labor in agriculture (self-employment)

(151) $TQLS_{URBAN}$ total supply from urban households

(152) YH_h households' income (h=RURAL, URBAN)

YH_{RURAL} rural household's income

$YH_{URBAN_{hu}}$ urban household hu's income (hu=01, 02, ⋯, 10)

(153) $tlh_{i,hr}$ tax rate of labor income for rural household (hr=R01, R02)

(154) θ_{R_i} share of capital income in sector i for rural household

(155) $tlh_{i,URBAN}$ tax rate of labor income for urban household hu (hu=01, 02, ⋯, 10)

(156) $\theta_{LU_{i,hu}}$ share of labor income for urban household hu (hu=01, 02, ⋯, 10)

(157) $\theta_{KU_{hu}}$ share of capital income for urban household hu (hu=01, 02, ⋯, 10)

(158) $TRANFER_{RURAL}$ transfer from government to rural household

(159) $TRANFER_{hu}$ transfer from government to rural household hu (hu=01, 02, ⋯, 10)

(160) $QHH_{i,h}$ purchase for goods i by household h

(161) $\beta_{H_{i,h}}$ share for goods i in total consumption by household h

(162) MPSH_{h} marginal propensity to save for household h