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Abstract

   Despite growing trade and economic relations among the countries in the Northeast Asian (NEA) region, there are only two bilateral free trade agreements in effect currently. The China–ROK Free Trade Agreement entered into force on 20 December 2015 and the Japan–Mongolia Economic Partnership Agreement (EPA) became effective on 7 June 2016. However, several EPAs and free trade agreements (FTAs) are under negotiation or have prospects to emerge among not only the countries in the region, but also surrounding regions and countries.

   An analysis of the economic effects of the ongoing FTA (China–Japan–Korea Trilateral Free Trade Agreement (CJK FTA)), and several other prospective FTAs—Northeast Asia Preferential Free Trade Agreement (NEA FTA); Northeast Asia plus the Eurasian Economic Union (EAEU) Preferential Free Trade Area (NEA+EAEU FTA); and Northeast Asia plus the Regional Comprehensive Economic Partnership (RCEP) plus the EAEU Preferential Free Trade Area (NEA+RCEP+EAEU FTA)—using the standard CGE Model and GTAP Data Base 9.0a revealed that all parties of the agreements will benefit from the formation of these free trade agreements, having welfare gains and real GDP expansions regardless of international capital mobility status—i.e. whether the capital is internationally mobile or not. Moreover, the results indicated that for the NEA region as a whole, the NEA FTA is preferable to the CJK FTA alone, and it would be even better off with the formation of wider free trade areas, such as with the other RCEP and EAEU members.

Keywords: Free trade; CGE analysis

JEL classification codes: F150; C680

1.   **The Model**

   In analyzing the expected economic effects of FTAs in Northeast Asia, we employed the Global Trade Analysis Project (GTAP) Data Base (Version 9.0a) and the standard GTAP Model (The Model). The GTAP Model is a multi-region and multi-sector Computable General Equilibrium (CGE) model[1] with perfect competition and constant returns to scale. Bilateral trade is handled via the Armington assumption. It combines detailed bilateral trade, transport and protection data characterizing the economic linkages among regions, together with individual country input–output databases, which account for inter-sectoral linkages.

   The GTAP Data Base 9.0a has triple reference years (2004, 2007 and 2011) and this analysis used 2011 as the reference year. Thus the values indicated in this analysis are expressed in constant 2011 US$ terms. The data are for 140 regions and 57 commodities, and in the consideration of the target countries the regions were aggregated into 12 from the original 140 regions in the model, while the original 57 sectors in the model were not aggregated. The

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[1] For more details on the GTAP model and database, refer to Hertel, T. (ed.), 1997.

aggregated regions are: China, Japan, the ROK, Mongolia, Russia, the EAEU4, ASEAN9, ANZI, the Rest of Asia, the United States, the EU_28, and Rest of World. Due to lack of data, the DPRK was not included in the Northeast Asia region, but the country is included implicitly in the Rest of Asia region as a part of the Rest of East Asia. Thus, the NEA region in this analysis refers to five countries in the region, excluding the DPRK (Appendix Tables I and II).

The original eight factors in the Model were aggregated into four factors: land, labor, capital and natural resources, where land and natural resources are immobile and labor and capital are mobile factors (Appendix Table III).

The composition of GDP of the countries in question is provided in Table 1. GDP shares of foreign trade activities were the highest for Mongolia among the selected countries with exports and imports each exceeding 70% of the country's GDP.

Table 1   Composition of GDP, %

Regions/ Countries	Private Consumption	Investment	Government Consumption	Exports	Imports	Total
China	36.3	46.1	13.5	26.7	-22.6	100
Japan	59.7	20.4	20.2	16.0	-16.2	100
ROK	52.7	31.0	14.4	51.3	-49.4	100
Mongolia	47.3	47.7	12.6	71.0	-78.6	100
Russia	49.5	21.8	18.5	29.2	-19.0	100
EAEU4	54.5	26.5	12.8	43.7	-37.4	100
ASEAN9	57.9	28.2	10.8	56.7	-53.6	100
ANZI	58.7	30.2	14.8	20.5	-24.2	100
Rest of Asia	65.9	20.9	10.6	53.8	-51.2	100
USA	70.1	18.5	16.5	12.1	-17.2	100
EU_28	59.9	19.0	22.0	39.3	-40.3	100
Rest of World	58.3	21.8	16.7	30.8	-27.6	100
World	58.9	23.5	17.6	28.2	-28.2	100

Source: GTAP 9.0a Data Base

2. **The Experiments**

Four FTA scenarios in the NEA region were considered in the simulations where the *ad valorem* import tariffs and tariff equivalents of bilateral nontariff barriers (NTBs) between the countries in question were removed on a preferential basis. The scenarios were:
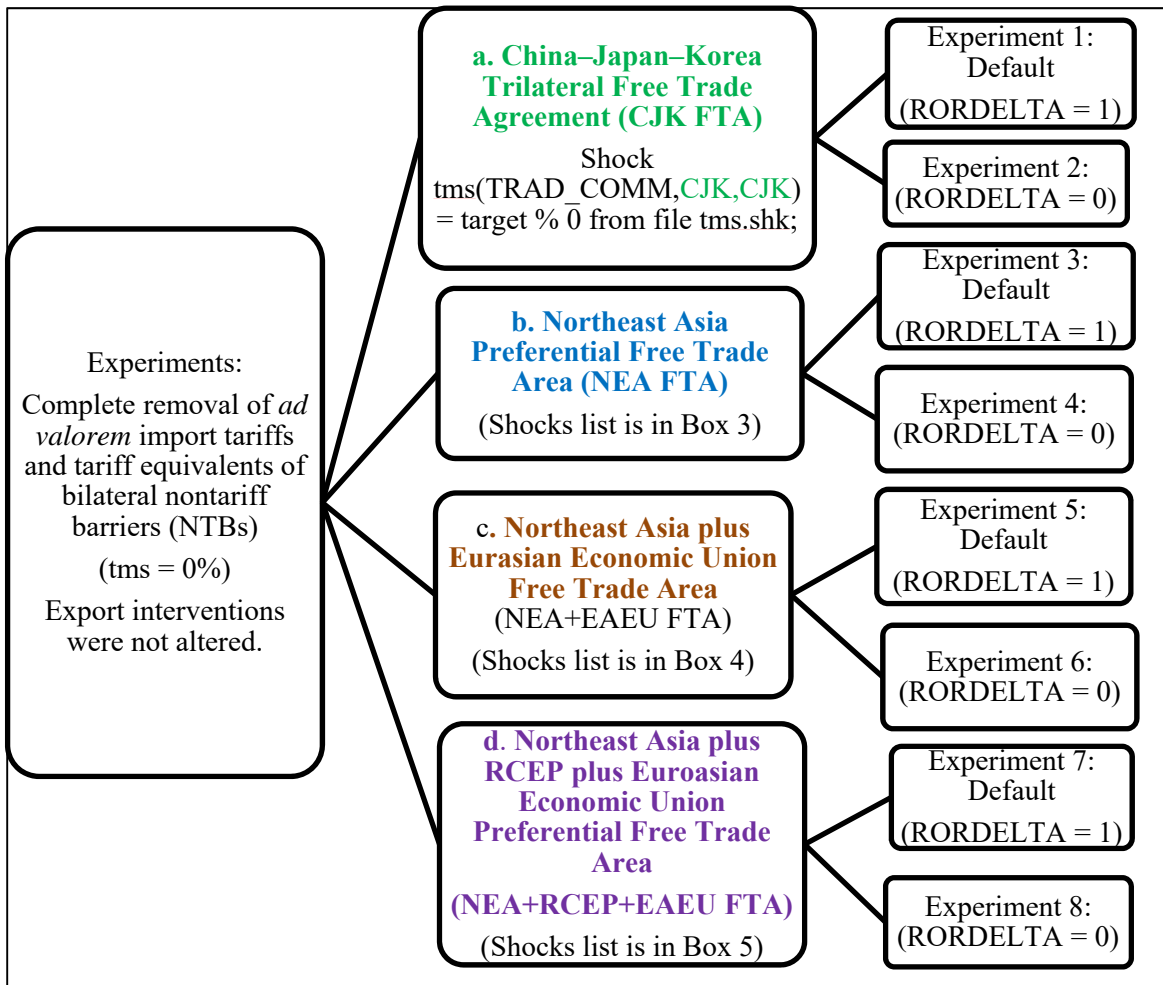
i)   China–Japan–Korea Trilateral Free Trade Agreement (CJK FTA). The members are: China, Japan and the ROK (CJK);

ii)   Northeast Asia Preferential Free Trade Agreement (NEA FTA). The members are the CJK members plus Mongolia and Russia (NEA);

iii)   Northeast Asia plus the Eurasian Economic Union (EAEU) Free Trade Area (NEA+EAEU FTA). The members are CJK, Mongolia, Russia and the other four members of the EAEU (EAEU4). The EAEU4 members are described in the Appendix Table I;

iv)   Northeast Asia plus RCEP plus the EAEU Preferential Free Trade Area (NEA+RCEP+EAEU FTA). The members are NEA plus the EAEU4, ASEAN9 and ANZI members. The ASEAN9 and ANZI members are described in the Appendix Table I.

Source-specific change in tax on imports of commodity "*i*" from country "*r*" into country "*s*" is expressed by a variable "*tms (i,r,s)*" in the Model and shocks were applied for a target rate of zero for this variable. Both values of the parameter "RORDELTA", which is the investment allocation binary coefficient in the Model, were applied in each scenario to observe the impacts of investment allocation decisions in the assumed FTAs. The default value of the parameter RORDELTA in the Model equals 1, where investment is allocated across regions to equate the change in the expected rates of return, *rore (r)* which implies international capital mobility. When RORDELTA equals 0, investments are allocated across regions to maintain the existing composition of capital stock (no international capital mobility) and it effectively fixes the trade balance for each country/region. Description of the experiments is provided in Box 1. The solution method was Gragg, or a multiple step extrapolation method.

In order to simplify the application of shocks to the Model, three additional subsets of the regions were created by modifying the CMFSTART file of the GTAP Model. These are: CJK, NEA4 (China, Japan, the ROK, and Mongolia) and RCEP (China, Japan, the ROK, ASEAN9 and ANZI) and the modified CMFSTART file is illustrated in Box 2, where rows numbered from 7 to 15 were added into the default version of the CMFSTART file. The CMFSTART file contains some additional instructions, which are sent to GEMPACK prior to solving the model.

Box 1   Description of the Experiments

Experiments: Complete removal of *ad valorem* import tariffs and tariff equivalents of bilateral nontariff barriers (NTBs) (tms = 0%) Export interventions were not altered.	**a. China–Japan–Korea Trilateral Free Trade Agreement (CJK FTA)** Shock tms(TRAD_COMM,CJK,CJK) = target % 0 from file tms.shk;	Experiment 1: Default (RORDELTA = 1)
		Experiment 2: (RORDELTA = 0)
	b. Northeast Asia Preferential Free Trade Area (NEA FTA) (Shocks list is in Box 3)	Experiment 3: Default (RORDELTA = 1)
		Experiment 4: (RORDELTA = 0)
	c. Northeast Asia plus Eurasian Economic Union Free Trade Area (NEA+EAEU FTA) (Shocks list is in Box 4)	Experiment 5: Default (RORDELTA = 1)
		Experiment 6: (RORDELTA = 0)
	d. Northeast Asia plus RCEP plus Euroasian Economic Union Preferential Free Trade Area **(NEA+RCEP+EAEU FTA)** (Shocks list is in Box 5)	Experiment 7: Default (RORDELTA = 1)
		Experiment 8: (RORDELTA = 0)

Box 2   The Modified CMFSTART file

```
1.  ! If a version has no CMFSTART file of its own
2.  ! RunGTAP creates one by copying the supplied file CMFSTART.DEF
3.  CPU = yes;    ! log show simulation times
4.  NDS = yes;    ! no displays
5.  Extrapolation accuracy file = NO ; ! No XAC file
6.  !servants = 1; ! use 2 processors at once, if possible
7.  XSET NEA4 #NEA4 regions#
8.  (China, Japan, ROK, Mongolia);
9.  XSUBSET NEA4 is subset of REG;
10. XSET CJK #ChinaJapanKorea#
11.  (China, Japan, ROK);
12. XSUBSET CJK is subset of NEA4;
13. XSET RCEP #RCEP regions#
14.  (China, Japan, ROK, ASEAN9, ANZI);
15. XSUBSET RCEP is subset of REG;
```

Source: GTAP Model

Box 3　Shock Statements in NEA FTA Scenario

Shock tms(TRAD_COMM,NEA4,NEA4) = target % 0 from file tms.shk;
Shock tms(TRAD_COMM,NEA4,"Russia") = target % 0 from file tms.shk;
Shock tms(TRAD_COMM,"Russia",NEA4) = target % 0 from file tms.shk;

Source:　GTAP Model

Box 4　Shock Statements in NEA+EAEU FTA Scenario

Shock tms(TRAD_COMM,NEA4,NEA4) = target % 0 from file tms.shk;
Shock tms(TRAD_COMM,NEA4,"Russia") = target % 0 from file tms.shk;
Shock tms(TRAD_COMM,"Russia",NEA4) = target % 0 from file tms.shk;
Shock tms(TRAD_COMM,"Russia","EAEU") = target % 0 from file tms.shk;
Shock tms(TRAD_COMM,"EAEU","Russia") = target % 0 from file tms.shk;
Shock tms(TRAD_COMM,"EAEU",NEA4) = target % 0 from file tms.shk;
Shock tms(TRAD_COMM,NEA4,"EAEU") = target % 0 from file tms.shk;

Source: GTAP Model.

Box 5　Shock Statements in NEA+RCEP+EAEU FTA Scenario

Shock tms(TRAD_COMM,RCEP,RCEP) = target % 0 from file tms.shk;
Shock tms(TRAD_COMM,RCEP,"EAEU") = target % 0 from file tms.shk;
Shock tms(TRAD_COMM,"EAEU",RCEP) = target % 0 from file tms.shk;
Shock tms(TRAD_COMM,"EAEU","EAEU") = target % 0 from file tms.shk;
Shock tms(TRAD_COMM,RCEP,"Mongolia") = target % 0 from file tms.shk;
Shock tms(TRAD_COMM,RCEP,"Russia") = target % 0 from file tms.shk;
Shock tms(TRAD_COMM,"Mongolia",RCEP) = target % 0 from file tms.shk;
Shock tms(TRAD_COMM,"Russia",RCEP) = target % 0 from file tms.shk;
Shock tms(TRAD_COMM,"Russia","EAEU") = target % 0 from file tms.shk;
Shock tms(TRAD_COMM,"Mongolia","EAEU") = target % 0 from file tms.shk;
Shock tms(TRAD_COMM,"Mongolia","Russia") = target % 0 from file tms.shk;
Shock tms(TRAD_COMM,"Russia","Mongolia") = target % 0 from file tms.shk;
Shock tms(TRAD_COMM,"EAEU","Russia") = target % 0 from file tms.shk;
Shock tms(TRAD_COMM,"EAEU","Mongolia") = target % 0 from file tms.shk;

Source: GTAP Model.

3. **The Results**

a)   **China–Japan–Korea Trilateral Free Trade Agreement (CJK FTA)**

In terms of the equivalent variation (EV), which is an indicator for measuring the effect on public welfare, the simulation results demonstrated that all three countries, China, Japan and the ROK, would benefit from the CJK FTA regardless of the investment allocation decisions, while other countries and regions, including those in the NEA region, would experience welfare losses and real GDP contractions.

In Experiment 1, with international capital mobility, Japan would have the largest welfare gain of US$21.4 billion, while those for the ROK and China equaled US$11.2 billion and US$1.9 billion, respectively. Most of Japan's welfare gain was associated with gains in terms of trade in goods and services equaling US$15.2 billion, while the ROK had relatively equal gains in terms of allocative efficiency (US$5.6 billion) and terms of trade in goods and services (US$5.8 billion). However, the ROK may experience a slight loss in its terms of trade in investment and savings equaling US$237 million. At the same time, China's allocative efficiency and terms of trade in investment and savings were improved by US$4.46 billion and US$475 million, respectively, while the country's terms of trade in goods and services would worsen by US$3.05 billion. However, the net effect was positive, equaling US$1.88 billion, as the allocative efficiency and terms of trade in investment and savings gains were larger than the terms of trade losses in goods and services. Although Russia was not a part of the CJK FTA, the country may benefit by having a welfare gain of US$43 million, when the capital is not mobile across regions (Table 2).

In addition, the simulation results indicated that the CJK FTA would result in positive changes in all the three countries' real GDP (expressed in the GDP quantity index) regardless of the investment allocation decisions. The ROK's real GDP change was the highest, equaling 0.467% and 0.356% depending on the investment allocation decisions, while those for Japan were 0.1% and 0.096%, and for China 0.061% and 0.054%. Higher values were observed when capital is internationally mobile (Table 3).

b)   **Northeast Asia Preferential Free Trade Area (NEA FTA)**

As expected, all members of the NEA region had welfare gains in the case of the NEA FTA, regardless of investment allocation decisions, while other regions would experience welfare losses and real GDP contractions. Welfare gains for Japan were the highest among the FTA members, equaling US$23.5 billion, followed by the ROK's US$12.4 billion and China's US$5.1 billion, when capital is internationally mobile. The other members of this FTA, Russia and Mongolia, had welfare gains of US$1.97 billion and US$58 million, respectively. These values were lower when capital is internationally immobile (Table 2).

When capital is internationally mobile (Experiment 3), most of the welfare gains were associated with allocative efficiency gains as well as improvements in terms of trade in goods

and services for all NEA countries, except Russia. Russia would have a loss of US$785 million in its terms of trade in goods and services, but due to its gains of US$1.5 billion in its terms of trade in investment and savings and US$1.2 billion gains in allocative efficiency, the country's total welfare gain from this FTA was positive, equaling US$1.92 billion (Appendix Table V).

Moreover, all members of the NEA FTA would expect positive changes in their real GDP regardless of investment allocation decisions. The gains were higher when capital is internationally mobile. The ROK would benefit most from the formation of the NEA FTA, with its real GDP increasing by 0.482% when capital is internationally mobile and 0.363% when capital is internationally immobile. In addition, the foreign trade activities of all NEA countries would increase as a result of this agreement and the increase for merchandize exports ranged between 1.12% (the lowest) for Japan and 4.374% (the highest) for the ROK, depending on international capital mobility, while the increase for merchandize imports would range between 1.049% (the lowest) for Mongolia and 5.274% (the highest) for the ROK. However, Mongolia's merchandise exports would decline by 0.401% when international capital is mobile (Tables 3, 5 and 6).

In terms of nominal GDP (expressed in the value of GDP), Russia may be affected negatively in both the cases of international capital mobility due to drops in its aggregate prices. Russia's GDP price index dropped respectively by 0.883% and 1.145%, when capital is internationally mobile and immobile. In addition, the prices of Russia's merchandise exports declined in both cases and the price index of its merchandise exports were 0.264% and 0.347% lower, respectively, when capital is internationally mobile and immobile. Mongolia would also experience a drop in its nominal GDP of 0.313% without international capital mobility, due to the 0.334% reduction in its aggregate prices (Table 4 and Appendix Tables VII and VIII).

c) **Northeast Asia plus the Eurasian Economic Union (EAEU) Preferential Free Trade Area (NEA+EAEU FTA)**

All countries in the NEA region would benefit from the formation of this FTA regardless of investment allocation decisions, while other countries and regions would experience welfare losses and real GDP contractions. The magnitude of these benefits were larger for all the NEA countries, except Russia, in the NEA+EAEU FTA scenario compared to the previous two FTA scenarios. The welfare gains ranged between US$61 million for Mongolia and US$23.5 billion for Japan, while Russia's welfare gain became slightly lower than the NEA FTA scenario, equaling US$1.958 billion when capital is internationally mobile. At the same time, real GDP expansion ranged between 0.062% (the lowest) for Russia and 0.484% (the highest) for the ROK when capital is internationally mobile. The gains were lower without international capital mobility and welfare gains ranged between US$21 million (the lowest) for Mongolia and US$20.4 billion (the highest) for Japan, while real GDP changes were 0.029% (the lowest) for Mongolia and 0.364% (the highest) for the ROK. Changes in nominal GDP had a similar pattern

with the NEA FTA (Tables 3 and 4).

However, despite being a part of this FTA, the other four members of the EAEU (EAEU4) may experience welfare losses as a result of the formation of this FTA, along with contractions of their real and nominal GDP due to losses in their allocation efficiency and worsening of the terms of trade in goods and services. EAEU4's terms of trade in goods and services worsened by US$194 when capital is internationally mobile. Russia's nominal GDP may also contract by 0.85% and 1.12% depending on international investment allocation decisions. This was associated with price drops of their merchandize exports. Price decline of merchandize exports in the EAEU area would range between 0.282% and 0.421% depending on international capital mobility (Table 3 and Appendix Table VIII).

d) **Northeast Asia plus RCEP plus the EAEU Preferential Free Trade Area (NEA+RCEP+EAEU FTA)**

All countries in the NEA, RCEP and EAEU areas, except the EAEU4, would benefit from formation of this FTA by having welfare gains and real GDP expansions regardless of investment allocation decisions, while other countries and regions would experience welfare losses and real GDP contractions. The magnitude of these gains were larger for all the NEA countries in this scenario than in the previous three FTA scenarios. Welfare gains ranged between US$70 million for Mongolia and US$31.8 billion for Japan and real GDP expansions were between 0.012% (the lowest) for the EAEU4 and 0.534% (the highest) for the ROK, when capital is internationally mobile. Without international capital mobility, the gains were lower and the welfare gains ranged between US$19 million for Mongolia and US$28 billion for Japan, while the ROK's real GDP expansion was also the highest, equaling 0.394%. Similar to the previous FTA scenario, although being a part of this FTA, the EAEU4 members would experience welfare losses regardless of investment allocation decisions and may see no impacts on their real GDP when capital is not internationally mobile (Tables 2 and 3).

Impacts on nominal GDP had a similar pattern as in the NEA+EAEU FTA scenario. Mongolia's aggregate level of prices became 1.083% lower when capital is not internationally mobile. Also, Russia, the EAEU4 and the ANZI members may experience reductions in their nominal GDP in both the cases of international capital mobility decisions due to drops of their aggregate price indices. At the same time, prices of merchandise exports of these countries would decline in a range of 0.098% to 0.439% (Table 4 and Appendix Tables VII, VIII).

Table 2　Equivalent Variations (EVs) via the FTAs

(2011 US$ million)

Regions	No international capital mobility				International capital mobility			
	CJK FTA	NEA FTA	NEA +EAEU FTA	NEA +RCEP + EAEU FTA	CJK FTA	NEA FTA	NEA +EAEU FTA	NEA +RCEP +EAEU FTA
China	93	2,831	3,456	7,845	1,883	5,130	5,841	10,623
Japan	18,421	20,309	20,376	27,977	21,446	23,485	23,544	31,801
ROK	7,758	8,701	8,821	11,150	11,194	12,384	12,521	14,040
Mongolia	-13	19	21	19	-26	58	61	70
Russia	43	1,824	1,817	2,492	-314	1,969	1,958	2,518
EAEU4	-15	-141	-185	-68	-78	-205	-111	-18
ASEAN9	-3,051	-3,458	-3,482	3,781	-3,800	-4,255	-4,290	6,207
ANZI	-1,014	-1,178	-1,210	5,142	-1,765	-2,053	-2,109	7,904
Rest of Asia	-2,753	-2,788	-2,796	-4,321	-3,048	-3,131	-3,145	-4,995
USA	-2,753	-3,178	-3,266	-7,445	-5,139	-6,307	-6,495	-13,924
EU_28	-3,098	-6,066	-6,339	-10,724	-3,670	-7,364	-7,724	-13,753
Rest of World	-1,687	-4,838	-5,142	-6,554	-4,272	-7,090	-7,385	-10,840

Source:　GTAP Model, simulation results

Table 3　Real GDP Changes via the FTAs (*qgdp* = GDP quantity index)

(% change)

Regions	No international capital mobility				International capital mobility			
	CJK FTA	NEA FTA	NEA +EAEU FTA	NEA +RCEP + EAEU FTA	CJK FTA	NEA FTA	NEA +EAEU FTA	NEA +RCEP +EAEU FTA
China	0.054	0.062	0.064	0.101	0.061	0.070	0.072	0.112
Japan	0.096	0.100	0.100	0.161	0.100	0.104	0.104	0.166
ROK	0.356	0.363	0.364	0.394	0.467	0.482	0.484	0.534
Mongolia	-0.006	0.021	0.029	0.062	-0.034	0.177	0.187	0.243
Russia	0.005	0.055	0.057	0.076	-0.001	0.062	0.062	0.081
EAEU4	-0.004	-0.031	-0.015	0.000	-0.008	-0.035	-0.001	0.012
ASEAN9	-0.018	-0.021	-0.021	0.110	-0.027	-0.031	-0.031	0.137
ANZI	-0.006	-0.007	-0.007	0.213	-0.013	-0.016	-0.016	0.239
Rest of Asia	-0.013	-0.013	-0.013	-0.022	-0.015	-0.016	-0.016	-0.029
USA	-0.001	-0.002	-0.002	-0.003	-0.003	-0.004	-0.004	-0.007
EU_28	-0.003	-0.008	-0.008	-0.013	-0.002	-0.008	-0.008	-0.013
Rest of World	-0.003	-0.007	-0.008	-0.012	-0.009	-0.014	-0.014	-0.024

Source:　GTAP Model, simulation results

Table 4   Changes in Nominal GDP (*vgdp* = change in value of GDP)

(% change)

Regions	No international capital mobility				International capital mobility			
	CJK FTA	NEA FTA	NEA +EAEU FTA	NEA +RCEP + EAEU FTA	CJK FTA	NEA FTA	NEA +EAEU FTA	NEA +RCEP +EAEU FTA
China	-0.214	0.002	0.041	0.234	-0.086	0.147	0.191	0.429
Japan	1.502	1.726	1.735	2.179	1.875	2.122	2.131	2.682
ROK	1.047	1.372	1.407	1.346	1.818	2.199	2.239	2.316
Mongolia	-0.416	-0.313	-0.301	-1.021	-0.685	0.914	0.957	0.541
Russia	-0.157	-1.091	-1.118	-1.261	-0.273	-0.820	-0.850	-1.052
EAEU4	-0.184	-0.401	-1.161	-1.192	-0.282	-0.512	-0.932	-1.007
ASEAN9	-0.441	-0.458	-0.459	0.076	-0.504	-0.532	-0.534	0.485
ANZI	-0.263	-0.281	-0.287	-0.558	-0.366	-0.406	-0.415	-0.179
Rest of Asia	-0.654	-0.639	-0.639	-0.976	-0.695	-0.690	-0.691	-1.054
USA	-0.222	-0.243	-0.248	-0.510	-0.321	-0.372	-0.380	-0.772
EU_28	-0.227	-0.323	-0.334	-0.560	-0.268	-0.384	-0.397	-0.681
Rest of World	-0.201	-0.278	-0.289	-0.498	-0.276	-0.362	-0.374	-0.655

Source: GTAP Model, simulation results

Table 5   Changes in Real Exports (*qxwreg* = change in volume of merchandise exports)

(% change)

Regions	No international capital mobility				International capital mobility			
	CJK FTA	NEA FTA	NEA +EAEU FTA	NEA +RCEP + EAEU FTA	CJK FTA	NEA FTA	NEA +EAEU FTA	NEA +RCEP +EAEU FTA
China	3.223	3.452	3.520	4.446	2.679	2.830	2.878	3.674
Japan	2.614	2.676	2.671	3.833	1.151	1.120	1.118	2.019
ROK	4.192	4.374	4.374	5.712	2.167	2.205	2.196	3.221
Mongolia	0.036	1.273	1.283	1.400	0.282	-0.401	-0.430	-0.524
Russia	-0.043	1.882	1.854	2.179	0.089	1.277	1.264	1.664
EAEU4	-0.101	-0.300	1.583	1.646	0.005	-0.137	1.096	1.227
ASEAN9	-0.199	-0.196	-0.196	4.022	0.040	0.069	0.072	2.939
ANZI	-0.103	-0.148	-0.157	6.079	0.125	0.131	0.130	4.920
Rest of Asia	-0.498	-0.506	-0.510	-0.730	-0.237	-0.224	-0.225	-0.294
USA	-0.192	-0.240	-0.249	-0.556	0.248	0.313	0.319	0.584
EU_28	-0.046	-0.091	-0.096	-0.175	0.070	0.078	0.079	0.144
Rest of World	-0.066	-0.089	-0.093	-0.261	0.055	0.065	0.065	0.046

Source: GTAP Model, simulation results

Table 6   Changes in Real Imports (*qiwreg* = change in volume of merchandise imports)

(% change)

Regions	No international capital mobility				International capital mobility			
	CJK FTA	NEA FTA	NEA +EAEU FTA	NEA +RCEP + EAEU FTA	CJK FTA	NEA FTA	NEA +EAEU FTA	NEA +RCEP +EAEU FTA
China	3.366	3.702	3.793	5.040	3.414	3.767	3.862	5.105
Japan	3.825	4.051	4.053	5.639	4.235	4.492	4.494	6.162
ROK	4.635	4.940	4.955	6.551	4.943	5.274	5.290	6.925
Mongolia	-0.033	1.049	1.063	1.167	-0.346	3.163	3.230	3.572
Russia	-0.044	2.948	2.901	3.499	-0.288	3.742	3.676	4.172
EAEU4	-0.093	-0.340	1.839	2.002	-0.184	-0.484	2.145	2.268
ASEAN9	-0.324	-0.332	-0.331	4.128	-0.393	-0.413	-0.415	4.543
ANZI	-0.088	-0.121	-0.128	4.738	-0.226	-0.282	-0.293	5.187
Rest of Asia	-0.817	-0.821	-0.824	-1.209	-0.920	-0.935	-0.940	-1.421
USA	-0.208	-0.250	-0.258	-0.579	-0.423	-0.520	-0.536	-1.133
EU_28	-0.066	-0.133	-0.140	-0.245	-0.091	-0.174	-0.183	-0.339
Rest of World	-0.062	-0.125	-0.133	-0.290	-0.148	-0.232	-0.243	-0.503

Source: GTAP Model, simulation results

4.   **Conclusions**

CGE analysis of the economic impacts of the four prospective free trade agreements covering the NEA region using GTAP Model and Data Base 9.0a have demonstrated that removing tariff barriers will benefit all parties of a free trade agreement, due to increased trade and economic activities. Specifically, in the cases of:

a) **CJK Trilateral Free Trade Agreement:** All three countries, China, Japan and the ROK, will benefit as a result of this agreement having positive EV values and real GDP expansions regardless of whether capital is internationally mobile or not. The ROK would benefit most in terms of real GDP change. All other regions would experience welfare losses, including those in the NEA region, except Russia when capital is not internationally mobile.

b) **NEA Preferential Free Trade Area:** All five countries in the NEA region would benefit from formation of an NEA FTA, having welfare gains and increases of real GDP regardless of the investment allocation decisions. The ROK was the largest winner in terms of its real GDP expansion. The other countries and regions in the model experienced welfare losses and contractions of their real GDP as well.

c) **NEA+EAEU Preferential Free Trade Area:** All countries in the NEA region would benefit from formation of this FTA regardless of investment allocation decisions, while other countries and regions would experience welfare losses and real GDP contractions. The magnitude of these benefits were larger for all the NEA countries, except Russia, in this scenario compared to the previous two FTA cases. Japan was the largest winner in terms of welfare gains, while the ROK would be the top beneficiary in terms of real GDP expansion.

   However, despite being a part of this FTA, the EAEU4 members may experience welfare losses along with drops in their real and nominal GDP due to their allocative efficiency losses and worsening of terms of trade in goods and services.

d) **NEA+RCEP+EAEU Preferential Free Trade Area:** Similar to the previous scenario, all countries in the NEA region would benefit from this agreement by having welfare gains and expansions of real GDP regardless of international capital mobility decisions. All countries in the NEA region were better off under this scenario than the previous three FTA cases, whereas Japan was the largest winner in terms of welfare gains and nominal GDP expansion, while the ROK would benefit most in terms of its real GDP expansion. The other members of the RCEP region would also benefit from this FTA by experiencing welfare gains and real GDP expansions. However, in both cases of international capital mobility, Russia, the EAEU4 and ANZI would experience reductions in terms of nominal GDP due to drops in their aggregate price indices.

Accordingly, for the NEA region as a whole, the NEA+ FTA is preferable to CJK FTA only, and would be even better off in formation of a wider coverage of free trade agreement partners, such as RCEP and the EAEU, where all the countries in the region would benefit from larger welfare gains and real GDP expansions regardless of the investment allocation decisions.

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Appendix Table I:　Classification of Regions in the Model

The Model (12 regions)	GTAP 9.0a (140 regions)
China	China
Japan	Japan
ROK	Republic of Korea
Mongolia	Mongolia
Russia	Russian Federation
EAEU4	Kazakhstan, Kyrgyzstan, Armenia, Belarus
ASEAN9	ASEAN9 members, except Myanmar: Brunei Darussalam, Cambodia, Indonesia, Lao People's Democratic Republic, Malaysia, Philippines, Singapore, Thailand, Vietnam
ANZI	Australia, New Zealand, India
Rest of Asia	Hong Kong, Taiwan, Rest of East Asia, Rest of Southeast Asia, Bangladesh, Nepal, Pakistan, Sri Lanka, Rest of South Asia
USA	United States of America
EU_28	Austria, Belgium, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Poland, Portugal, Slovakia, Slovenia, Spain, Sweden, United Kingdom, Bulgaria, Romania, Croatia
Rest of World	Rest of Oceania, Canada, Mexico, Rest of North America, Argentina, Bolivia, Brazil, Chile, Colombia, Ecuador, Paraguay, Peru, Uruguay, Venezuela, Rest of South America, Costa Rica, Guatemala, Honduras, Nicaragua, Panama, El Salvador, Rest of Central America, Dominican Republic, Jamaica, Puerto Rico, Trinidad and Tobago, Caribbean, Switzerland, Norway, Rest of EFTA, Albania, Ukraine, Rest of Eastern Europe, Rest of Europe, Rest of Former Soviet Union, Azerbaijan, Georgia, Bahrain, Islamic Republic of Iran, Israel, Jordan, Kuwait, Oman, Qatar, Saudi Arabia, Turkey, United Arab Emirates, Rest of Western Asia, Egypt, Morocco, Tunisia, Rest of North Africa, Benin, Burkina Faso, Cameroon, Côte d'Ivoire, Ghana, Guinea, Nigeria, Senegal, Togo, Rest of Western Africa, Central Africa, South Central Africa, Ethiopia, Kenya, Madagascar, Malawi, Mauritius, Mozambique, Rwanda, Tanzania, Uganda, Zambia, Zimbabwe, Rest of Eastern Africa, Botswana, Namibia, South Africa, Rest of South African Customs, Rest of the World

Source:　GTAP 9.0a Data Base

Appendix Table II: Classification of Sectors in the Model

No.	Code	Description
1	pdr	Paddy rice
2	wht	Wheat
3	gro	Cereal grains nec.
4	v_f	Vegetables, fruit, nuts
5	osd	Oil seeds
6	c_b	Sugar cane, sugar beet
7	pfb	Plant-based fibers
8	ocr	Crops nec.
9	ctl	Cattle, sheep, goats, horses
10	oap	Animal products nec.
11	rmk	Raw milk
12	wol	Wool, silk-worm cocoons
13	frs	Forestry
14	fsh	Fishing
15	coa	Coal
16	oil	Oil
17	gas	Gas
18	omn	Minerals nec.
19	cmt	Meat: cattle, sheep, goats, horse
20	omt	Meat products nec.
21	vol	Vegetable oils and fats
22	mil	Dairy products
23	pcr	Processed rice
24	sgr	Sugar
25	ofd	Food products nec.
26	b_t	Beverages and tobacco products
27	tex	Textiles
28	wap	Wearing apparel
29	lea	Leather products
30	lum	Wood products
31	ppp	Paper products, publishing
32	p_c	Petroleum, coal products
33	crp	Chemical, rubber, plastic products
34	nmm	Mineral products nec.
35	i_s	Ferrous metals
36	nfm	Metals nec.
37	fmp	Metal products
38	mvh	Motor vehicles and parts
39	otn	Transport equipment nec.

Appendix Table II: Classification of Sectors in the Model (continued)

No.	Code	Description
40	ele	Electronic equipment
41	ome	Machinery and equipment nec.
42	omf	Manufactures nec.
43	ely	Electricity
44	gdt	Gas manufacture, distribution
45	wtr	Water
46	cns	Construction
47	trd	Trade
48	otp	Transport nec.
49	wtp	Sea transport
50	atp	Air transport
51	cmn	Communication
52	ofi	Financial services nec.
53	isr	Insurance
54	obs	Business services nec.
55	ros	Recreation and other services
56	osg	Public administration, Defense, Health, Education
57	dwe	Dwellings

Source: GTAP 9.0a Data Base

Appendix Table III: Classification of Production Factors in the Model

	Old factor			New factor	
No.	Code	Description	No.	Code	Description
1	Land	Land	1	Land	-1
2	tech_aspros	Technicians/Associates, Professional	2	Labor	mobile
3	clerks	Clerks	2	Labor	mobile
4	service_shop	Service/Shop workers	2	Labor	mobile
5	off_mgr_pros	Officials and Managers	2	Labor	mobile
6	ag_othlowsk	Agricultural and Unskilled	2	Labor	mobile
7	Capital	Capital	3	Capital	mobile
8	NatlRes	Natural Resources	4	NatRes	-0.001

Source: GTAP 9.0a Data Base

Appendix Table IV CJK FTA Welfare Effects: EV Decomposition Summary
(Experiment 1: International Capital Mobility)

(2011 US$ million)

Regions	Allocative Efficiency	Terms of Trade in Goods and Services	Terms of Trade in Investment and Savings	Total Welfare
China	4,459	-3,051	475	1,883
Japan	5,894	15,160	337	21,391
ROK	5,611	5,819	-237	11,194
Mongolia	-3	-22	-1	-26
Russia	-14	-495	195	-314
EAEU4	-21	-77	19	-78
ASEAN9	-583	-3,262	46	-3,799
ANZI	-451	-1,150	-165	-1,765
Rest of Asia	-187	-2,915	54	-3,048
USA	-413	-3,769	-957	-5,139
EU_28	-413	-3,128	-166	-3,707
Rest of World	-1,312	-3,357	396	-4,272
Total	12,568	-246	-4	12,319

Source: GTAP Model, simulation results

Appendix Table V NEA FTA Welfare Effects: EV Decomposition Summary
(Experiment 3: International capital mobility)

(2011 US$ million)

Regions	Allocative Efficiency	Terms of Trade in Goods and Services	Terms of Trade in Investment and Savings	Total Welfare
China	5,121	364	-374	5,111
Japan	6,161	16,914	356	23,431
ROK	5,800	6,888	-304	12,384
Mongolia	16	46	-3	58
Russia	1,174	-785	1,529	1,918
EAEU4	-93	-154	42	-205
ASEAN9	-660	-3,578	-16	-4,254
ANZI	-547	-1,290	-216	-2,053
Rest of Asia	-199	-2,954	22	-3,131
USA	-588	-4,674	-1,045	-6,307
EU_28	-1,391	-5,651	-356	-7,398
Rest of World	-2,029	-5,429	367	-7,090
Total	12,765	-303	2	12,464

Source: GTAP Model, simulation results

Appendix Table VI   NEA+EAEU FTA Welfare Effects: EV Decomposition Summary

(Experiment 5: International capital mobility)

(2011 US$ million)

Regions	Allocative Efficiency	Terms of Trade in Goods and Services	Terms of Trade in Investment and Savings	Total Welfare
China	5,291	999	-467	5,823
Japan	6,164	16,966	359	23,490
ROK	5,821	7,007	-308	12,521
Mongolia	16	47	-3	61
Russia	1,190	-859	1,577	1,908
EAEU4	-2	-194	85	-111
ASEAN9	-667	-3,605	-18	-4,289
ANZI	-565	-1,326	-217	-2,109
Rest of Asia	-202	-2,963	21	-3,145
USA	-617	-4,817	-1,060	-6,495
EU_28	-1,484	-5,912	-363	-7,758
Rest of World	-2,129	-5,652	396	-7,385
Total	12,816	-309	2	12,509

Source: GTAP Model, simulation results

Appendix Table VII   Aggregate Price Changes by Region: GDP Price Index (pgdp (REG))

(% change)

Regions	No international capital mobility		International capital mobility	
	NEA FTA	NEA+EAEU+ RCEP FTA	NEA FTA	NEA+EAEU+R CEP FTA
China	-0.06	0.133	0.077	0.319
Japan	1.624	2.015	2.016	2.512
ROK	1.005	0.949	1.709	1.781
Mongolia	-0.334	-1.083	0.736	0.297
Russia	-1.145	-1.336	-0.883	-1.133
EAEU4	-0.37	-1.193	-0.477	-1.020
ASEAN9	-0.437	-0.034	-0.501	0.348
ANZI	-0.274	-0.770	-0.391	-0.417
Rest of Asia	-0.624	-0.954	-0.674	-1.025
USA	-0.242	-0.507	-0.368	-0.765
EU_28	-0.315	-0.547	-0.375	-0.668
Rest of World	-0.271	-0.487	-0.349	-0.631

Source: GTAP Model, simulation results

Appendix Table VIII   Price Index of Merchandise Exports by Region (pxwreg (REG))

Regions	No international capital mobility				International capital mobility			
	CJK FTA	NEA FTA	NEA +EAEU FTA	NEA +RCEP + EAEU FTA	CJK FTA	NEA FTA	NEA +EAEU FTA	NEA +RCEP +EAEU FTA
China	-0.237	-0.081	-0.055	0.023	-0.141	0.03	0.06	0.185
Japan	1.153	1.313	1.32	1.674	1.434	1.615	1.622	2.062
ROK	0.56	0.709	0.726	0.821	0.916	1.096	1.115	1.282
Mongolia	-0.347	0.241	0.253	0.173	-0.457	0.683	0.709	0.784
Russia	-0.141	-0.347	-0.366	-0.439	-0.218	-0.264	-0.282	-0.391
EAEU4	-0.146	-0.27	-0.421	-0.47	-0.218	-0.327	-0.349	-0.43
ASEAN9	-0.274	-0.291	-0.292	0.061	-0.302	-0.32	-0.321	0.311
ANZI	-0.226	-0.257	-0.263	-0.308	-0.308	-0.348	-0.354	-0.098
Rest of Asia	-0.409	-0.396	-0.396	-0.601	-0.42	-0.409	-0.409	-0.614
USA	-0.205	-0.233	-0.238	-0.462	-0.286	-0.333	-0.34	-0.664
EU_28	-0.203	-0.284	-0.294	-0.485	-0.245	-0.335	-0.346	-0.585
Rest of World	-0.164	-0.248	-0.258	-0.408	-0.228	-0.305	-0.314	-0.514

Source: GTAP Model, simulation results