2

What Effect Will Trade Liberalization between Japan and ASEAN Members Have Over Time?

*Kazuhiko Oyamada**

I. Introduction

Over the past decade, the global economy has become increasingly interdependent, and international linkages have intensified with the launch of the World Trade Organization (WTO). Most of the members of the WTO are also involved in regional economic arrangements such as the Asia-Pacific Economic Cooperation (APEC), the European Union (EU), and the North American Free Trade Agreement (NAFTA), or bilateral free-trade areas (FTAs) in the process of WTO negotiations. Because it often takes a long time to agree on a single guiding formula to be used by all members in making multilateral tariff cuts when the coverage of trade liberalization is wide, small-scale economic arrangements such as preferential trading cooperation are regarded as being consistent with and supportive of the formation of larger-scale frameworks. Such smaller-scale economic arrangements that precede global trade liberalization are rapidly increasing in number.

Along with this global economic situation, the Japanese government is examining the feasibility of several economic arrangements, such as with Chile, Korea, Malaysia, Mexico, the Philippines, and Thailand. In particular, when Japan and Singapore signed an economic partnership arrangement in January 2002, Japanese Prime Minister Junichiro Koizumi emphasized the importance of forming a comprehensive economic partnership that would include an FTA between Japan and ASEAN. In order to support the initiative, a group of professionals from Japan and ASEAN member countries started listing sensitive products and evaluating anticipated effects of liberalizing trade. The proposal prepared by the group

was presented at a top-level meeting among the ASEAN+3 economies held in November 2002. While many economists believe that increased economic integration among countries has tended to increase long-term growth rates, and that deepening openness and economic interdependence through free trade and international investment capital movement will be major factors in generating prosperity for the global economy, it may be important for policy makers to numerically estimate the anticipated effects of liberalizing trade and investment when countries launch into an economic partnership program. One of the purposes of this report is to evaluate trade liberalization between Japan and ASEAN members under current or prospective scenarios being considered by the Japanese government.

In the field of trade-related negotiations, results from Applied General Equilibrium (AGE) analyses based on real economic data sets may be informative, because the analytical models can quantify the impact of the policy changes in a highly complicated economic system and may yield concrete evaluations. *Trade Liberalization among Major World Trading Areas* (Whalley, 1985) was one of the earliest research papers that quantified the merits of alternative actions in international trade policy. It analyzed the effects of various trade-liberalization initiatives, using a numerical model of global trade. More recent studies have been presented by the Global Trade Analysis Project (GTAP, Hertel ed., 1997), which continuously carries out comprehensive analyses on trade-related subjects and supplies consistent data that enable us to analyze trade-related policy changes and get information for decision making. However, since the models used in these analyses are essentially based on a static framework, the dynamic side of the impact that is important in the field of open-economy macroeconomics,[1] for instance, how the patterns of savings and investment that lie behind growth effects translate into certain patterns of current account dynamics, have not been captured in the analyses. While adding a mechanism of capital accumulation to a static model may enable us to capture some of the positive aspects of growth, it is quite clear that a satisfactory standard-of-living analysis requires the introduction of "forward-looking" intertemporal preferences of households (who decide on savings), as well as "forward-looking" intertemporal optimization of firms (who decide on investment).[2] In this regard, this study offers some insights into the potential impact of trade liberalization, incorporating "forward-looking" decision making of economic agents.

The purpose of this study is to answer the following questions, using

a forward-looking, multisectoral, multiregional AGE model of global trade:

1. How does trade liberalization between Japan and ASEAN countries affect regional standard-of-living levels?
2. What are the dynamic profiles of potential impact?

We shall approach these questions simulating announced implementation of trade liberalization between Japan and ASEAN members, in comparison with the case of China and ASEAN countries. The model in this paper solves for a set of inter- and intratemporally consistent prices. Both savings and investment are the result of dynamic optimization based on future prices that are consistent with the achieved levels of savings and investment. Since the forward-looking model is calibrated on the assumption that the benchmark data are obtained from the global economy in a stationary state, we focus on the qualitative dynamic impact of policy changes. In the evaluation of policy options, we compare impact, quantifying deviations from the values of variables given in the reference run.

In the following section, we introduce a simple enough model to grasp the basic impact of changes in trade protection that may aid us understanding the simulation results. In Section II, we outline the major assumptions and the structure of the forward-looking, multisectoral, multiregional AGE model used in this study. In Section III, we perform three simulations with the model and interpret the results. Finally, Section IV concludes the paper.

II. The Model

In this section, we outline the major assumptions and the structure of the forward-looking, multisectoral, multiregional AGE model used in this study. We also present the basic structure of Benchmark Data and the parameterization of the model.

A. Nature of the Model

First, let us show the major assumptions used in this study.

Multisectoral, Multiregional Growth Model The framework is that of

a dynamic multisectoral, multiregional growth model, which is based on the Ramsey-Cass-Koopmans type of optimal growth theory. The global economy is divided into five countries/regions: (1) Japan, (2) China, (3) the Asian NIEs (Hong Kong, Korea, Singapore, and Taiwan), (4) ASEAN4 (Indonesia, Malaysia, the Philippines, and Thailand), and (5) the Rest of the World (ROW). While only four countries are included as the ASEAN members, because the model is planned to be extended to include Foreign Direct Investment (FDI) in the future,[3] the other members are included in ROW. Industries are aggregated into three sectors: primary industries, manufacturing, and services. Economic growth is led by the exogenous growth of labor input and total factor productivity (TFP). In order to obtain a steady growth path as the base case, the economic-growth rate should be equal among regions. While it is unrealistic to assume identical economic-growth rates for each region, we assume the growth rates to be zero in order to focus on the qualitative dynamic impact of policy changes.

Perfect Competition The model is essentially based on the neo-classical growth theory, and its solution can be regarded as the result of perfect competition.[4] This is one straightforward implication from the model. Since perfect competition is hardly realizable in actual economies, the simulation results should be read as giving only a potential picture of a hypothetical economy under conditions of perfect competition, on the basis of which we can abstract fundamental determinants of economic growth. When one assumes monopolistic or oligopolistic scale economies in the model, the impact of policy changes may be amplified. In this regard, it can be said that results from the simulations with the model used in this study depict sort of lower-bound estimates.

Primary Factors The labor force is assumed to be immobile beyond the regional boundaries. In contrast, investment capital flows across countries /regions (foreign capital inflow/outflow), and its flow is determined so as to balance each country's/region's current accounts. It is assumed that the representative consumers in every country/region receive factor income from domestic firms, and that they then invest a fraction of their income through the interregional capital market. In addition to these, note that full employment of labor is assumed and plays an important role in performing simulations. Itakura *et al.* (2003) suggested that the investment capital may flood into particular regions in the wake of trade-related policy changes with the models assuming full employment. Since interregional investment

capital movement affects standard-of-living levels much in the general equilibrium framework, the simulation results might present an extreme picture.

Exchange Rates Exchange rates for the currencies of individual countries/regions do not enter into the equation in this model, since the model is of pure-barter general equilibrium type. In a monetized extension of the model, an explicit function of demand for money in each country/region is specified, and a particular regional money stock determines the monetary equilibrium. Such a specification, however, will reveal the classical dichotomy between real and monetary phenomena, as is often presented in standard macroeconomic theory. This dichotomy implies that behavior on the real side of the economy is independent of monetary conditions and that the monetary side alone determines the price of money in terms of goods. Relative commodity prices therefore remain unchanged if the money stock changes, and the price level is determined by the money stock alone once real-side behavior is determined. Since the model used in this report is a real-side trade model, the issue of the determination of exchange rates does not arise.

Benchmark Data The source of data for the model is the GTAP version 5 database. The GTAP database is a set of regional input-output tables and sectoral trade flows that connect sectoral exports and imports that appear in the input-output tables, plus several kinds of estimated elasticity. The target year is 1997. There are four sheets of trade-flow data, which are respectively presented at wholesale prices, F.O.B. prices, C.I.F. prices, and protection-inclusive market prices. The differences among these four sheets consist of *ad valorem* equivalent domestic transportation margins and export subsidies, international shipping margins, and import tariffs, import quotas, antidumping duties, and nontariff barriers. Note that we collectively handle the latter four (import tariffs, import quotas, antidumping duties, and nontariff barriers) as a single item to be removed in the simulations performed in this report.

Service Trade Service trade includes trade in factor services (interest, profits, and dividends) as well as trade in nonfactor services (business, insurance, and financial services). In the GTAP framework, we have data only on nonfactor service trade, which are in turn broken down into shipping and nonshipping service components. In the model, a fixed fraction of output is supplied for international shipping services. Since the

GTAP database does not fully include estimated trade barriers, which might exist in service trade, our simulations do not reflect reforms in the service sector. While the real service sector may remain restrictive, it is not included in this study because of difficulties in measuring the distortions or markups; therefore, the simulation results in this study may be regarded as lower-bound estimates.

B. Structure of the Model

In turn, we present the basic structure of the model used in this report, focusing on the dynamic side of the model. The model is an extension of a typical static global trade model, such as that presented by Hertel ed. (1997), with forward-looking properties, such as those introduced by Devarajan and Go (1998). In the following, r and t denote countries and time periods, respectively.

Enterprise There is one competitive enterprise in each sector for every country/region, which produces one kind of product. Production and factor inputs are all determined endogenously so that resources are optimally used from the viewpoint of maximization of net income. Factor substitutability is assumed among labor, capital, and intermediate input. Note that we assume that nested factor inputs in the production and technologies in all sectors exhibit constant returns to scale. The dynamic decision problem of the enterprise is to choose a time path of investment that will maximize the value of the firm, defined as the discounted sum of temporal net income yielded in each period. Investment comprises raw capital and is equipped to form the capital stock of each country/region. Since this is a long-term model, inventory is included in investment. Note that the adjustment cost of capital installation is assumed. The cost of one unit of investment to be installed as raw capital declines when capital accumulation proceeds. As a result, desired levels of capital stock are attained gradually with instantaneous changes in the rate of return.

Households The representative consumer in each country/region maximizes her/his discounted utility of the temporal sequence of aggregated consumption. The utility function is homogenous and additively separable with constant elasticity of marginal utility. The utility is discounted by the consumer's positive and constant rate of time preference. Since the financial claims are perfect substitutes *ex ante*, we cannot uniquely determine the individual consumer's optimal portfolio

shares. However, since the goods are imperfect substitutes, interregional capital-market equilibrium conditions define the foreign savings for each region endogenously. The model treats capital flows as equal to the balance of trade, adjusted for debt-service payment, and the stream of debt-service payment arising from an increase in foreign savings is incorporated into the household's decision making. Without uncertainty and with efficient capital markets, financial assets among countries/regions earn the same anticipated rate of return.

Interregional Trade The product of the firm in every country/region is not treated as homogeneous across countries but as an imperfect substitute for that of another. By way of example, American and Japanese cars are not treated as a single homogeneous product (cars) but as differentiated products, between which there is a specific elasticity of substitution due to demand. This assumption is called the Armington assumption (Armington, 1969) and is necessary to accommodate cross hauling (the phenomenon of a country's both importing and exporting the same product at the same time). This is inconsistent with the traditional Hecksher-Ohlin trade model, which is based on the premise of homogeneous products. The model adopts a transaction system similar to that of the GTAP model, presented by Hertel ed. (1997).

III. Simulations

We now report on the results of four dynamic simulations, categorized into two types, performed in this forward-looking framework. The two categories distinguish simulation scenarios according to whether the primary industries are included or not included in the trade-liberalization program. This is because some groups are feeling concern for the case that liberalizing trade in primary industries, especially in agriculture, reduces domestic production volumes of the sector when they face a more competitive interregional trade market.

In the case in which trade liberalization is implemented for all of the sectors (let us refer to this as "Case A" in the simulations), we consider three scenarios: (i) trade liberalization between Japan and ASEAN4 that takes place in the fifth period, (ii) trade liberalization between China and ASEAN4 that is imposed in the fifth period, and (iii) sequenced implementation of (i) and (ii) whereby China (initiating free trade in the fifth period) precedes Japan (liberalizing trade in the ninth period). This

scenario considers the present situation that China is going ahead of Japan in preparing to conclude agreements on economic partnerships with ASEAN members. In turn, we only consider one scenario, which corresponds to (i) trade liberalization between Japan and ASEAN4 that takes place in the fifth period in Case A, and in the case in which trade liberalization is implemented for the manufacturing and service sectors (Case B). The reason is that there is only a small difference between Cases A and B and other scenarios.

In these simulations, we examine announced effects of the policy changes that are fully anticipated five or nine periods ahead. In the simulations, trade barriers against the other member countries/regions of the coalition are removed forever after liberalizing trade. Note that the deviations in values of variables from the base case are shown in the figures.

First of all, we identify the trade barriers to be removed in the simulations. Table 2.1 shows the *ad valorem* equivalent protection rates for 1997 levied on sectoral trade flows from the source country/region

Table 2.1

***Ad Valorem* Equivalent Protection Rate**

(%, 1997)

		Japan	China	NIEs	ASEAN4	ROW
Japan	Primary	0.000	13.900	11.360	2.191	12.742
	Manuf.	−1.086	8.477	4.933	8.974	9.239
	Services	0.000	−0.001	−0.007	−0.002	−0.004
China	Primary	9.492	0.003	9.757	4.778	17.767
	Manuf.	15.632	0.001	16.489	19.150	14.111
	Services	−0.019	0.000	−0.010	−0.016	−0.014
NIEs	Primary	10.121	49.825	9.744	3.753	11.586
	Manuf.	4.224	3.568	1.968	1.685	4.188
	Services	0.027	0.018	0.101	0.136	0.083
ASEAN4	Primary	12.038	14.794	36.071	6.613	6.043
	Manuf.	11.116	11.771	8.388	9.998	7.812
	Services	0.000	0.000	0.000	0.000	0.000
ROW	Primary	8.379	9.751	12.881	9.111	4.588
	Manuf.	5.651	8.907	6.744	7.687	4.586
	Services	0.147	0.131	0.395	0.164	0.166

Source: GTAP version 5 database.

(appearing in the top row) to the destination (appearing in the left column). The values of protection are obtained by subtracting the trade flows at C.I.F. prices from those at protection-inclusive market prices. Specifically, these margins include import tariffs, import quotas, antidumping duties, and nontariff barriers. Note that we collectively handle them in the simulations as the trade barriers to be removed.

A. Dynamic Impact

In this subsection we focus on the dynamic impact of the four scenarios of trade-liberalization programs in the Asian region. In a static framework, output prices of the commodities produced in countries/regions involved in a union tend to rise relative to the global average of output prices, as we saw in Section II. The high prices of products of union members in comparison with those of nonmembers improve the terms-of-trade and enable the members to be better off. Under the condition of low price distortion and resulting more efficient interregional resource allocation, trade diversion may occur, and as a result, economic volumes of union members enlarge in the global economy through expansion of production among the members. This growth effect amplifies the static impact through capital accumulation in a dynamic framework.

In the framework of forward-looking dynamics, capital price becomes one key factor. Changes in capital prices triggered by the future static shock will lead movements into patterns of interregional investment flow following the movements in interregional trade in goods. The effects of the movements in interregional investment are crucial for the global economic situation. When a policy change, such as trade liberalization, is announced to be implemented in a certain future period, the expected static impact and subsequent growth effects raise the capital prices[5] among the union members relative those among nonmembers. Thus, the effects of future trade liberalization appear in the periods before policy changes through the movements in interregional investment flows, and the existence of price distortions characterizes the impact before and after policy implementation. In the preimplementation period, changes in capital prices affect the allocation of interregional investment and at the same time affect the real markets through changes in output prices. Since the changes in capital prices are reflected in those of output prices in our framework, we shall use “output prices” synonymously with “capital prices” in the analyses to follow.[6]

1. Case A (i): Trade Liberalization between Japan and ASEAN4

We start with simulating trade liberalization between Japan and ASEAN4 that takes place four periods ahead. In this case, output prices of Japan and ASEAN4 rise relative to the global average of output prices, and the prices outside fall. As a result, both trade flow between Japan and ASEAN4, as well as inflow from China, the Asian NIEs, and ROW increase. In contrast, trade outside the union and trade outflow from Japan and ASEAN4 to other countries/regions are respectively reduced. Trade diversion to Japan and ASEAN4 occurs. Figures 2.1 and 2.3 depict the impact of trade liberalization between Japan and ASEAN4 on output prices of products made in Japan and ASEAN4 relative to the global average. Figures 2.2 and 2.4 show export, import, and output values of Japan and ASEAN4, respectively. Note that every value shows deviation from the value of corresponding variable given in the base case (the case in which no policy change takes place). With regard to this announced liberalization, the following points can be observed:

First, Japanese export volume is reduced before the implementation of trade liberalization. This is because the capital prices in Japan rise in comparison with those of the other countries/regions before the policy change, so the proportion of the interregional investment flow directed toward Japan becomes larger. If we compare the changes in output prices in Japan with those in ASEAN4, it is clear that the prices in Japan had already risen before the implementation. The changes in output prices reflect movements in capital prices. Consequently, Japan increases foreign savings by cutting exports and importing more in the preimplementation period. This increased foreign savings finances the expansion of investment in Japan.

Second, there is a large difference in the time profiles of output prices between Japan and ASEAN4. In particular, one may notice that the output prices of manufactured products of ASEAN4 drop after the policy implementation, and its new stationary state level becomes lower than the base case level. One may regard that the price decreases of manufactured products made in ASEAN4 are the result of excess supply of the products. In fact, liberalizing trade with Japan in particular expands the volume of the manufacturing sector in ASEAN4, concentrating resources from primary industries and services. Since some important elements, such as interregional fragmentation and intragroup trade in Multinational Enterprises (MNEs), are not modeled in this study, changes in resource allocation are systematically determined by the parameters and structure

of the model, and should be regarded as one straight-forward illustration.

To see why there is a large difference in the time profiles of output prices, let us check the macroeconomic variables. Figures 2.5 and 2.6 depict the values of consumption, investment, and capital stock in Japan and ASEAN4. It is apparent that the investment in Japan increases before liberalizing trade, and in the postimplementation period it rapidly decreases to the new stationary state level. In contrast, the investment in ASEAN4 increases with the implementation of trade liberalization then gradually decreases to the new stationary state level higher than the base case. The deviation of investment in ASEAN4 is more than five times higher than that in Japan at the highest level. This implies that a large portion of interregional investment flow into ASEAN4 after the policy change is outflow from Japan. The rush of interregional investment to ASEAN4 enlarges the stock of foreign capital of ASEAN4, and a portion of the borrowings is repaid to the creditors within the simulation period. The terminal condition for the model used might affect this result. Since the capital in ASEAN4 is steadily accumulated, the foreign borrowings may easily be repaid, and the capital prices in ASEAN4 gradually fall along with advances in capital accumulation. This is reflected to the gradual fall in output prices in ASEAN4 in the postimplementation period.

Another point we can see from Figures 2.5 and 2.6 is that the levels of investment in Japan and ASEAN4 toward the new stationary state are respectively one and three percent higher than the base case. It implies that investment in both countries/regions is continuously expanded by the trade liberalization. This is the result of growth effects, in addition to the improvement in terms-of-trade. If we look at GDP, the impact of trade liberalization between Japan and ASEAN4 is clearly illustrated. The effects on GDP are shown in Figure 2.7. Since the values in the figure show the deviations from the base case, GDP levels in Japan and ASEAN4 are successively raised by one and more than three percent, respectively.

While GDP may be a major indicator that captures the economic condition, increases in income do not directly imply improvement in standard-of-living levels. Even when income levels increase, standard-of-living levels may worsen if commodity prices rise more than increases in income. In this regard, we also check the standard-of-living levels, which are measured by the consumption quantities in each country/region. Those are shown in Figure 2.8. One may notice that the standard-of-living levels improve less than half as much as does GDP in both Japan and ASEAN4. In particular, the Japanese standard-of-living level is reduced after the policy implementation. It may be the result of the price increases

of domestically produced goods.

Finally, we would like to note that the standard-of-living level of ROW is improving toward the new stationary state. This is achieved through gradual withdrawal of resources invested in ASEAN4 after trade liberalization.

2. Case A (ii): Trade Liberalization between China and ASEAN4

The second simulation is trade liberalization between China and ASEAN4. As in the case between Japan and ASEAN4, trade liberalization is announced four periods before the implementation. In this case, the story seems to be totally different from the previous case. Price effects are dominant in overall impact. The rise in output prices in China and ASEAN4 spills over to the global economy through intermediate input. Consequently, the global average of output prices is three times higher than in the base case, relative to the interregional rate of return. This is because the initial relationship between China and ASEAN4 through trade is the weakest in the relationships among the five countries/regions modeled in this study. Tables 2.2 and 2.3 show the initial relationships among countries/regions with regard to both export and import. Note that each country/region labeled at the top is the source in its column for the destinations listed at left.

It can easily be seen that the shares of China show the smallest values in both exports and imports with ASEAN4 and that those of ASEAN4 are similar in Chinese exports and imports. Because of initial weaknesses in trade relationships, products with inflated prices are exported from both China and ASEAN4 and used as intermediate input in countries/regions all over the world. This causes a secondary price rise in commodities

Table 2.2

Share of Trade Partner in Exports

(%, 1997)

	Japan	China	NIEs	ASEAN4	ROW
Japan	0.00	17.04	8.38	13.91	5.93
China	8.66	0.00	12.52	3.53	1.85
NIEs	18.35	14.42	10.43	19.82	5.41
ASEAN4	10.12	4.26	10.95	5.90	2.76
ROW	62.87	64.28	57.71	56.85	84.05
Total	100.00	100.00	100.00	100.00	100.00

Source: GTAP version 5 database.

Table 2.3

Share of Trade Partner in Imports

(%, 1997)

	Japan	China	NIEs	ASEAN4	ROW	Total
Japan	0.00	10.15	9.82	9.23	70.80	100.00
China	21.25	0.00	29.57	4.72	44.45	100.00
NIEs	18.48	7.10	10.12	10.88	53.43	100.00
ASEAN4	19.07	3.92	19.87	6.06	51.08	100.00
ROW	6.25	3.13	5.53	3.08	82.01	100.00

Source: GTAP version 5 database.

produced in Japan, Asian NIEs, and ROW, and amplifies the price effects several times larger from the initial shock. As mentioned before, one cause of this phenomenon is the assumption of full employment. If one were to include the factor of redundant workers in Asian countries/regions, the price effects would be moderate.

As we expected, the price-increase rates of Chinese and ASEAN4 products are especially high, such that the prices of commodities made in those countries/regions remain high in relation to the global average. Figures 2.9 and 2.11 show the impact of trade liberalization between China and ASEAN4, implemented in the fifth period, on output prices of Chinese and ASEAN4 products relative to the global average. The effects on export, import and output values of China and ASEAN4 are also shown in Figures 2.10 and 2.12. Several points can be observed. First, exports from both China and ASEAN4 decrease in the preimplementation period. Second, exports from China do not exceed the volume of the base case, even after trade liberalization takes place. Third, the output prices of primary and manufactured products of ASEAN4 are below the levels in the base case.

One of the reasons for the above two points is the result of expanded foreign capital inflow to China and ASEAN4. As in the previous case of trade liberalization between Japan and ASEAN4, ASEAN4 repays the foreign borrowings along with the accumulation of capital proceeds. Therefore, exports from ASEAN4 increase and exceed the level of increase in imports after liberalization. It is also a similar story to Case A (i), that the capital price in ASEAN4 gradually falls and is reflected in the gradual fall in output prices after the policy implementation. In contrast, China cannot increase exports because of the relatively high prices of its products. This means that products, especially manufactured goods, of

China cannot be competitive against those of ASEAN4. This is seen from the low prices of goods manufactured in ASEAN4. As a result, China may remain a debtor in the new stationary state. Creditors are the Asian NIEs and ROW. So what is the response of Japan? Japan is another debtor in the new stationary state. However, in turn, there is improvement in debtors' terms-of-trade in this framework. Because of their improved terms-of-trade, Japan and China may import more and export less, because one unit of export earns more than in the base case and enables those countries to increase imports of cheaper products from the others. The impact of the policy change on output prices, and on export, import, and output values of Japanese products are respectively shown in Figures 2.13 and 2.14.

Surprisingly, the output prices of Japanese products are the highest in the global economy. This rise in prices causes the prices of primary and manufactured products of ASEAN4 to remain below the global average. The rise in Japanese output prices is caused by the intermediate use of imports from China and ASEAN4 to Japan, which are three times larger in proportion than those of ROW. It can be said that the Japanese production is more sensitive than ROW to price increases for output of goods made in China and ASEAN4. The initial impact on output prices and the subsequent terms-of-trade shock cause a rise in capital prices in Japan. This draws foreign capital into Japan. Since Japan has strong relationships with ROW, Japan increases imports of cheap products from ROW and raises its own consumption level. The impact of trade liberalization between China and ASEAN4 on GDP and standard-of-living levels is shown for each country/region in Figures 2.15 and 2.16.

As a result of Japanese increases in this case, the GDP volumes of Japan, China, and ASEAN4 become more than one percent larger than those in the base case. An interesting point is that if we look at the standard-of-living levels the improvement for ASEAN4 remains less than one percent. In contrast, Japanese standard of living improves by more than two percent, and the improvement of China's standard of living reaches five percent more than in the base case. These are the results of terms-of-trade effects. Finally, one more difference from Case A (i) is that standard-of-living levels do not surge through the simulation period. This implies that the growth effects are not so strong. In this case, the initial impact of liberalizing trade between China and ASEAN4 itself might not be so large; however, Japan responds sensitively to the price increases of products made in China and ASEAN4, and this affects trade patterns in the global economy. This means that it is better for Japanese industry to have complementary relationships with Chinese and ASEAN4 industry. Japan

may have an important role to play in linking with both China and ASEAN4, since the initial relationships with them are not strong.

3. Case A (iii): Sequenced Implementation, in which China Precedes Japan in Liberalizing Trade with ASEAN4

Let us move to the third simulation, in which China gets a head start on Japan in liberalizing trade with ASEAN4. Both policy changes are assumed to occur in the fifth and ninth periods, respectively, and those are fully anticipated by all of the economic agents in the global economy. We start checking the effects of markets and output prices. Figures 2.17 and 2.19 show the impact of sequenced implementation of two types of trade liberalization on output prices of products made in Japan and China relative to the global average, and Figures 2.18 and 2.20 show the export, import, and output values for both countries.

A large difference from the previous two scenarios can be observed in the patterns of Chinese exports and production. In this sequenced case, exports from China increase by more than three percent in the new stationary state level. Since Japan signs a free-trade agreement with ASEAN4 in the ninth period, output prices of Chinese products remain low relative to the global average, making those products competitive in the global market. This is an effect of Japanese trade liberalization with ASEAN4, which leads to lower Chinese output prices, and the positive effects help China to expand production, especially in the manufacturing sector, under the condition of Chinese trade liberalization with ASEAN4.

In turn, the impact on Japan is close to that seen in Case A (i). What does this result imply? One possibility is that the impact of liberalizing trade between Japan and ASEAN4 is stronger than that between China and ASEAN4. Another point of view may be that price effects observed in Case A (ii) are easily affected by the other policy changes. This is not so strange, because price effects have influence through changing the patterns of interregional investment, which is quite sensitive to fluctuations in capital prices. Figures 2.21 and 2.22, which show the impact relative output prices have on the global average and the export, import, and output values of ASEAN4 products, also support this hypothesis. While the figures for ASEAN4 seem to be simple combination of Cases A (i) and (ii), the shocks when free trade with Japan starts are several times larger than the impact when trade liberalization with China takes place.

Finally, let us look at the impact on GDP and standard-of-living levels. Both Figures 2.23 and 2.24 show that the benefit ASEAN4 would receive from trade liberalization between Japan and ASEAN4 is amplified

by the precedent free trade between China and ASEAN4. This is because less distortion makes results in benefit for the countries/regions involved in a coalition.

4. Case B (i): Trade Liberalization between Japan and ASEAN4, Excluding Primary Industries

The last simulation enables us to verify impact of excluding primary sectors from the liberalization program for Japan and ASEAN4. Large differences from Case A (i) appear in Figures 2.25 and 2.26, which capture the impact on the export, import, and output values of Japan and China, respectively. Looking at these tables, one can easily find that the Japanese exports are larger, and imports become smaller than those in the case of full liberalization. In contrast, the decline of Chinese exports is smaller. If primary industries are not included in the liberalization program, Japanese imports of products of primary industries are smaller, and Japan's domestic production volume of this sector remains slightly larger than in the case that includes this sector in the policy changes. This implies that resource allocation for other sectors, especially manufacturing, in Japan becomes smaller. One interesting point is that the volume of Japanese production in the manufacturing sector becomes smaller, Chinese manufacturing production also becomes smaller than in the case of full liberalization. It enlarges the allocation of resources to primary industries in China. This is the reason that the decline in Chinese exports becomes smaller. This is well explained if we assume that the manufacturing sectors in both Japan and China have a close and complementary relationship, as in the previous simulation. Other variables, such as production and output prices in other countries/regions, are not greatly affected. This is reflected in the GDP and standard-of-living levels shown in Figures 2.27 and 2.28. Of course, there is some amount of loss from the remaining distortions in the primary sectors.

B. Impact on Standard of Living

In this subsection, we measure the effects of four cases of trade liberalization on regional standard of living, based on the idea of Hicksian Equivalent Variations (EV). EV is the amount of money equivalent to the changes that have already taken place in the base case, in other words the income changes that move the agent to the postchange standard-of-living levels. In our dynamic framework, we calculate the discounted sum of temporal EV obtained in each period to find the accumulated growth

Table 2.4

Welfare Gains (In Million US$ at 1997 Constant Prices)

	Case A (i)	Case A (ii)	Case A (iii)	Case B (i)
Japan	168,800.80	1,658,510.00	193,797.70	94,139.28
China	−15,560.10	526,476.10	46,247.82	−36,715.00
NIEs	−27,887.00	−251,987.00	−45,111.20	−17,200.50
ASEAN4	73,534.28	41,863.28	117,621.80	71,160.14
ROW	−67,290.00	−1,929,980.00	−151,189.00	18,229.82
Total	131,597.98	44,882.38	161,367.12	129,613.74

Source: Author.

Table 2.5

Welfare Changes

(%)

	Case A (i)	Case A (ii)	Case A (iii)	Case B (i)
Japan	0.013	0.122	0.014	0.007
China	−0.021	0.682	0.061	−0.049
NIEs	−0.020	−0.180	−0.032	−0.012
ASEAN4	0.134	0.076	0.214	0.130
ROW	−0.002	−0.059	−0.005	0.001
Total	0.104	0.641	0.252	0.076

Source: Author.

effects that policy changes potentially have. The standard-of-living gains from trade liberalization are reported in Table 2.4 in millions of U.S. dollars at 1997 constant prices. Note that these standard-of-living gains are closely related to the standard-of-living levels shown in Figures 2.8, 2.16, 2.24, and 2.28 in the previous subsection, which are the "discounted" integral values of the images valued with the income in the base case. Since our EV is accumulated through 50 periods to capture the results from growth effects, it is important *not to directly compare* with the EV calculated in the other analyses based on static AGE models. For reference, the standard-of-living changes in percentage from the base case are also shown in Table 2.5.

There are several points to be noted. First, the results from simulations with Case A (i) and (iii) confirm the orthodox proposition that all of the countries/regions that enter into free-trade agreements are better off, while countries/regions outside the union tend to be worse off. However, as we

saw previously, price effects and resulting terms-of-trade shock push the rise in Japanese standard-of-living level in Case A (ii) to ten times larger than in Case A (i). Rather than standard-of-living gains, a standard-of-living loss of ROW reaches thirty times larger. In our framework, the interregional investment flow greatly affects the global trade patterns. One solution may be to abandon the assumption of full employment.

Second, less distortion results in more benefit for the countries/regions involved in a union. If we look at Case A (iii), Japan and ASEAN4 receive the larger benefit than in Case A (i). Instead, the standard-of-living loss of the countries/regions outside the coalition is also increased. From the viewpoint of ASEAN4, while the standard-of-living gains from liberalizing trade with China are not very large, the gains from free trade with Japan might be beneficial, owing to growth effects.

Third, the standard-of-living gains of Japan in Case B (i), when primary industries are excluded from the liberalization program, come to less than sixty percent of the gains in Case A (i), the case of full liberalization. In contrast, ROW recovers to get an overall gain in standard of living in Case B (i). The increase in consumption in ROW in the latter half of the simulation period is larger.

Figure 2.1

Relative Output Prices to the Global Average (Japan-Case A (i))

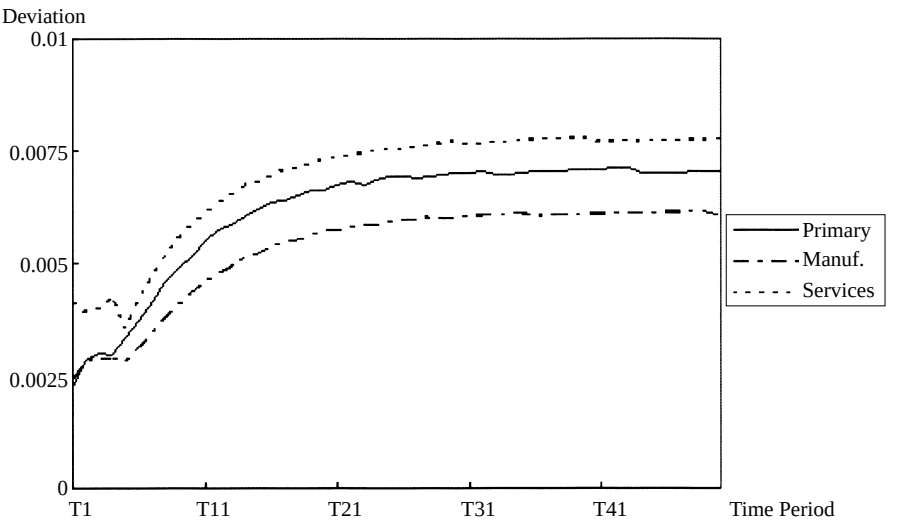


Figure 2.2

Export, Import and Output Values (Japan-Case A (i))

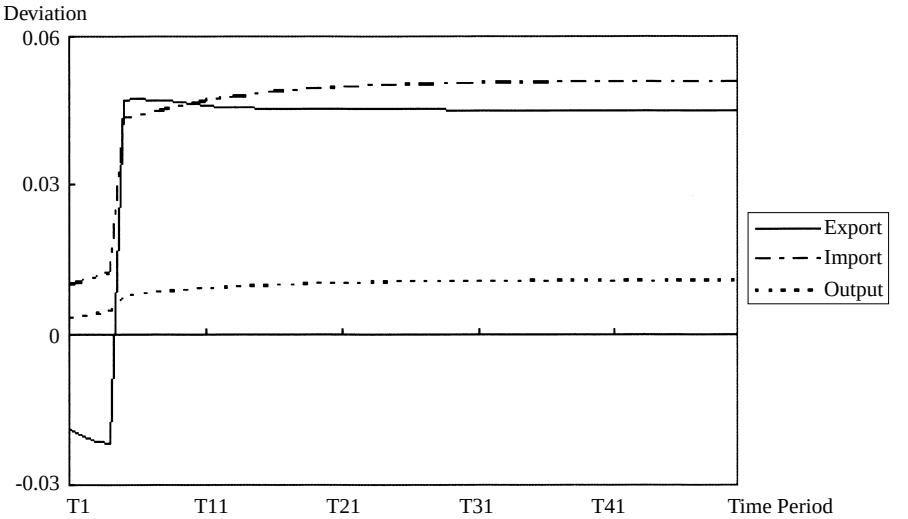


Figure 2.3

Relative Output Prices to the Global Average (ASEAN4-Case A (i))

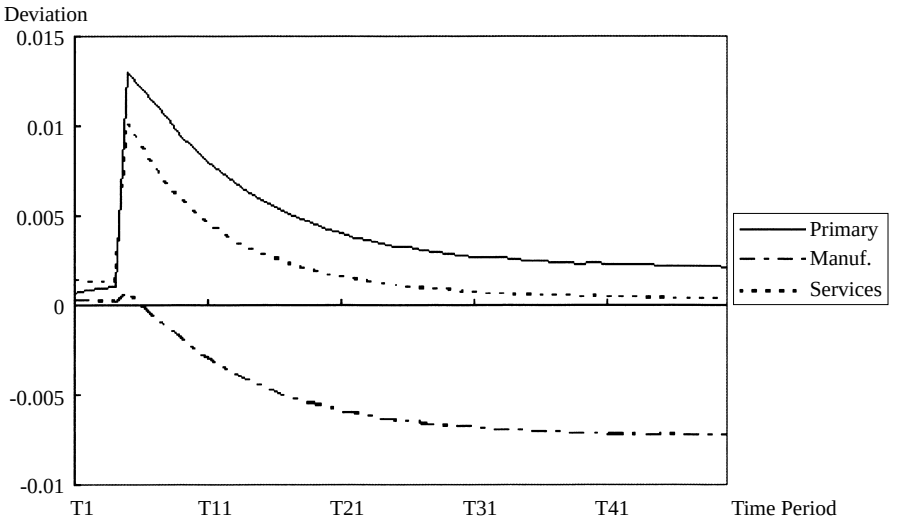


Figure 2.4

Export, Import and Output Values (ASEAN4-Case A (i))

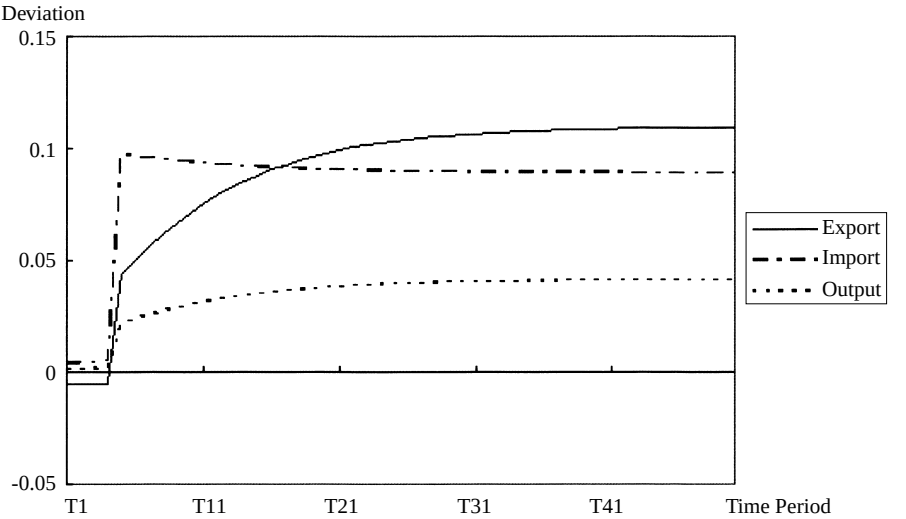


Figure 2.5

Consumption, Investment and Capital Stock Values (Japan-Case A (i))

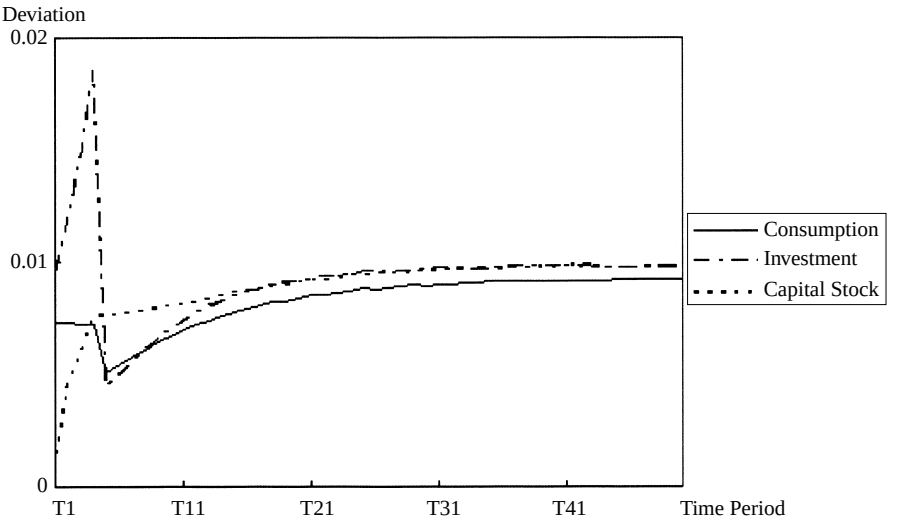


Figure 2.6

Consumption, Investment and Capital Stock Values (ASEAN4-Case A (i))

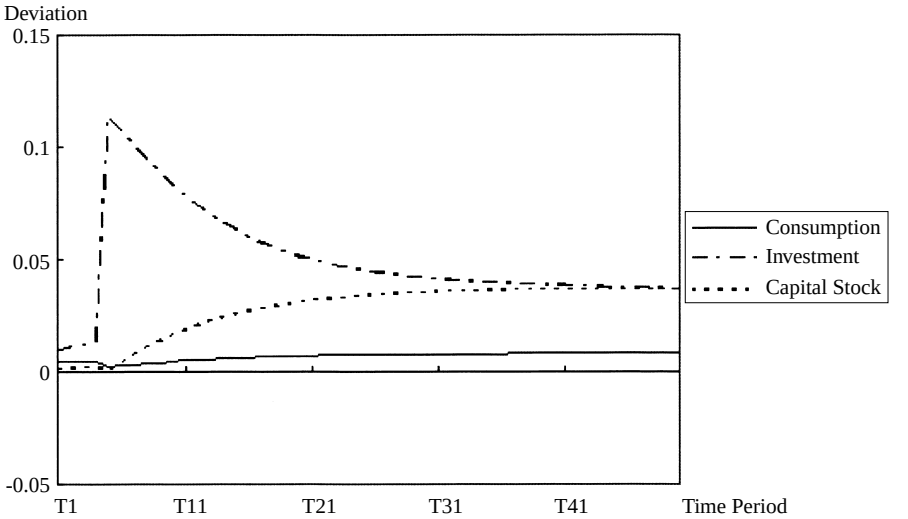


Figure 2.7

GDP (Case A (i))

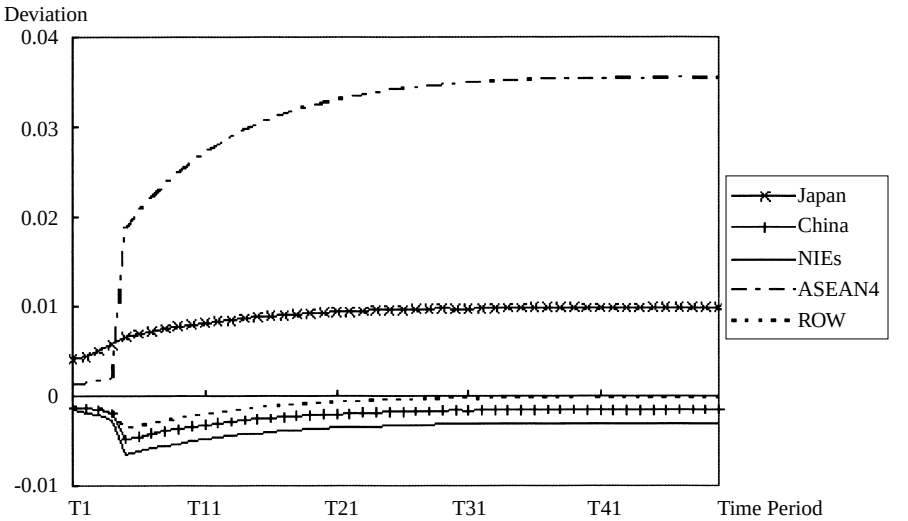


Figure 2.8

Regional Welfare (Case A (i))

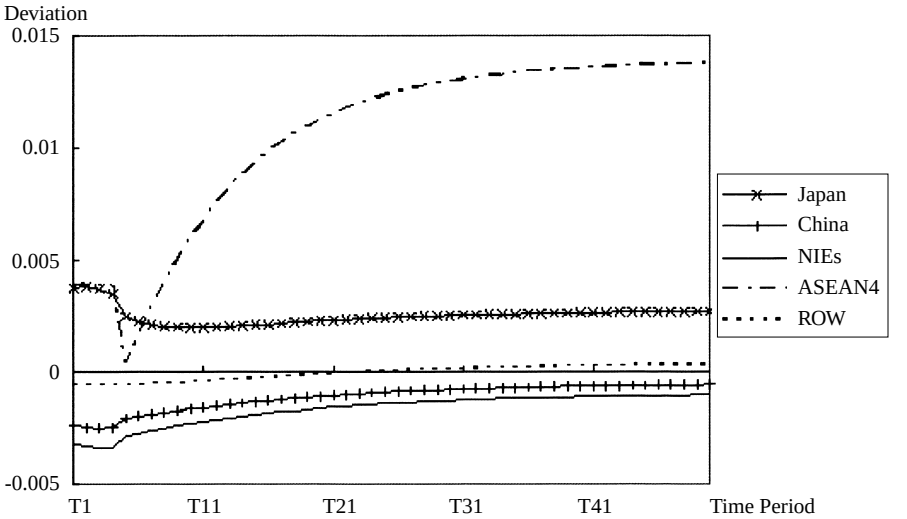


Figure 2.9

Relative Output Prices to the Global Average (China-Case A (ii))

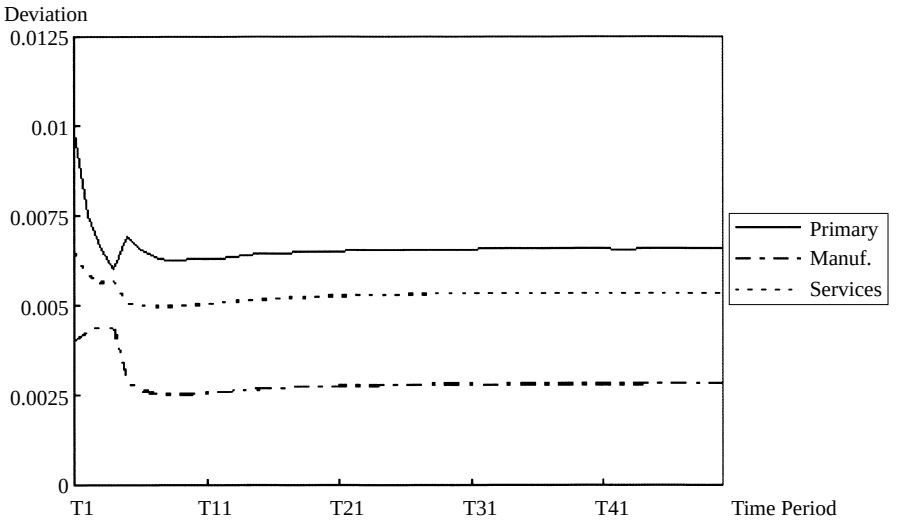


Figure 2.10

Export, Import and Output Values (China-Case A (ii))

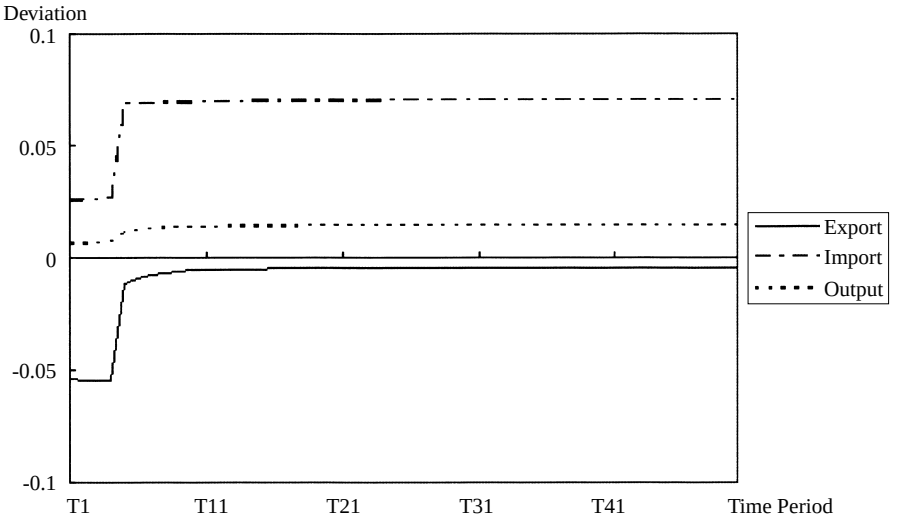


Figure 2.11

Relative Output Prices to the Global Average (ASEAN4-Case A (ii))

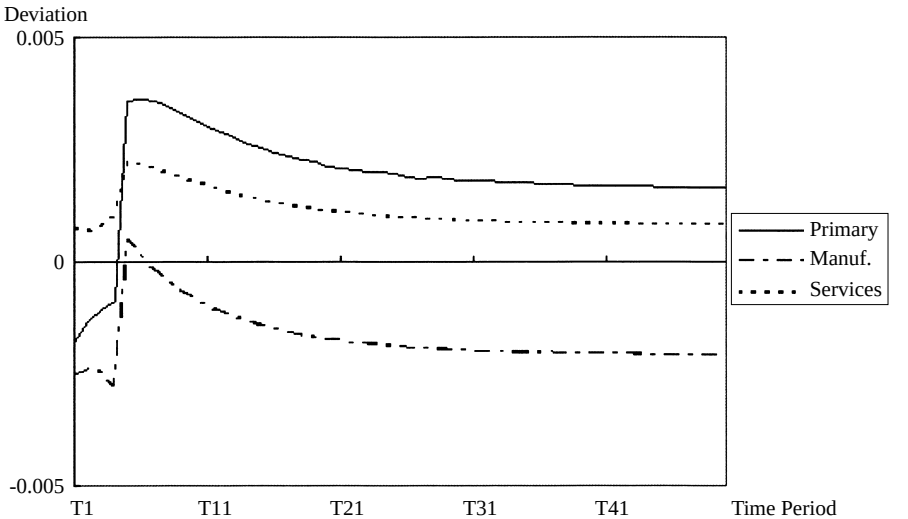


Figure 2.12

Export, Import and Output Values (ASEAN4-Case A (ii))

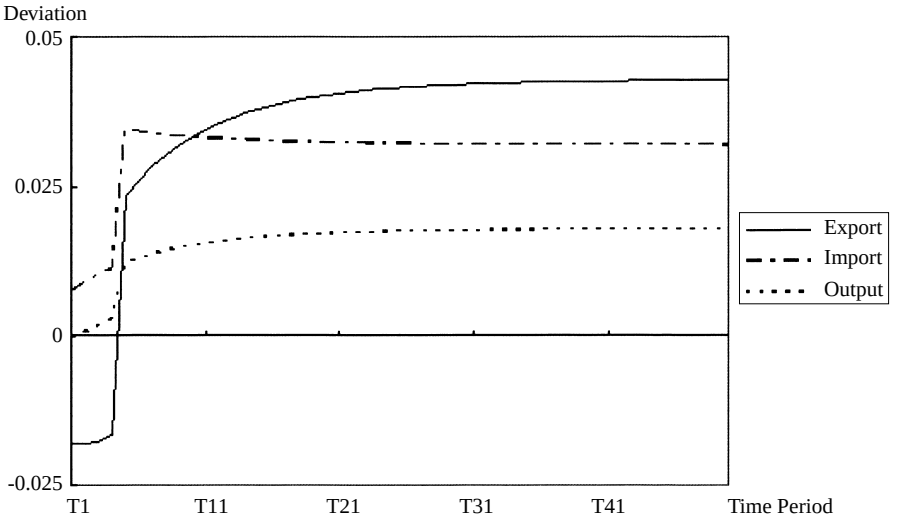


Figure 2.13

Relative Output Prices to the Global Average (Japan-Case A (ii))

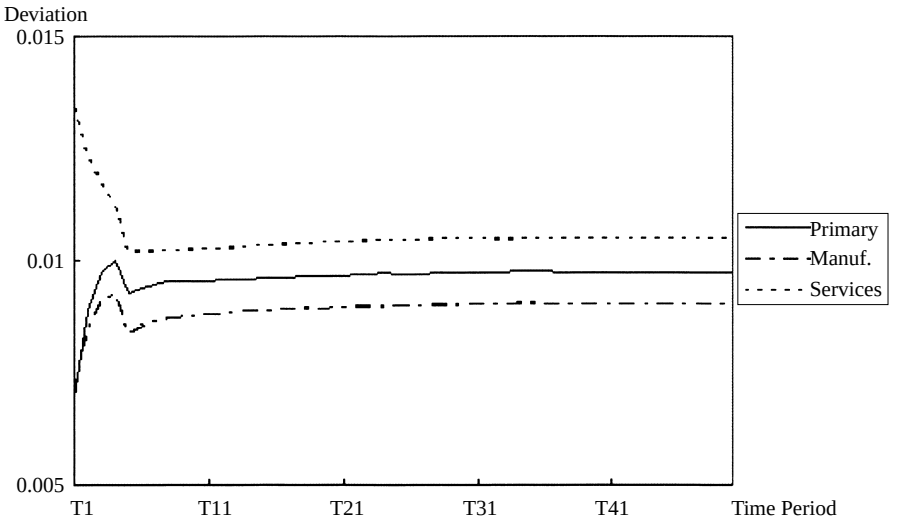


Figure 2.14

Export, Import and Output Values (Japan-Case A (ii))

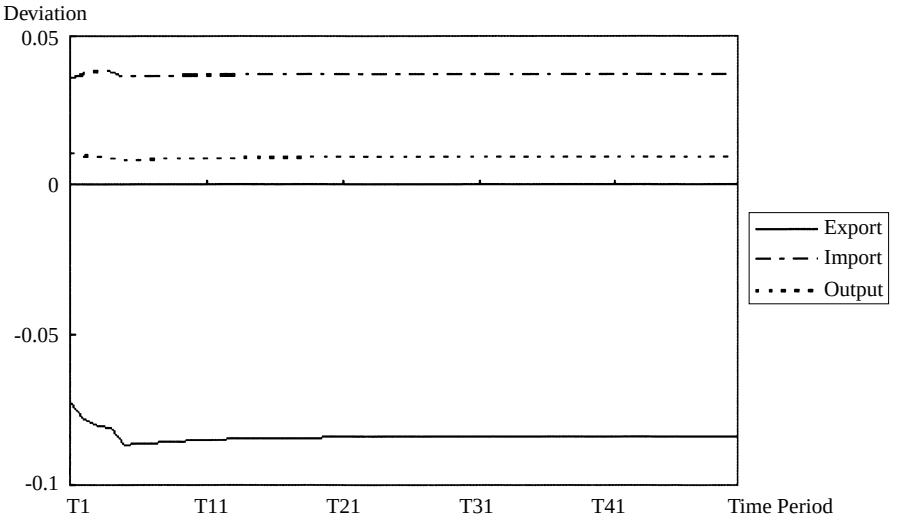


Figure 2.15

GDP (Case A (ii))

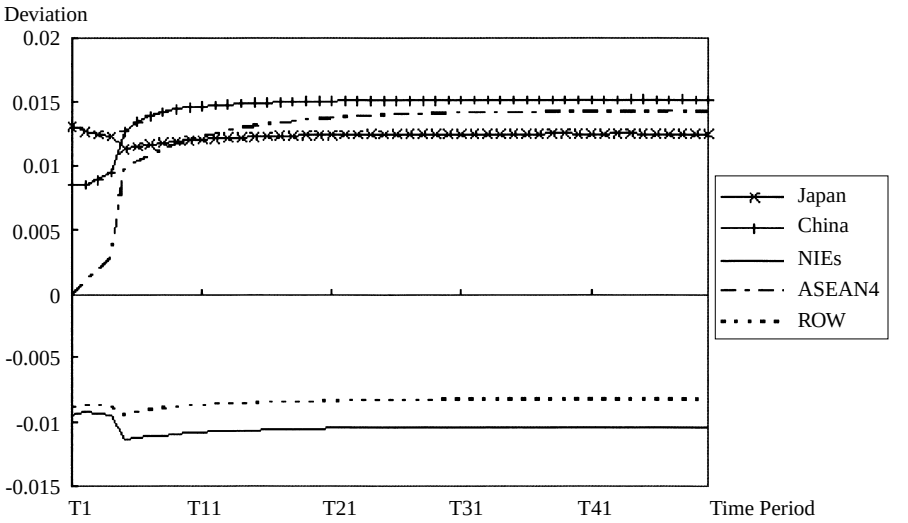


Figure 2.16

Regional Welfare (Case A (ii))

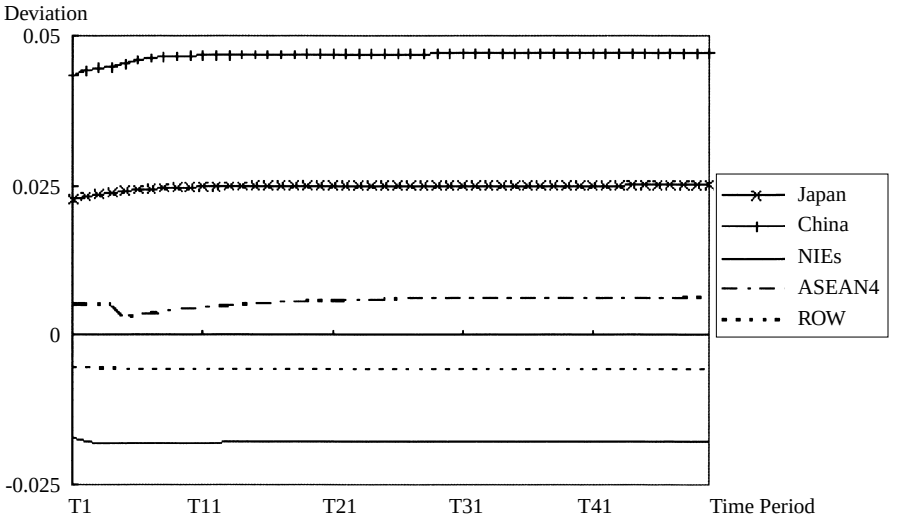


Figure 2.17

Relative Output Prices to the Global Average (Japan-Case A (iii))

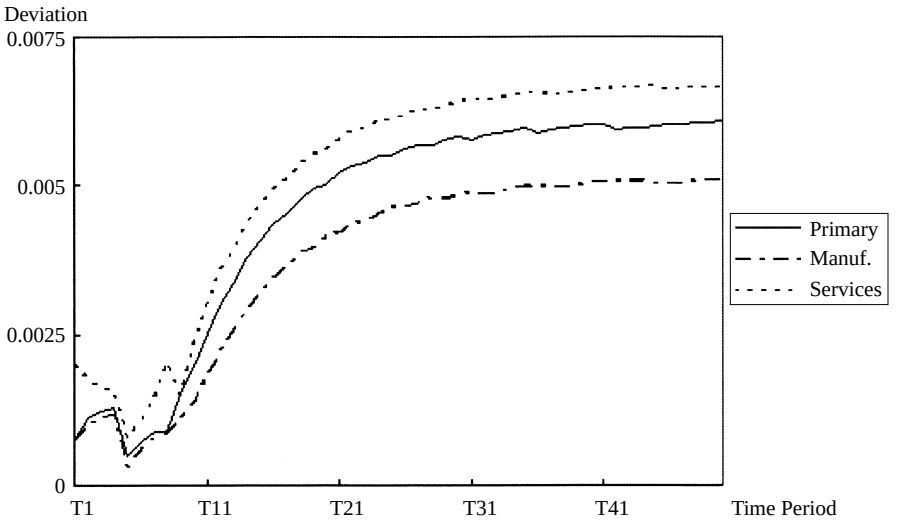


Figure 2.18

Export, Import and Output Values (Japan-Case A (iii))

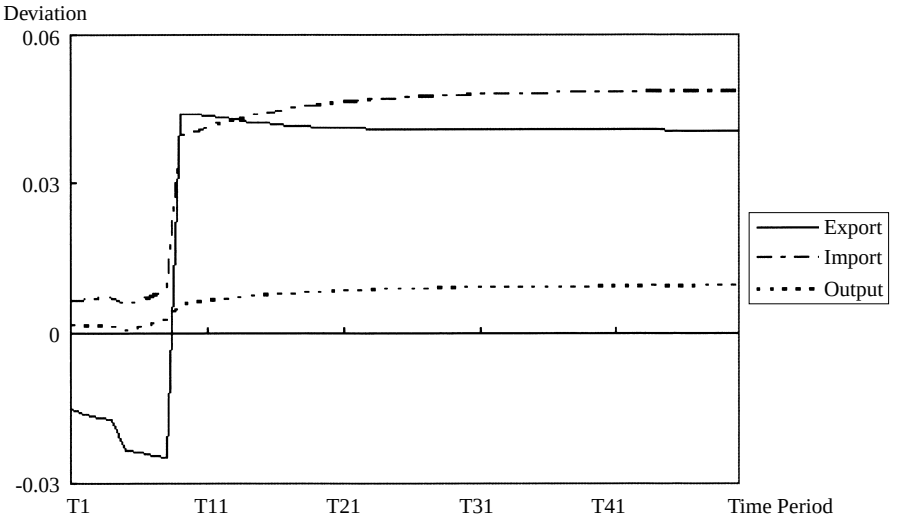


Figure 2.19

Relative Output Prices to the Global Average (China-Case A (iii))

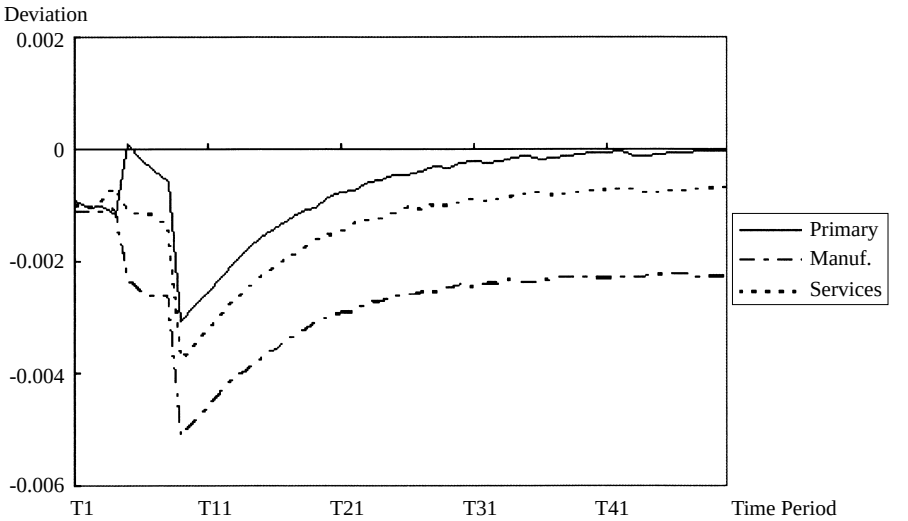


Figure 2.20

Export, Import and Output Values (China-Case A (iii))

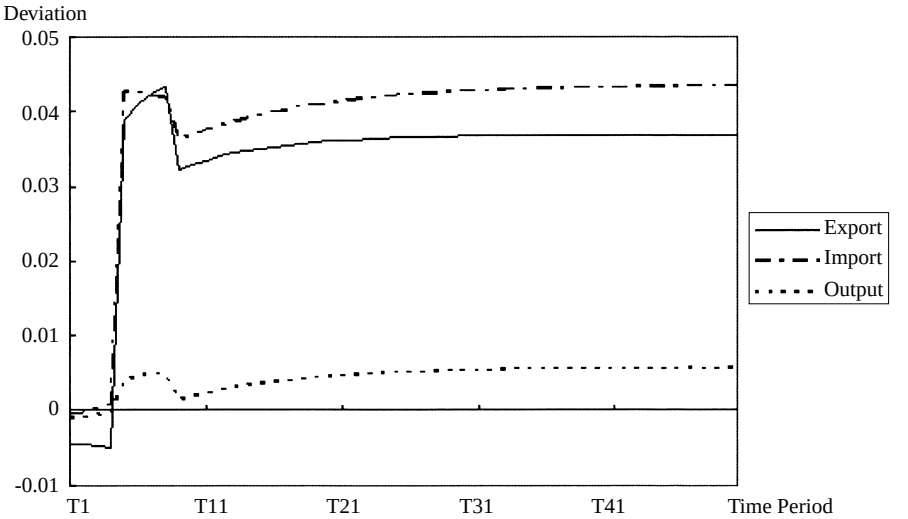


Figure 2.21

Relative Output Prices to the Global Average (ASEAN4-Case A (iii))

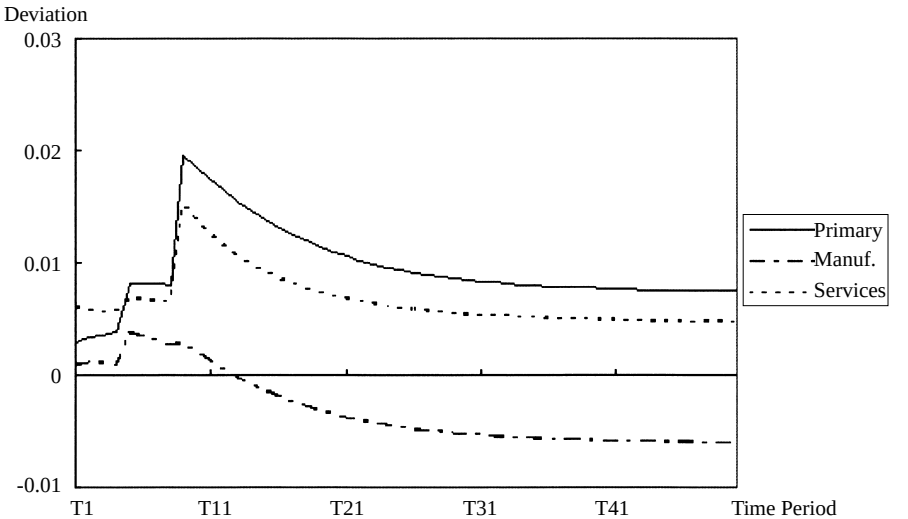


Figure 2.22

Export, Import and Output Values (ASEAN4-Case A (iii))

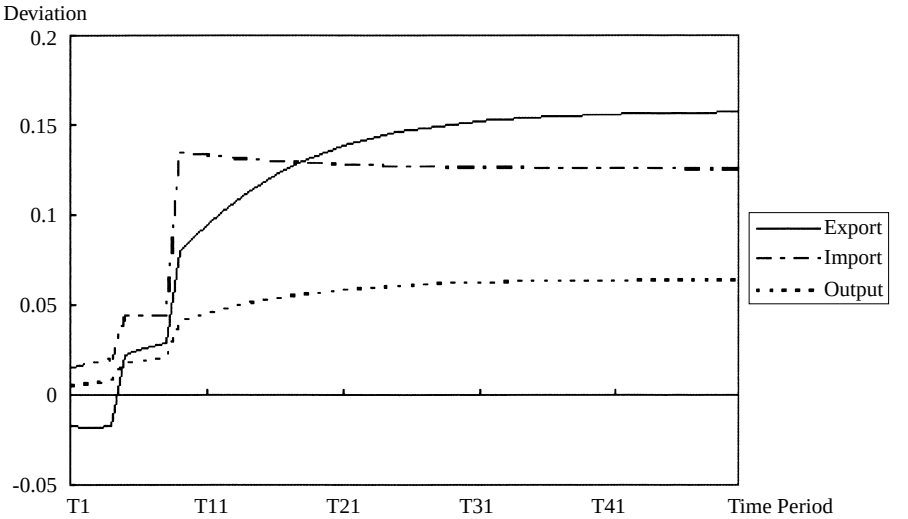


Figure 2.23

GDP (Case A (iii))

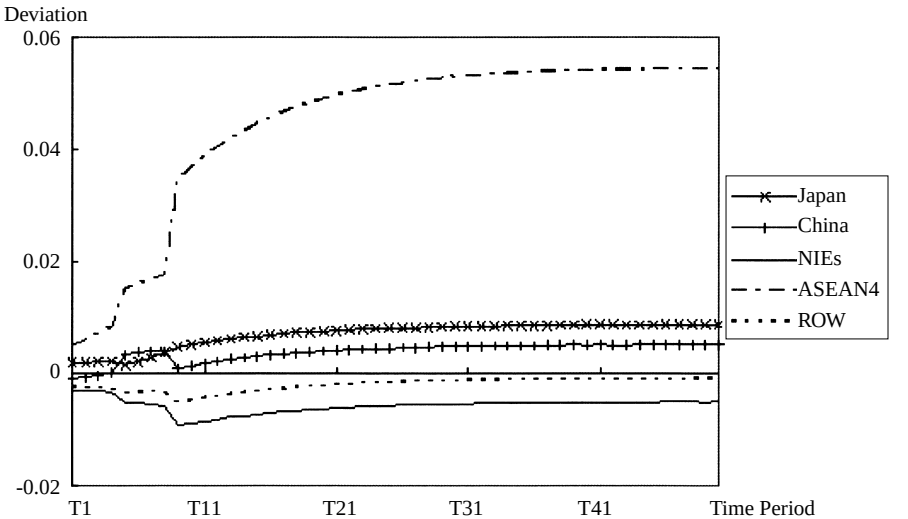


Figure 2.24

Regional Welfare (Case A (iii))

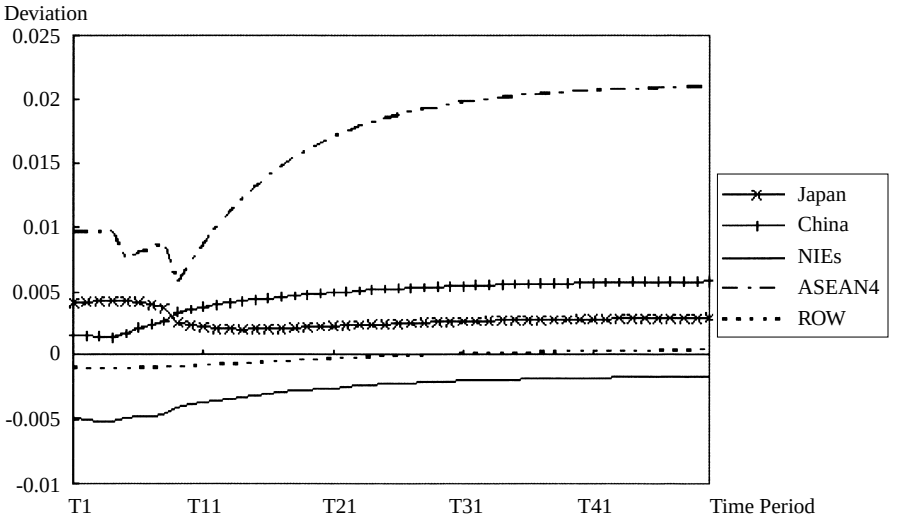


Figure 2.25

Export, Import and Output Values (Japan-Case B (i))

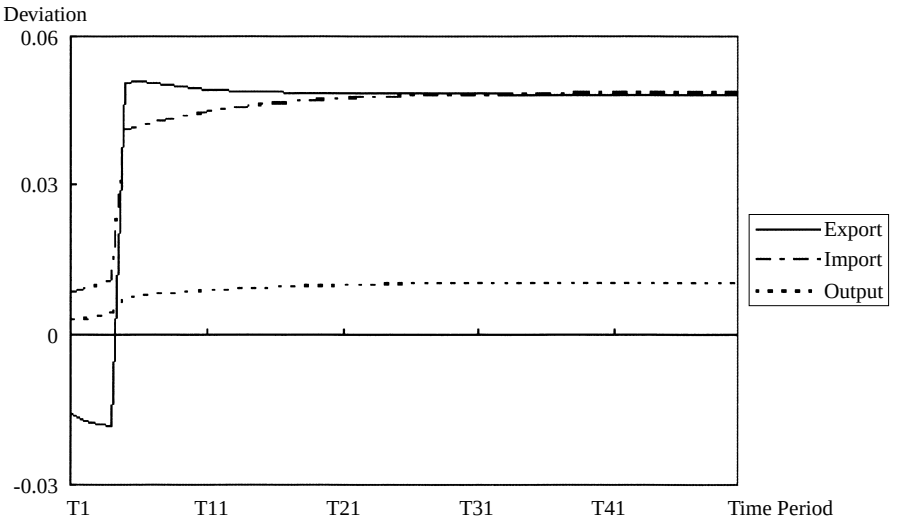


Figure 2.26

Export, Import and Output Values (China-Case B (i))

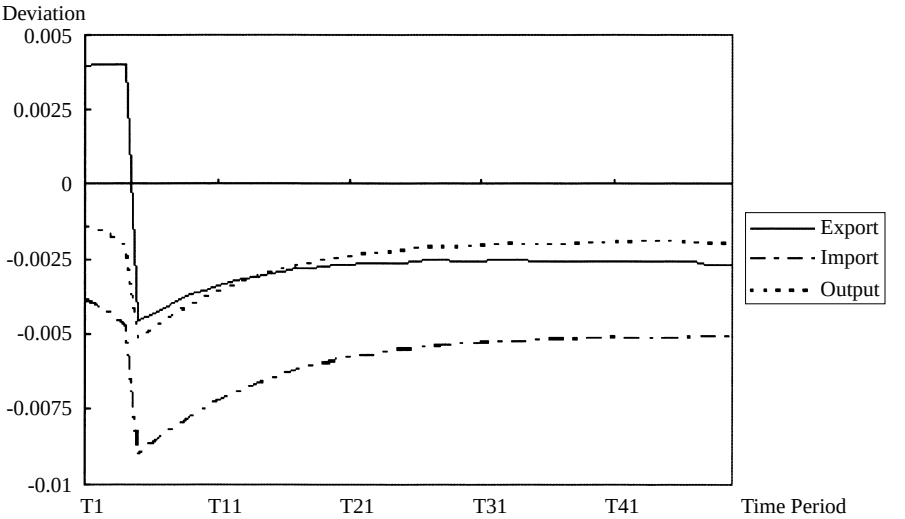


Figure 2.27

GDP (Case B (i))

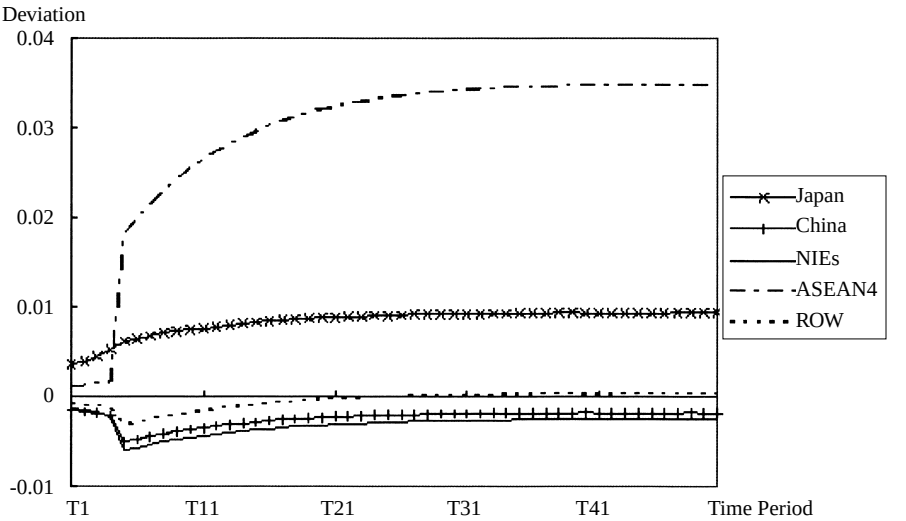
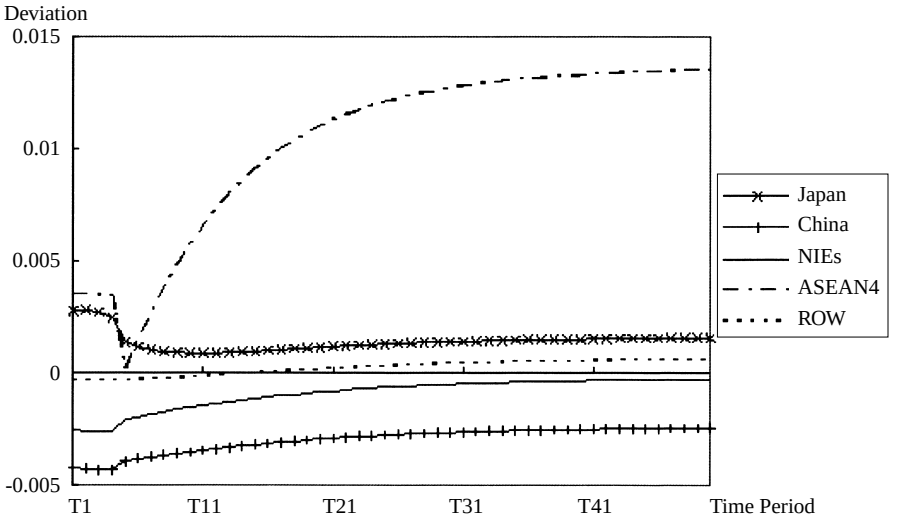


Figure 2.28

Regional Welfare (Case B (i))



IV. Concluding Remarks

The purpose of this study was to clarify the potential impact of trade liberalization between Japan and ASEAN members, using a forward-looking, multiregional, multisectoral AGE model of global trade. The model can be used to analyze questions where the response of intertemporal variables such as savings and investment are important; however, the structure of the global economy is also relevant.

Simulations with the model revealed the response of the global economy to four types of trade-liberalization program. The key findings can be summarized as follows:

A. Trade liberalization between Japan and ASEAN4 has a tendency to cause trade diversion into the coalition, followed by steady capital accumulation; however, the case between China and ASEAN4 changes the trend of interregional investment flows through price effects that may significantly affect the patterns of trade.

B. The price effects and the subsequent changes in the patterns of interregional investment patterns, caused by trade liberalization between China and ASEAN4, are sensitive and may easily be affected by other policy changes, such as those that induce steady capital accumulation, through removal of distortions in trade markets.
C. The benefit that ASEAN4 would receive from trade liberalization with Japan might be amplified by free trade between China and ASEAN4.
D. Japan has a possibly important role in the Asian region in the linking of China and ASEAN4 through close and complementary relationships of Japanese and Chinese industries, especially in the manufacturing sector, since the initial relationship between China and ASEAN4 is not very strong.

There are several potentially important issues that are not taken into account in the present analytical framework. First, the assumption that the global economy is on a balanced growth path at the initial point (used in order to calibrate the model) is unrealistic. Since Asian economies are still in the process of development, it is appropriate to think that the global economy is on a dynamic adjustment path. While Lau *et al.* (2002) offered a new procedure for allowing different regional growth rates in a stationary state, the econometric approach still has importance in projections.

Second, since trade liberalization may affect fiscal budgets by reducing revenues from import and export duties, it is important to shed light on the possible negative impact that trade liberalization may have. Economic growth may be decelerated through the accumulation of public capital. The next issue of this study would include such activities of the public sector.

Third, impact on the trend of Foreign Direct Investment (FDI) cannot be captured clearly in this analysis. An effort to include decision making on investment by MNEs has been made, but several important profiles of FDI still remain that are difficult to model.

Fourth, the present analytical model seems to be too sensitive to changes in patterns of interregional investment. As Itakura *et al.* (2003) suggested, modeling without an assumption of full employment may be an important subject.

Finally, it would be crucial from a political-economic standpoint to incorporate economies of scale. We therefore feel that it is also important to abandon the assumption of perfectly competitive markets in the future.

Notes

* The author would like to express his gratitude to Daisuke Hiratsuka, the Institute of Developing Economies, and Ken Itakura, Purdue University, for their helpful comments and suggestions.

1 Using a two-country model with capital accumulation and assuming pooling equilibrium, Buiter (1989) analyzed the effects of various fiscal policies on trade balance. Ono and Shibata (1992) examined the effects of home-country supply-side shocks on the standard-of-living levels of both home and foreign countries. Some studies have made efforts to extend the $2 \times 2 \times 2$ Hecksher-Ohlin model into dynamic analyses. Fisher and Vousden (1997) analyzed the growth effects of customs unions and free-trade areas. Ono and Shibata (1991) incorporated intertemporally optimizing agents and analyzed the effects of fiscal policy on each country's standard of living. From the viewpoint of economic growth, Islam (2001) clarified, using a numerical multiregional growth model, that the patterns and trends in the global economy are consistent partially with the stylized facts of growth of national economies, and that optimal growth rates, optimal structure, and growth dynamics without and with convergence constraints appear to be the same.

2 Francois *et al.* (1997) and Keuschnigg and Kohler (1997) addressed the importance of accumulated growth effects of trade-related policy changes. Devarajan and Go (1998) pointed out the contradiction of the assumption in recursively dynamic models that the same agent behaves rationally for one set of decisions (within-period decisions) but irrationally for another (intertemporal decisions).

3 Available data that capture interregional FDI flows and stock are limited to those four countries among the ASEAN members.

4 Because of the difficulties in parameterizing the model, neither imperfect competition nor biased information is incorporated in this study. While Yeldan and Roe (1994) pointed out the importance of modeling noncompetitive or missing market structures and heavily politicized, regulated managerial practices that are often based on imperfect and biased information, we concentrate on an analysis assuming perfectly competitive markets.

5 Capital prices may be translated into stock prices. Capital price multiplied by the interregional rate of return in the model gives us the expected dividends and earnings retained in an enterprise in which one has theoretically invested.

6 While there are variables that represent capital prices in the model used in this study, for the sake of simplicity we shall use output prices as the capital price indices when we see impact on interregional investment flow.

References

Armington, Paul S. 1969. "A Theory of Demand for Products Distinguished by Place of Production." *International Monetary Fund Staff Papers,* Vol.XVI, No.1: 159-76.

Brooke, Anthony, David Kendrick, and Alexander Meeraus. 1992. *GAMS: A User's Guide, Release 2.25.* San Francisco: Scientific Press.

Buiter, Willem H. 1989. *Budgetary Policy, International and Intertemporal Trade in*

the Global Economy. Amsterdam: North Holland.

Devarajan, Shantayanan and Delfin S. Go. 1998. "The Simplest Dynamic General Equilibrium Model of an Open Economy." *Journal of Policy Modeling,* 20(6): 677-714.

Fisher, Eric O. and Neil Vousden. 1997. *Dynamic Trade Creation.* mimeo.

Francois, Joseph F. 2001. *THE NEXT WTO ROUND: North-South stakes in new market access negotiations.* Adelaide and Amsterdam and Rotterdam: CIES and the Tinbergen Institute.

Francois, Joseph F., Bradley J. McDonald, and Haken Nordstroem. 1997. "Capital Accumulation in Applied Trade Models." In *Applied Methods for Trade Policy Analysis,* ed. J. F. Francois and K. A. Reinert. Cambridge: Cambridge University Press.

Hertel, Thomas W., ed. 1997. *Global Trade Analysis.* Cambridge: Cambridge University Press.

Islam, Sadar M. N. 2001. "Optimal Multiregional Global Economic Growth: Formulation of an Optimal Growth Program, Growth Prospects, and Convergence." *Journal of Policy Modeling,* 23: 753-74.

Itakura, Ken, Thomas W. Hertel, and Jeffrey J. Reimer. 2003. "Labor Market Impacts of the Japan-ASEAN Free Trade Agreement." Paper presented at the International Conference on "Emergent Trilateralism in the Pacific Basin," June, University of California, Berkeley.

Keuschnigg, Christian and Wilhelm Kohler. 1997. "Dynamics of Trade Liberalization." In *Applied Methods for Trade Policy Analysis,* ed. Joseph F. Francois and Kenneth A. Reinert. Cambridge: Cambridge University Press.

Lau, Morten I., Andreas Pahlke, and Thomas F. Rutherford. 2002. "Approximating Infinite-Horizon Models in a Complementarity Format: A Primer in Dynamic General Equilibrium Analysis." *Journal of Economic Dynamics and Control,* 26 (4): 577-609.

Ono, Yoshiyasu and Akihisa Shibata. 1991. "Trade, Capital Accumulation, and Welfare." *ISER Discussion Paper,* No.259.

_____. 1992. "Spill-Over Effects of Supply-Side Changes in a Two-Country Economy with Capital Accumulations." *Journal of International Economics,* 33, 127-46.

Whalley, John. 1985. *Trade Liberalization among Major World Trading Areas.* Cambridge: MIT Press.

Yeldan, Erinc A. and Terry L. Roe. 1994. "Environmental Policy under Alternative Market Structures: Lessons from Turkey as a NIC." Paper presented at the Fifth International CGE Modeling Conference, October 27-29, University of Waterloo, Canada.