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Welfare Aspects in the Realignment of Commercial Framework between Japan and China

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Introduction

As Chinese economy has grown to have an great influence on the advance economies, not only the United States and EU, but Japan also has noticed to make the realignment of commercial framework between Japan and China. In our previous paper[1], we made an analytical framework to link two countries' national models and a tentative simulation in a limited data exchange, where we had a simulation of Free Trade Arrangement to remove import tariffs. Current project could build the linking model to have the data exchange mutually with the iteration at each time period[2].

The analysis in this paper is to evaluate the several policy alternatives in a welfare aspect for Japanese economy. Welfare is measured with the concept of "Equivalent Valuation" which is employed by CGE modelers in their analyses. However, it is meaningful that the equivalent valuation is observed effectually in a dynamic context of long-term economic fluctuation. The paper focuses on a specific industry in Japanese tradable sectors, "Textile" which is a biggest importing sector among Chinese products. Even if the textile industry lost the equivalent valuation as a policy alternative, there might be the net gain of equivalent valuation in a whole economy. For observing the welfare impacts of policy alternatives, this paper examines the different equivalent valuations of three cases of tariff removal in Japan, mutual tariff removal and of the exchange rate appreciation of Chinese Yuan for the textile industry. In order to respond to such requirement, JIDEA model has been well prepared in a framework of INFORUM system[3].

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[1] *Toshiaki Hasegawa, Yasuhiko Sasai, Takeshi Imagawa, Mitsuhito Ono, "Japan-China regional economic integration and Asian economic growth: Influence on Japanese economy", prepared for the 12th INFORUM World Conference, Ascea, Italy, 2004.*

[2] *Mitsuhito Ono, et al. "Simulation of Japan-China Regional Economic Arrangement", and Yinchu Wang, "The Impact of Free Trade between China and Japan on Chinese Economy". Both papers were prepared for the 15th International Input-Output Conference, Beijing, China, June 27-July 1, 2005. Also, refer to M. Ono, Y. Sasai, T. Imagawa, T. Hasegawa, K. Shiraishi, "Simulation of Japan-China Regional Economic Arrangement", and Yinchu Wang, "The Linkage between MUDAN and JIDEA", presented in the 13th INFORUM International Conference, July 3-9, 2005, Huangshan, China.*

[3] *See INFORUM webpage; www.inforum.umd.edu.*

Equivalent Valuation in a dynamic context

In order to measure the price and the quantity changes of an industry's product as an index, Laspeyres quantity index[4], L_Q, is useful. Original Laspeyres quantity index, L_Q, is defined as follows;

$$L_Q = \frac{\sum_i p_i^0 q_i^1}{\sum_i p_i^0 q_i^0} \qquad (1),$$

where (0) and (1) denote the base year and the compared year in the price p_i and the quantity q_i in the i-th industry, respectively. At the base year (0), the nominal demand is equal to the real demand in number. In order to compare the welfare change between the base year and the compared (given) year (1), the equivalent valuation, E.V., defined along the criterion of Laspeyres quantity index is the key concept in this paper.

$$E.V. = \sum_i p_i^0 q_i^1 - \sum_i p_i^0 q_i^0 \qquad (2).$$

If we adopted 1.0 for the price index at the base year, equivalent valuation becomes the matter to deal with the quantity in terms of the base year.

In a dynamic long-term analysis, if we want to identify the part of economic change itself caused by the specific policy, we have to remove the part of demand increase (or decrease) caused by the economic change over time under the baseline condition. Therefore, the above formula of equivalent valuation, E.V., should be rewritten for the particular sector as follows,

$$L_Q = \frac{p_{i,BS}^0 (q_{i,sm1}^1 - q_{i,BS}^1)}{p_{i,BS}^0 q_{i,BS}^0} \qquad (3).$$

In this context, we should use the following rewritten formula of equivalent valuation for the i-th industry;

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[4] *Total demand nominal values of demand at the base year and the compared year in a changing economy in the price, the quantity, and the income are expressed as follows.;*

$\sum_i p_i^0 q_i^0$ *vs.* $\sum_i p_i^1 q_i^1$ *, where* $\sum_i p_i^0 q_i^0$ *; the sum of the price times the quantity for the i-th goods at the base year (0), respectively. And also,* $\sum_i p_i^1 q_i^1$ *is the sum of the price times the quantity for the i-th goods at the compared year (1), respectively.*

$$E.V. = p^0_{i,BS}(q^1_{i,SM} - q^1_{i,BS}) - p^0_{i,BS} q^0_{i,BS} \qquad (4).$$

Summed up the above i-th industry for i=1,2,…,n, we reach the following total equivalent valuation for the specific policy denoted by "SM" compared with the changed baseline denoted by "BS" in the whole economy.

$$T.E.V. = \sum_i p^0_{i,BS}(q^1_{i,SM} - q^1_{i,BS}) - \sum_i p^0_{i,BS} q^0_{i,BS} \qquad (5).$$

In a dynamic long-term analysis, the demand curve might be depicted as an envelope of the short-term demand curves. The composite intersection of each supply and demand curve over time is possible to move toward any direction from the point of the initial equilibrium under the various economic conditions. In the analysis of international trade, the import demand curve is induced by subtracting the domestic supply from the domestic demand horizontally at each price. Such excess demand curve, that is, the import demand curve, in the dynamic context, is shown in Figure1.

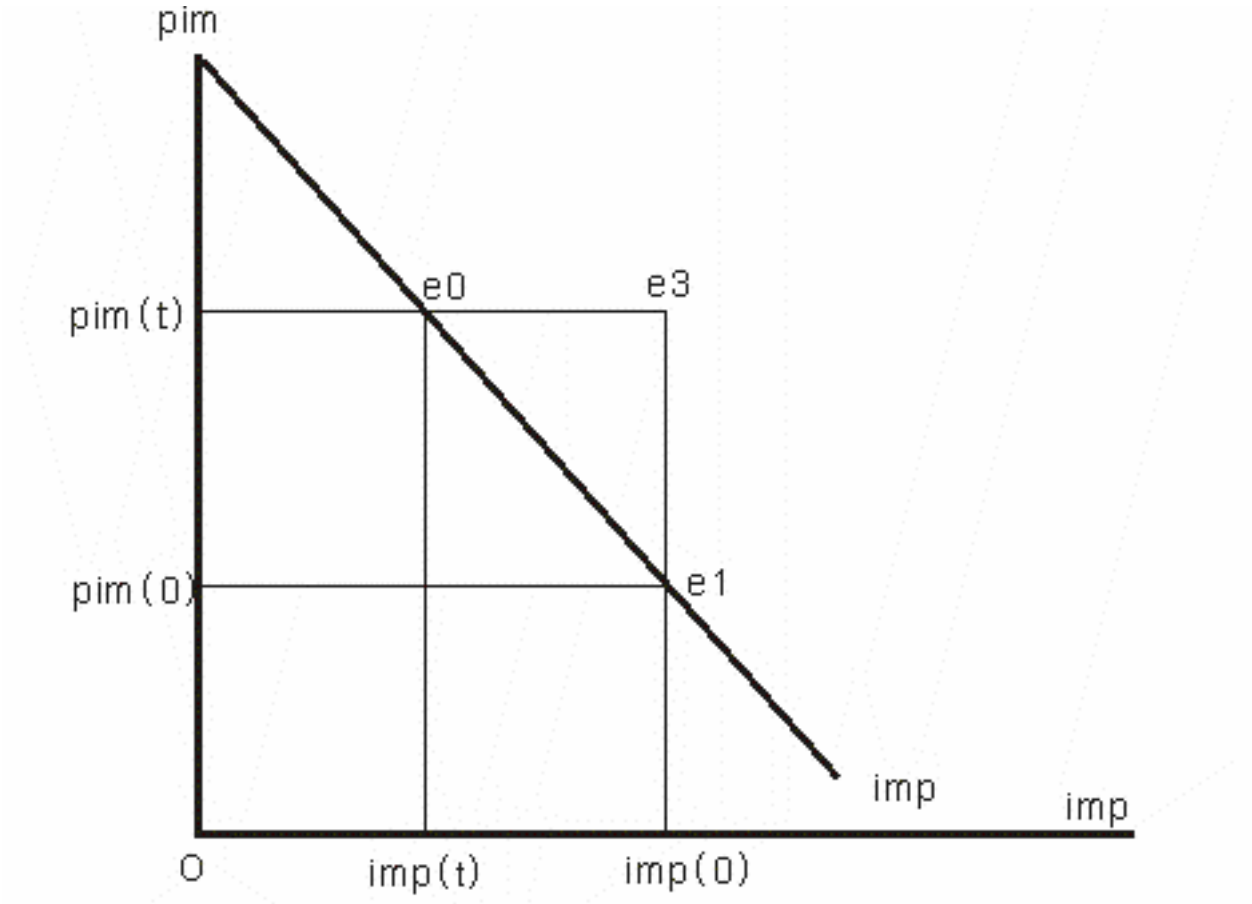


Figure1 Price change of tariff removal in Import demand function

*In Figure 1, the import quantity, imp, is depicted in the horizontal axis, while the vertical axis shows the import price, pim. The initial value of import demand shown by the product pim(t)*imp((t) at the point e0, where the import tariff was imposed on this industry. (t) denotes tariff inclusive, while (0) denotes tariff removed position. We can expect that the import tariff removal leads to the price drop down to pim(0) and the import demand increase, imp(0), i.e., the compared value of import demand, pim(0)*imp(0). The equivalent valuation in this Figure 1 is equal to the product pim(t)*{imp(0)-imp(t)} in terms of the price of base year.*

If the price was taken as the index based on the based year (t), the evaluation equivalent is just equal to pim(t){imp(t)-imp(0)}. We can regard the price index as a basic unit of currency, such like 1 Japanese Yen in terms of the base year. Given pim(t)=1.0, the evaluation equivalent is just equal to {imp(t)-imp(0)}.*

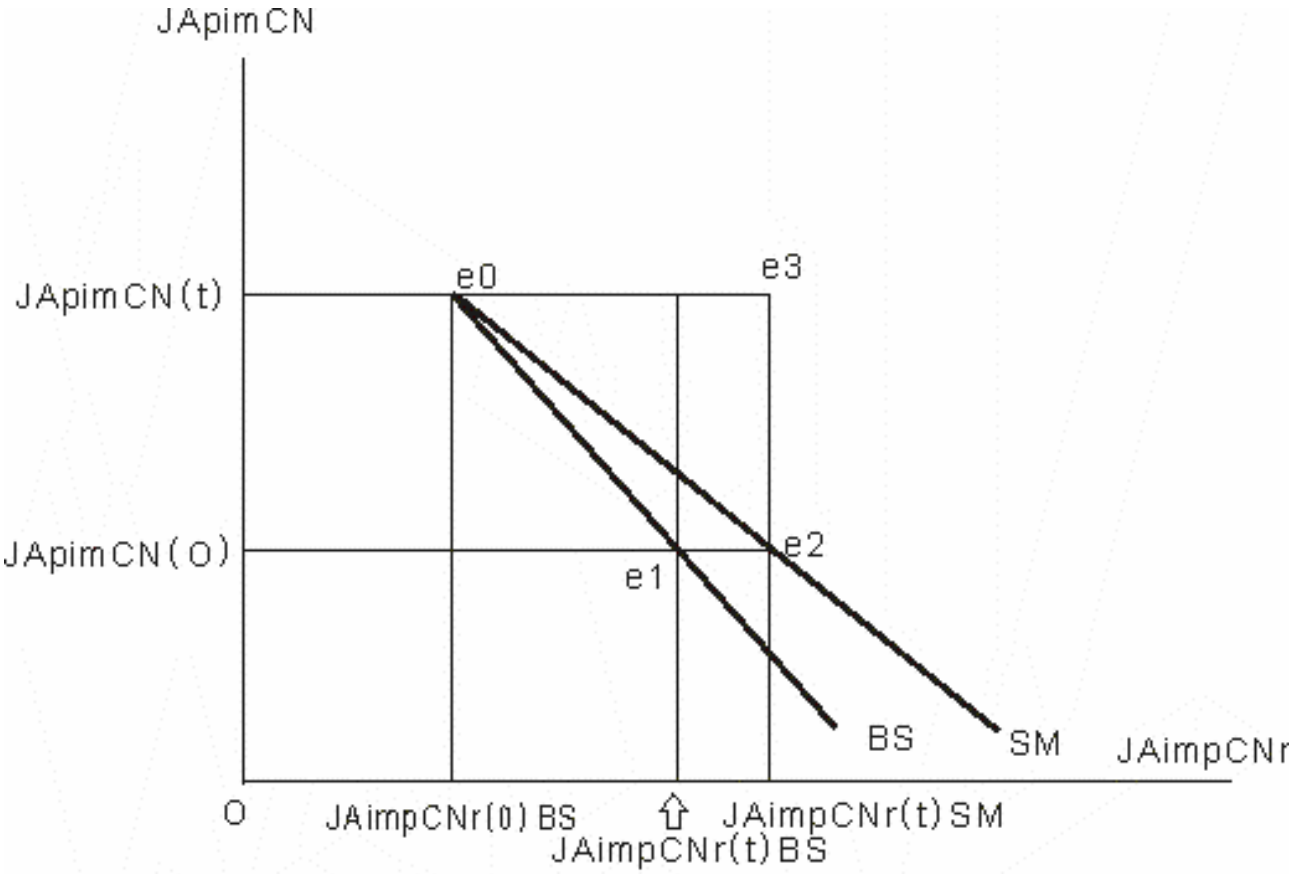


Figure 2 Price change of tariff removal in a dynamic context

In a dynamic context, where we analyzed Regional Trade Arrangements in terms of the linking model of Japanese model, JIDEA version 5.1s, and Chinese model, MUDAN version 3.0, the price and the quantity of import demand change over time without the policy change. In both models, we introduced the same notations to give and take the trade data. In Figure 2, JAimpCNr implies Japanese import from Japan in 1995 constant price. And, JApimCNr implies Japanese import price from China. This is illustrated as a case of Baseline, BS from the point e0 to the point e1. Policy

change such like a tariff removal for the Chinese products in Japan shifts the line e0BS to the line e0SM. Because we use the price index in the vertical axis, JApimCNr(t) is equal to 1.0. Equivalent valuation in the case of this policy change is shown as the area of following equation (6) according to the definition of the above equation (5).

$$E.V.=JApimCN(t)*\{JAimpCNr(0)SM-JAimpCNr(0)BS\}-JApimCNr(t)BS*JAimpCNr(t)BS$$
$$=\{JAimpCNr(0)SM-JAimpCNr(0)BS\}\}-JAimpCNr(t)BS \qquad (6)$$

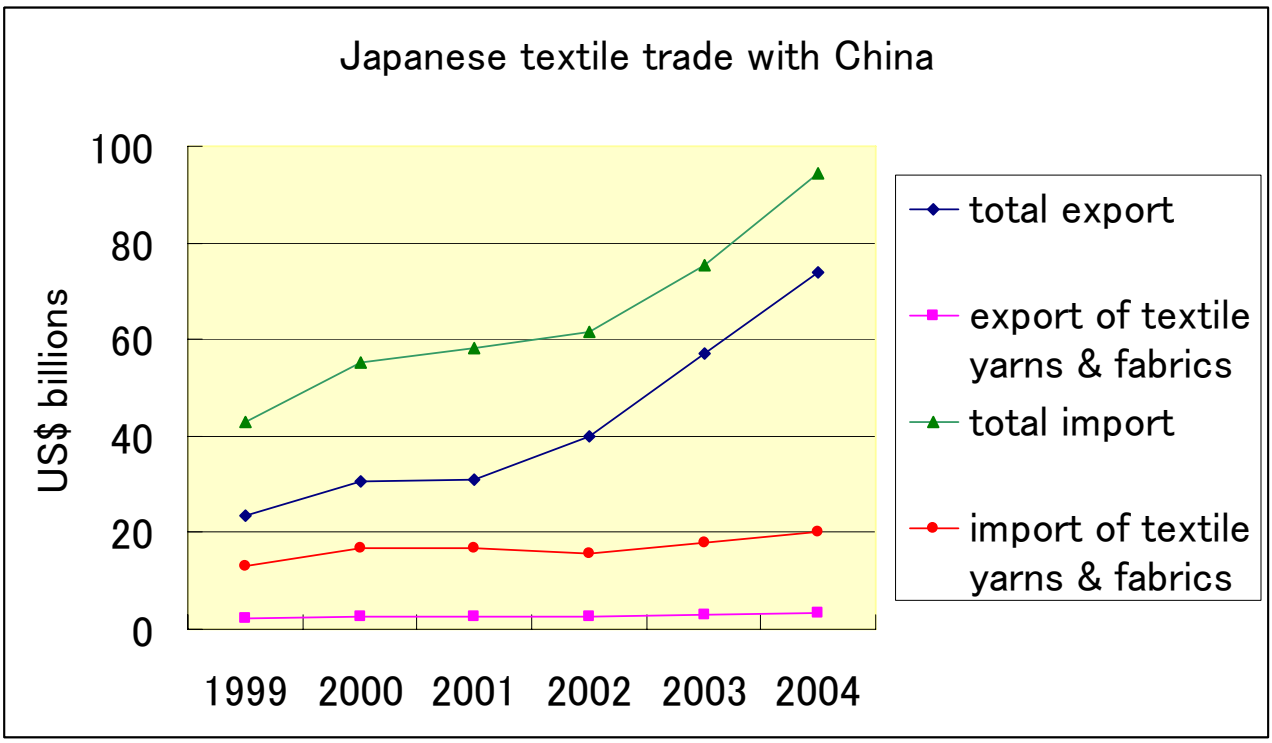
where JApimCNr(t)BS= JApimCNr(t)SM=1.

Equivalent valuation measured in equation (6) implies not only the amount of quantity change of import, but also the money term of import change, also, measured in a base year.

Japanese import of Chinese "Textile"

Textile and Clothing industries among Japanese JIDEA model with 100 industry sectors and 63 tradable sectors might be integrated as one "Textile" industry for the concern in this paper. The reason why we focus on the textile import from China to Japan is that it corresponds to 31% of Japanese import from China in 2003, one of the largest importing sector. The following Figure 3 and Table 1 compiled by MOF-JETRO trade data is slightly different from our JIDEA trade data taken from INFORUM-BTM data, shows us the importance of Textile trade between Japan and China.

Figure 3 Japanese textile trade with China



Source: Figure was depicted by the author with use of trade statistics from the ministry of finance compiled by

JETRO.

Table 1 Share of textile yarns and fabrics in the total Japanese trade with China

	1999	2000	2001	2002	2003	2004
export share of textile	9.87	8.63	8.07	6.09	4.90	4.32
import share of textile	30.68	30.27	29.11	25.65	23.71	21.39

Source: Author processed the original data of trade statistics of the ministry of finance compiled by JETRO.

Japanese tariff data released by Ministry of Finance has the precise information about the import tariffs, but its product classification is quite different from the one of Input-Output table in Japan, with multiple criterions of tariff imposing system. In the previous paper, such complicated tariff data was integrated in a 100 sector framework of JIDEA model[5]*. As far as we confine the tariff protection to compare with tariff revenue, textile industry receives 76.5% of total tariff protection in our analysis.*

After the expiration of quota scheme in the Multi Fiber Arrangement, MFA, of WTO, Chinese export of yarns and clothing has severely flooded into EU and the United States. In such a strongly protected industry, how largely would some policy arrangement between Japan and China influence on the industry concerned? Also, how largely would some policy arrangement between Japan and China influence on the whole economy?

How severely influenced by the price change of import product from China?

The price change of import product from China would occur in several channels. In this paper, the first channel is supposed to occur in Japan by the whole tariff removal for all importing products from China, which is named as simulation 1. The second channel occurs in the case which both countries take the tariff removal, but 10% cut of current tariff level in China, which case is named as simulation 3, sm3. We considered the exchange rate appreciation of Chinese Yuan as the third case, where is named as simulation 4, sm4. In simulation 4, we estimated how largely 10% appreciation of Chinese exchange rate would influence on our textile industry. All policy alternatives were assumed to be introduced in 2003.

For Japanese importers, they face to the price of Chinese made products in the following contents:

$$JApimCN = (1+tm)*[\{JPY*pj(t-1)/pj(t)\} / pc(t-1)/pc(t)\ ] \qquad (7)$$

where tm is the tariff rate on Chinese products in Japan. That is, the above expression implies the real exchange rate included tariff rate. This expression may influence on the behavior of Japanese import from China. Figure 4 shows the nominal and the real exchange rate of Chinese Yuan to Japanese Yen, where the latter was calculated with use of both countries' CPI.

In the simulation of sm4, we assumed the case of both side price changes in Japanese economy,

[5] *T. Hasegawa et al, (2004), ibid.*

JApimCN and JApexCN. Table 2 shows the import price indexes of the baseline and three alternative policies in the results of JIDEA simulation. The equivalent valuation requires the use of the import price in the base year, which is shown at the first line in a bound block. In any cases, the import price in textile industry do not move so much as compared with other bound sectors; total industry and manufacturing industry. It is controvertible to see that the size of price fall in Textile industry is much smaller than the size of price falls in the total economy and the manufacturing industry.

Figure 4 Fluctuation of Chinese exchange rate Yuan to Japanese Yen

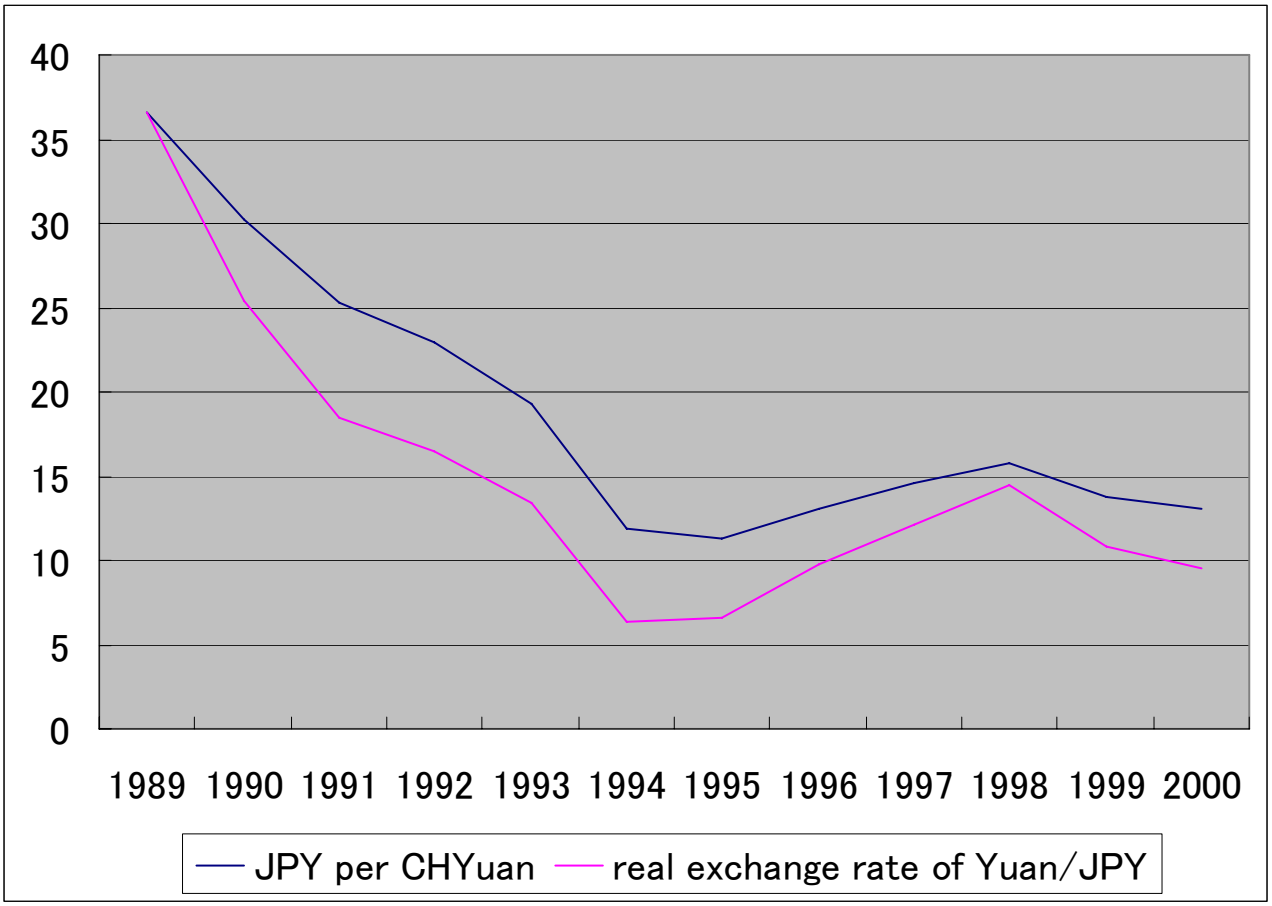


Table 2 Import Price Index, JApimCN *(to be inserted here from the last page)*

Table 3 Equivalent Valuation of Policy Realignment						
	2003	2004	2005	2006	2007	2008
E.V. of sm1 in Total industry	0.0949	0.1214	0.1514	0.1703	0.1425	0.1162
E.V. of sm3	0.1140	0.1375	0.2609	0.3945	0.3964	0.4322
E.V. of sm4	0.1115	0.1404	0.2712	0.4000	0.3958	0.4310
E.V. of sm1 in Ag., Fo., &Fish.	0.0004	0.0004	0.0004	0.0003	0.0002	0.0002
E.V. of sm3	0.0004	0.0003	0.0005	0.0005	0.0004	0.0004
E.V. of sm4	0.0004	0.0003	0.0005	0.0005	0.0004	0.0004
E.V. of sm1 in Total Manufacturing	0.0815	0.1051	0.1359	0.1577	0.1316	0.1075
E.V. of sm3	0.1007	0.1215	0.2395	0.3739	0.3767	0.4135
E.V. of sm4	0.0982	0.1244	0.2495	0.3793	0.3761	0.4123
E.V. of sm1 in Textile	0.0222	0.0223	0.0335	0.0340	0.0283	0.0224
E.V. of sm3	0.0294	0.0243	0.0624	0.0842	0.0851	0.0899
E.V. of sm4	0.0284	0.0276	0.0656	0.0856	0.0851	0.0898

In the simulation of linking model between JIDEA and MUDAN, we could get the welfare index in the specific fields in Japanese economy. Three alternatives of commercial policies have different size in equivalent valuation. Most small influence was occurred in the case of sm1. sm3 and sm4 are almost same influences in equivalent valuation, which are much attractive alternatives for the whole Japanese economy. Also, these alternatives have the difference of within 0.1 million employment increase in total industry. Probably, the higher effects of simulations of sm3 and sm4 will occur in Chinese economy than in Japanese economy, because it seems that China has the higher level of import tariff compared with Japanese import tariff.

In Table 4, we give the employment level for the baseline and each simulation by the aggregated sector. The employment share of textile industry in total industry is only 1.98% in 2003. Such a small part of industry in Japanese economy has been subsidized in a relatively high tariff protection.

Table 4. Employment change in policy alternatives						
	2003	2004	2005	2006	2007	2008
1.Total industry	6671.881	6715.366	6679.355	6707.658	6704.523	6716.290
1.sm1	6674.118	6717.200	6682.162	6709.485	6706.008	6717.385
1.sm3	6675.310	6719.014	6686.904	6715.402	6713.028	6725.734
1.sm4	6675.394	6718.918	6687.009	6715.452	6713.031	6725.746
2.01 Agriculture, Forestry & F	432.801	422.738	394.512	388.310	371.067	360.079
2.sm1	432.377	422.477	394.333	388.137	370.932	359.956
2.sm3	432.677	423.033	395.382	389.588	372.904	362.582
2.sm4	432.724	423.042	395.400	389.594	372.910	362.592
3.Total Manufacturing	1416.674	1410.939	1419.391	1395.899	1399.073	1394.192
3.sm1	1418.902	1412.602	1420.055	1396.119	1399.281	1394.333
3.sm3	1421.293	1416.090	1424.329	1401.209	1405.628	1402.158
3.sm4	1421.390	1416.047	1424.150	1401.125	1405.618	1402.155
4. 04 Textile	132.175	121.820	129.486	120.177	122.250	121.839
4.sm1	131.492	121.222	128.542	119.290	121.485	121.209
4.sm3	132.732	123.172	130.977	122.486	125.929	127.156
4.sm4	132.747	123.138	130.904	122.450	125.927	127.153

Table 3. Import price index, JApimCN

	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
1.Total industry	0.86383	0.83982	0.85372	0.83696	0.84283	0.84877	0.85550	0.79520	0.80227	0.80794	0.81715
1.sm 1	0.86383	0.83982	0.85374	0.83704	0.84305	0.84900	0.85554	0.79529	0.80217	0.80785	0.81706
1.sm 3	0.86383	0.83982	0.85372	0.83702	0.84303	0.84900	0.85543	0.79528	0.80187	0.80743	0.81643
1.sm 4	0.86383	0.83982	0.85374	0.83704	0.84305	0.84900	0.85549	0.79529	0.80186	0.80742	0.81643
2.01 Agriculture, Forestry & Fishery	0.89994	0.86213	0.83650	0.84245	0.83708	0.83774	0.84764	0.78926	0.79660	0.80229	0.81062
2.sm 1	0.89994	0.86213	0.83650	0.84243	0.83708	0.83782	0.84773	0.78941	0.79674	0.80242	0.81073
2.sm 3	0.89994	0.86213	0.83650	0.84242	0.83708	0.83782	0.84774	0.78948	0.79685	0.80252	0.81087
2.sm 4	0.89994	0.86213	0.83650	0.84243	0.83708	0.83782	0.84773	0.78948	0.79685	0.80252	0.81087
3.Total Manufacturing	0.88307	0.85287	0.85971	0.84348	0.85103	0.85387	0.85875	0.79872	0.80410	0.80911	0.81775
3.sm 1	0.88307	0.85287	0.85971	0.84341	0.85097	0.85376	0.85853	0.79849	0.80379	0.80882	0.81751
3.sm 3	0.88307	0.85287	0.85970	0.84339	0.85097	0.85374	0.85840	0.79832	0.80332	0.80822	0.81668
3.sm 4	0.88307	0.85287	0.85971	0.84341	0.85097	0.85374	0.85847	0.79831	0.80331	0.80821	0.81668
4. 04 Textile	0.94259	0.90879	0.92230	0.90541	0.91701	0.92464	0.92959	0.86472	0.87411	0.87861	0.88771
4.sm 1	0.94259	0.90879	0.92231	0.90543	0.91704	0.92471	0.92963	0.86486	0.87420	0.87867	0.88773
4.sm 3	0.94259	0.90879	0.92227	0.90540	0.91702	0.92477	0.92965	0.86504	0.87440	0.87887	0.88791
4.sm 4	0.94259	0.90879	0.92231	0.90543	0.91704	0.92477	0.92966	0.86506	0.87441	0.87886	0.88791

Note: First lines in each sector block denote the price index of baseline in JIDEA.
Second lines denote the price index caused by Japanese import tariff removal.
Third lines denote the composite case of sm 1 plus 10% lumpsum cut of Chinese import tariffs.
Fourth lines denote the price index of the case of 10% Chinese Yuan Appreciation.