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KEIO/KYOTO GLOBAL COE DISCUSSION PAPER SERIES

DP2009-009

# Why the Financial Crisis Affected Japanese Exports So Seriously?

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## Abstract

The effect of the macroeconomic shock on Japanese exports, caused by the financial crisis, was far more excessive than in other countries. This paper focuses on the relationship between the change in U.S. demand and the Japanese export structure, which was formed before the crisis, as a reason for the sudden fall of Japanese exports. Japanese exporters expanded the international division of labor by outsourcing in China and formed a trade triad between the U.S., China, and Japan. The empirical analysis of the paper provides interesting findings that : (1) Japanese exporters increased the number of exported goods and the average value of exports to China, (2) they, on the other hand narrowed the range of export goods to the U.S., and specialized export goods to high-end products with high income elasticity, and (3) as a consequence of the change of trade structure, the goods for which U.S. demand decreased matched the goods in which Japanese exporters specialized for export to the U.S., (4) the demand shock after the financial crisis decreased remarkably the intensive margin of export goods for the U.S. and brought about a significant reduction of Japanese exports for the U.S. market.

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September 8, 2009

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Abstract

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## 1. Introduction

The world economy is in serious recession since the financial crisis. According to the statistics of the IMF as shown in table 1, the growth rate of GDP in the world was 3.2% in 2008 and is expected to be minus 1.3% in 2009 and remain at a low rate until 2010. Of all the countries, the Japanese economy has been one of the most seriously affected by the current financial crisis. The GDP growth rate in Japan was minus 0.6% in 2008 and is predicted to be minus 6.2% in 2009, however, despite being ground zero for this financial crisis, the U.S. GDP growth rate was 1.1% in 2008 and is predicted to be minus 2.8% for 2009. The decline of Japanese GDP is far greater than even that of the U.S. In the early stages of the financial crisis, many did not predict that Japan would experience such a serious economic recession in comparison with other countries because the effect on Japan's financial sector was far smaller than other nations. However, Japan's economic recession eventually became the most serious among OECD countries in terms of GDP growth rate.

Table 1. Changing Rates of GDP Growth

The serious recession of the Japanese economy was caused mainly by the sharp decline in demand for Japanese exports and the reduction of private capital investment. The decline in U.S. import demand sent shockwaves through export-dependent countries around the world. But we find that the impact of the reduction of U.S. demand on trade varies among countries because of different structures of comparative advantage. An investigation needs to be conducted into why Japan was affected so seriously by the change in US demand compared to other major exporting countries. The purpose of this paper is to investigate statistically what feature of Japanese exports caused such a massive decline after the financial crisis.

The paper is constructed as follows. In the following section, paying attention to the change in US imports, we discuss the reasons why the impact on Japanese exports was more serious than other nations. Section 3 describes how the development of a trade triad between the U.S., China, and Japan, which was accelerated by the growing offshore outsourcing of Japanese multinational corporations (MNCs), caused a change in specialization of Japanese exports to high-end goods. Specialization had a major effect on the reduction of the Japanese exports to the

U.S. In Section 4, by decomposing the Japanese export value to the range of products and the average export value, the paper statistically examines how they have changed since 1990 and estimates what factors have contributed to these changes. In particular, we find that the long term trend of the extensive margin differs between the exports for China and the U.S. In Section 5, we observe how the product range (extensive margin) and the average price of exported goods (intensive margin) changed after the financial crisis. In comparing the two margins, we observe that the drop in the actual intensive margin of Japanese exports to the U.S far exceeds the prediction, which is one of the reasons behind the sharp reduction in Japanese exports. The last section discusses remaining issues and subjects.

## 2. Comparative Advantage and Variation of Imports

After recovering from the recession caused by the crash of the IT bubble, the U.S. economy recorded a significant increase in imports, that is, almost 10% every year since 2002. But the sudden decline of U.S. demand caused by the financial crisis sharply decreased U.S. imports, as shown in figure 1. The reduction of the U.S. demand badly affected many nations worldwide. We, however, have to note that an import reduction after the financial crisis did not have an equivalent effect on every exporting country across the world. In fact, as shown in table 2, U.S. imports from Japan decreased by 40%, while total U.S. imports decreased by 30% in the first quarter of 2009, compared to the rate for the same quarter in the previous year. On the other hand, although imports from China decreased, the margin of decline was only 10%. Imports from both Japan and Canada decreased most sharply after the financial crisis.

Figure 1. Trend of US Imports,

Table 2. Changing Rates of U.S. Imports

We also find that the reduction of import demand since the financial crisis differed among products. Some countries specialized their exports in the goods whose import demand in the U.S. decreased greatly. This difference in specialization of trade caused the difference in the rate of import reduction among exporting countries. As shown in table 2, except for petroleum products, the reduction in U.S. import demand for automotive vehicles, parts, and engines and

industrial supplies and materials was very large--over 40% in the 1st quarter in 2009. On the contrary, the reduction in imports of food, consumer durables and nondurables is not significant.

The U.S., as the largest destination country of Japanese exports, absorbed one fifth of Japan's total export share in 2008. As Figure 2 shows, Japan has revealed its comparative advantage in the automobile, electronics and electric goods, and machinery industries in trade with the U.S. and has specialized their exports for the U.S. in these products. In 2008, the share of automobiles and parts was one third, electronics and electric machinery 16%, machinery one fifth of total exports to the U.S. In total, exports in these three product categories amounted to over 70% of total exports.

Figure 2. Composition of Japanese Exports to the U.S.

Therefore, the sharp reduction in import demand since the financial crisis in these industry categories, in which Japan has a comparative advantage with the U.S. and specialized its exports, became a cause of decreasing imports from Japan notably, compared with other foreign countries. Canada, which also specialized its exports in automotive vehicles, parts, and engines, experienced a serious drop in imports of 38%. On the other hand, it was the consumer goods of the small income elasticity to import demand in which China had the comparative advantage with the U.S. This appears as a small margin of decline of U.S. imports from China since the financial crisis.

**3. Trade Triad and Offshore Outsourcing**

The changes in U.S. imports since 2000 are noteworthy. Table 3 shows that the import share from East Asia in total was 34% of total U.S. imports in 2000. This share hardly changed until 2007. However, the composition of exporting countries among East Asian countries has changed greatly.

The import share from China has increased significantly, while the import shares from Japan and Asian newly industrialized economies (NIEs) in the the Association of Southeast Asian Nations or ASEAN (except for Hong Kong and Taiwan) have fallen. In 2000, the import share from Japan was 12%, Asian NIEs-ASEAN (except for Hong Kong and Taiwan) 10%, and

China 8%, respectively. In 2007, just before the financial crisis, the import share from Japan dropped to 7%, Asian NIEs-ASEAN (except for Hong Kong and Taiwan) fell to 7%, while imports from China rose to 16%. In that seven year period, a major share U.S. imports (by country of origin) was converted to China.

Table 3. Composition of US Imports

On the other hand, the share of export destinations from Japan also changed largely during the period. As shown in table 4, the share of Japanese exports to the U.S. was 30% in 2000 and 6% to China the same year. In 2007, however, the share of Japanese exports to the U.S dropped to 20% while the share to China increased to 15%. Since then, the export share from Japan to China has continued to increase. Now, China has become the largest importer for Japanese exporters.

Table 4. Share of Japanese Exports to China and the U.S.

Behind this change in trade partners, we find the formation of the trade triad between the U.S., China, and Japan. Some of products that were directly exported to the U.S. in 2000 were exported as parts and intermediate goods to China, where they were processed into final goods, before eventually being exported to the US. This type of trade triad was formed by Japanese MNCs' outsourcing in China.[1] Table 5 presents the composition of offshore outsourcing of Japanese firms by industry and task.[2] Offshore outsourcing to China exceeds 50% of the total number of cases of offshore outsourcing in the world. Moreover, offshore production of final goods in China has reached 20% of offshore outsourcing of Japanese firms.

Table 5. Composition of Offshore Outsourcing Disaggregated
by Geographical Destination and Industry

[1] As for the triad trade between the U.S., China, and Japan, see Dean, Lovely, and Mora (2009).
[2] Ito, Tomiura, and and Wakasugi (2009).

The goods which Japanese multinational firms export to the U.S. as the final destination consist of two types of goods: the goods that are produced in Japan and exported to the US; and the goods whose parts and components are produced in Japan and exported to China, then reprocessed in China before being exported as final products to the US. Both types of goods are produced on the basis of the comparative advantage reflecting the relative abundance of production factors in exporting countries. The former type of goods are high-end goods, which are knowledge-intense and require skilled labor, and the latter are the low-end goods, that require unskilled labor, which is abundant in China. That is, through the international division of labor between China and Japan, Japanese firms specialized their product range in Japan for high-value-added goods, and produced labor-intensive goods in the China.

The development of this type of international division of labor is one of the reasons behind the enlarged effect in the reduction of import demand in the U.S., for Japanese exports, since the financial crisis. For example, the contraction of U.S. automobile loans, provoked by the financial crisis, resulted in a sharp fall in car demand in the U.S.

Moreover, compared with daily necessaries, the reduction in demand for high-value-added products was remarkable. Since these goods, which are directly exported to the U.S. from Japan, have such characteristics, exports from Japan were more seriously affected by the U.S. business stagnation. That is, the formation of the trade triad is considered to have had a significant impact on Japanese exports during the financial crisis.

## 4. Variation of Japanese Exports: Extensive and Intensive Margins

The purpose of this section is to investigate statistically the changes of Japanese trade structure. The decomposition of trade volume to the extensive margin and intensive margin enables us to observe the features of the changes in trade.

Recent theoretical and empirical studies of international trade including Melitz (2003), Bernard, Eaton, Jensen, and Kortum (2003), Bernard, Redding, and Schott (2006) and Chaney (2008), focus firm's extensive for analyzing the patterns of international trade. They highlighted the number of exported goods and the number of destination countries. Bernard, Jensen, Redding, and Schott (2007) presented the intensive margin of average import or export value per firm-products increased. Bernard, Jensen, Redding, and Schott (2009) decomposed the

volume of trade $x_c$ with country c as follows:

(1) $$x_c = [f_c][p_c]\left[\frac{x_c}{f_c p_c}\right]$$

where $f_c$ is the number of firms which export to country c, $p_c$ the number of the goods per firm, $\left[\frac{x_c}{f_c p_c}\right]$ the average trade volume.

$f_c$ and $p_c$ express the extensive margin and the intensive margin, respectively. Bernard, Jensen, Redding, and Schott (2009), decomposing the trade variation into extensive and intensive margins, investigated the nominal export growth of US from 1993 to 2003 and also examined the behavior of U.S. exports around 1997, at the time of the Asian financial crisis.[3] They revealed the intensive margin accounted for the majority of export declines, while there were substantial changes in extensive margins around the crisis. Since previous literature reveals that the extensive margins of trade can account for a large share of the variation in exports across countries, the results of Bernard, Jensen, Redding, and Schott should be noted.

Along the well-known gravity relationship between trade flows and the size of trade partners, we investigate how the extensive margin and the intensive margin contributed to the variation of Japanese exports between 1990 and 2007 just before the financial crisis. Different from the US statistics, the statistical data for the number of exporting firms per by destination country and the number of products per firm are not available in Japan. Therefore, instead of using equation (1), we decompose the trade volume $V_{i,t}$ to the number of products $N_{i,t}$ as the extensive margin and the average trade value $\left[\frac{V_{i,t}}{N_{i,t}}\right]$ as the intensive margin, as follows:

(2) $$V_{i,t} = N_{i,t} \times \left[\frac{V_{i,t}}{N_{i,t}}\right]$$

where *t* expresses the year.

[3] Trade density used in Bernard et al (2009) is omitted here.

The coefficients are estimated on the basis of the gravity equation in which the size of trade partners determines the trade volume. For the estimation, the extensive margin and the intensive margin are dependent variables, and the GDP size of trade partners, the exchange rate, and such an institutional factor of trade as the accession of WTO, are included as the explanatory variables in equations (4) and (5)

(3) $$\ln V_{i,t} = \alpha_0 + \alpha_1 \ln GDP_{i,t} + \alpha_2 \ln GDP_{J,t} + \alpha_3 \ln EX_{US,t} + \alpha_4 WTOdummy_i + \varepsilon_t$$

(4) $$\ln N_{i,t} = \beta_0 + \beta_1 \ln GDP_{i,t} + \beta_2 \ln GDP_{J,t} + \beta_3 \ln EX_{US,t} + \beta_4 WTOdummy_i + \mu_t$$

(5) $$\ln\left[V_{i,t} / N_{i,t}\right] = \gamma_0 + \gamma_1 \ln GDP_{i,t} + \gamma_2 \ln GDP_{J,t} + \gamma_3 \ln EX_{US,t} + \gamma_4 WTOdummy_i + \upsilon_t$$

where $V_{i,t}$ is the Japanese export to country *i* in the year *t*, $N_{i,t}$ is the number of exported goods from Japan to the country *i* which are counted on the basis of HS 6 digits product categories, $GDP_{i,t}$ is GDP of country *i* in the year *t*, $GDP_{J,t}$ is the GDP of Japan in the year *t*, $EX_{US,t}$ is the exchange rate expressed by yen per dollar, WTO dummy is the dummy variable of China's WTO accession, taking one if China is the member of WTO in the year *t*. As the estimation is on the time series data, the country pair specific factors such as language and distance are subsumed in the constant term.

The estimation is conducted for Japanese exports to the U.S. and China, based on the data of 18 years from 1990 to 2007.[4]

**(1) Exports for the U.S.**

Estimation results are shown in table 6. It is noted that the income elasticity to the extensive margin is negative, while the income elasticity to the intensive margin is positive. The negative trend of the extensive margin of Japanese exports to the U.S. implies that the number of exported goods from Japan decreased along with the increase of the U.S. demand during the years from 1990 to 2007.

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[4] For collection of data and estimation in this section, I acknowledge Tomoyuki Iida, a graduate student of Keio University, for his excellent assistance.

On the other hand, the income elasticity to the intensive margin shows a large and positive coefficient. This result suggests that Japanese firms have taken the export strategy, which narrowed the product range of exported goods, and concentrated on the high-value-added products. As for the effects of exchange rate changes on extensive and intensive margins, we find that the yen depreciation has a positive effect to increase both extensive and intensive margins at a high statistical significance.

Table 6. Estimation of Extensive and Intensive Margins (Export to the US)

**(2) Exports for China**

Exports to China show a different trend from the U.S. bound exports. Table 7 shows that both the extensive and intensive margins of Japanese exports to China increased according to the increase in Chinese income with a high statistical significance. That is, the Japanese exporters increased the number of exported goods and also raised the average export value according to the expansion of the market demand in China. At the contrast to the U.S., it is notable that the yen depreciation has no significant effect on the increase of intensive margin, but has an effect on extensive margin.

Table 7. Estimation of Extensive and Intensive Margins (Exports to China)

Comparing the estimation results of Japanese exports to the U.S. and China, we can summarize the variation of the Japanese trade structure from 1990 to 2007 as follows:

(i) The increase of U.S. demand and the yen depreciation accelerate Japanese exporters to narrow the product range of the goods exported to the U.S. and increase their average value,

(ii) The increase of demand in china push Japanese exporters to expand the product range and raise the average value of exported goods to China. The depreciation of yen push Japanese exporters to expand only the product rage of exported goods to China.

(iii) The reduction of the range of exports to the U.S. with the expansion of the range of exports to China coincides with the development of the trade triad due to the expansion of outsourcing in China by Japanese multinationals.

## 5. Change after the Financial Crisis

The estimated results of the variation of Japanese exports after 1990, by decomposing the contribution to extensive and intensive margins, provide a standard to evaluate the changes of Japanese exports after the financial crisis. Figures 3-1 and 3-2 show actual and predicted values of the extensive and intensive margins of Japanese exports to the U.S. from 1990 to 2008. Predicted values are calculated from equations (4) and (5).

Figure 3-1 Extensive Margin of Exports to the U.S.

Figure 3-2 Intensive Margin of Exports to the U.S.

After 1990, both actual and predicted values of the extensive margin show a downward trend, and the tendency of the reduction of product range became much more remarkable in 2003 and afterwards. In particular, they fell sharply in 2008. We did observe a disparity between actual and predicted values.

On the other hand, we find a different feature of the intensive margin from the extensive margin. After 2003, when the U.S. economy recovered from the recession caused by the crash of IT bubble, the actual value of the intensive margin remarkably exceeded the predicted value before 2007. Since the financial crisis, conversely, the actual value was much less than the predicted value. In other words, although the average export value from Japan to the U.S. showed the increase far exceeding a trend before the financial crisis, it later fell sharply and was much less than the trend. This means that the downturn of Japanese exports to the U.S. due to the demand contraction following the financial crisis, was far larger than the expected value, and that it was caused by a sudden drop of the intensive margin. The estimation result in table 6 shows that the significant upward trend of intensive margin after 2003 and the sharp drop after 2007 are related to the exchange rate changes of yen per dollar. Before the financial crisis Japanese yen has been depreciated, but after that yen is significantly appreciated.

Figures 4-1 and 4-2 show the comparison of actual and predicted values of the extensive and intensive margins for exports to China. Although the extensive margin kept increasing between 1990 and 2005, it began to decrease slightly from 2006 onwards. The number of export

goods from Japan, which has expanded through the international division of labor in production process with China, has not increased since 2006. On the other hand, the intensive margin has continued to increase from 1990 until now. We do not find a significant difference between actual and predicted values in either the extensive or intensive margins in the case of exports to China.

That is, in the trend of the intensive margin of exports to China, we do not observe a sharp drop of the actual value far exceeding the predicted value that appeared for exports to the U.S. This suggests that the recession since the financial crisis did not bring about a serious impact on Japanese exports to China.

Figure 4-1. Extensive Margin of Exports to China

Figure 4-2. Intensive Margin of Exports to China

**6. Conclusion**

Since the financial crisis, Japan exports decreased more remarkably than other countries. The coincidence of the goods for which U.S. demand sharply decreased with the goods to which Japanese exporters specialized their export composition, was a major reason for the sharp reduction of Japanese exports to the U.S. Such a matching of Japanese exports with the demand of the U.S.—Japan's largest export destination—was one of the factors that led such a serious recession of the Japanese economy following the financial crisis.

A relationship between the trade structure and macroeconomic shock revealed by the current recession gave us a hint to investigate the Japanese export structure formed before the financial crisis. To the U.S., Japanese exporters have narrowed the range of export goods and specialized their export in high-end goods with high income elasticity like automobiles and capital goods. During the process, they formed a trade triad between the U.S., China, and Japan. To China, they have widened the range of goods exported, through the development of international division of labor with China.

The demand shock due to the financial crisis occurred with the structural change of Japanese exports, which lead to a sharp decrease of the average value of Japanese exports to the U.S. Before the crisis, the average value had risen to a higher level than predicted on the trend. In the analysis of U.S. exports to Asian countries after the Asian financial crisis, Bernard, Jensen,

Redding, and Schott (2009) revealed evidence that the intensive margin was strongly affected by the reduction of the market. This paper shows that the same variation is observed in Japanese exports after the financial crisis. The result in this paper is consistent with the results of Bernard, Jensen, Redding, and Schott (2009).

However, due to the limited availability of Japanese firm-level trade data, this paper does not present an analysis of the extensive margin of the number of exporting firms by destination or the number of export products per firm. We also have to note how the demand shock affects the extensive margin through the entry and exit of exporters, and what difference occurs between arm's length and intra-firm export transactions. These remaining issues require further analysis.

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Table 1. Changing Rates of GDP Growth, by Country

| | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 |
|---|---|---|---|---|---|---|---|
| World | 4.5 | 5.1 | 5.2 | 3.2 | −1.3 | 1.9 | 4.3 |
| U.S. | 2.9 | 2.8 | 2.0 | 1.1 | −2.8 | 0.0 | 3.5 |
| EU | 2.2 | 3.4 | 3.1 | 1.1 | −4.0 | −0.3 | 1.7 |
| United Kingdom | 2.1 | 2.8 | 3.0 | 0.7 | −4.1 | −0.4 | 2.1 |
| Japan | 1.9 | 2.0 | 2.4 | −0.6 | −6.2 | 0.5 | 2.2 |
| China | 10.4 | 11.6 | 13.0 | 9.0 | 6.5 | 7.5 | 10.2 |
| NIES−4 | 4.7 | 5.6 | 5.7 | 1.6 | −5.6 | 0.8 | 4.4 |
| ASEAN−5 | 5.5 | 5.7 | 6.3 | 4.9 | 0.0 | 2.3 | 4.3 |
| India | 9.2 | 9.8 | 9.3 | 7.3 | 4.5 | 5.6 | 6.9 |

(Source) World Economic Outlook, IMF

Table 2. Changing Rates of US Imports, by Product and Country

| | 2008:I | 2008:II | 2008:III | 2008:IV | 2009:I/p/ |
|---|---|---|---|---|---|
| Petroleum and products | 0.60 | 0.60 | 0.59 | -0.15 | -0.54 |
| Foods, feeds, and beverages | 0.08 | 0.12 | 0.10 | 0.06 | -0.05 |
| Industrial supplies and materials | 0.34 | 0.35 | 0.37 | -0.10 | -0.45 |
| Capital goods, except automotive | 0.05 | 0.07 | 0.03 | -0.06 | -0.20 |
| Automotive vehicles, parts, and engines | 0.00 | -0.02 | -0.12 | -0.24 | -0.49 |
| Consumer goods (nonfood) | 0.01 | 0.05 | 0.05 | -0.06 | -0.13 |
| All countries | 0.12 | 0.15 | 0.13 | -0.09 | -0.30 |
| Europe | 0.13 | 0.14 | 0.10 | -0.07 | -0.27 |
| Canada | 0.12 | 0.15 | 0.16 | -0.14 | -0.38 |
| Mexico | 0.08 | 0.10 | 0.04 | -0.11 | -0.26 |
| China | 0.02 | 0.07 | 0.10 | 0.01 | -0.10 |
| Japan | 0.03 | 0.03 | -0.07 | -0.16 | -0.41 |

(Source) Statistics of International Transaction, Department of Commerce, US

Table 3 Composition of US Imports, by Country

| | 2000 | 2007 |
|---|---|---|
| Europe | 0.212 | 0.209 |
| Canada | 0.191 | 0.163 |
| Latin America and Other Western Hemisphere | 0.171 | 0.177 |
| East Asia | 0.347 | 0.334 |
| China | 0.082 | 0.163 |
| Hong Kong | 0.010 | 0.004 |
| Taiwan | 0.033 | 0.020 |
| Japan | 0.120 | 0.074 |
| Other East Asia* | 0.103 | 0.074 |
| Members of OPEC | 0.055 | 0.089 |
| R.O.W. | 0.024 | 0.028 |

(Source) Statistics of International Transaction, Department of Commerce, US

(Note) Other East Asia* includes Indonesia, Korea, Malaysia, Philippines, Singapore, and Thailand.

Table 4. Share of Japanese Exports to China and the U.S.

| | 2000 | 2007 | 2008 | 2009.6 |
|---|---|---|---|---|
| China | 0.063 | 0.153 | 0.160 | 0.185 |
| US | 0.297 | 0.201 | 0.175 | 0.161 |

(Source) Statistics of International Trade, Japanese Ministry of Finance

Table 5. Offshore Outsourcing Disaggregated by Geographical Destination and Task

| Region / Task | China | ASEAN | Other Asia | U.S.A. & Europe | ROW | World *Total* |
|---|---|---|---|---|---|---|
| Jigs/Dies | 7.35 | 2.64 | 1.93 | 0.51 | 0.09 | *12.52* |
| Intermediates | 19.19 | 7.61 | 4.37 | 3.32 | 0.85 | *35.34* |
| Final Assembly | 19.56 | 8.57 | 3.52 | 2.92 | 0.68 | *35.25* |
| R & D | 1.22 | 0.45 | 0.40 | 1.39 | 0.11 | *3.58* |
| Info services | 1.28 | 0.65 | 0.20 | 0.79 | 0.09 | *3.01* |
| Customer supports | 1.79 | 0.91 | 0.51 | 1.16 | 0.14 | *4.51* |
| Professional services | 0.71 | 0.37 | 0.31 | 0.65 | 0.09 | *2.13* |
| Other tasks | 1.70 | 0.71 | 0.34 | 0.71 | 0.20 | *3.66* |
| *Total* | *52.80* | *21.91* | *11.58* | *11.47* | *2.24* | *100* |

Notes: Shown are the percentages in the total number of FO cases. The outsourcing of the same category of tasks to the same type of suppliers in the same region is counted as one FO case even if multiple transactions are involved.

Source: Ito, Tomiura, and Wakasugi (2009)

Table 6. Estimation of Extensive and Intensive Margins (Exports to the U.S,)

| | Total Value of Export | Extensive margin (Number of products) | Intensive margin (average value) |
|---|---|---|---|
| GDP of US | 0.645 ** | −0.069 ** | 0.714 ** |
| | (8.60) | (−4.32) | (9.14) |
| GDP of Japan | 0.340 * | 0.110 * | 0.230 * |
| | (1.96) | (2.99) | (1.28) |
| Exchange rate (¥/$) | 0.867 ** | 0.199 ** | 0.668 * |
| | (4.10) | (4.44) | (3.03) |
| Constant | 3.453 | 4.912 ** | −1.458 |
| | (0.58) | (3.92) | (−0.24) |
| Number of observations | 18 | 18 | 18 |
| Adjusted $R^2$ | 0.817 | 0.727 | 0.823 |

The figures in parenthesis are t-statistics.

* and ** present 1percent and 5 percent statistics of significance, respectively.

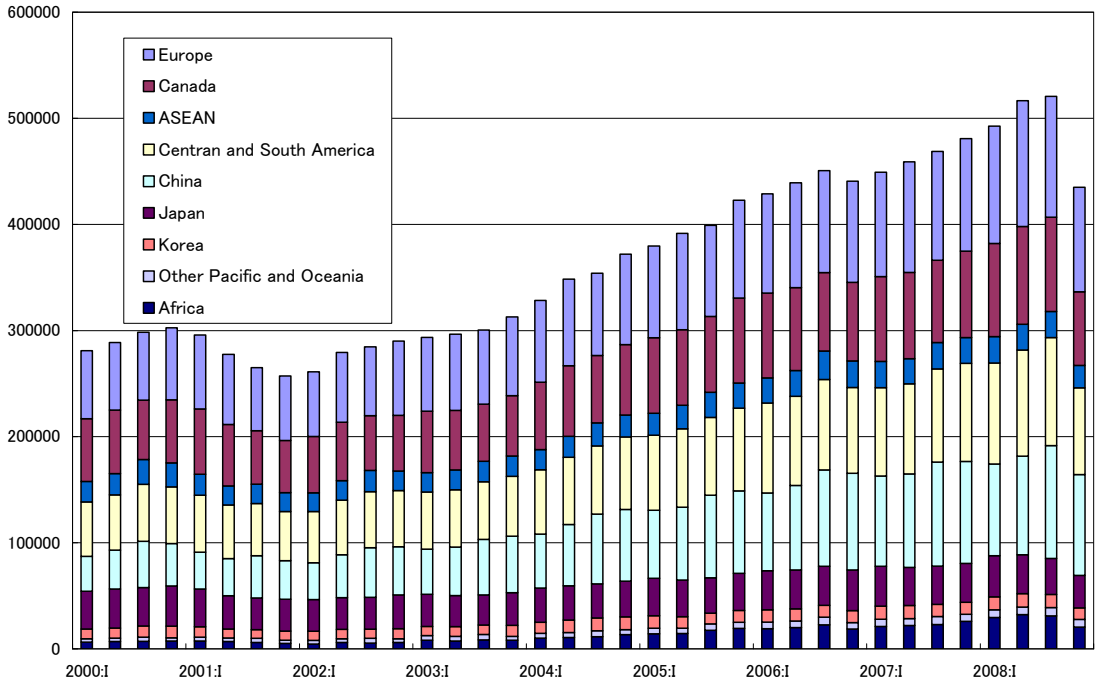
Table 7. Estimation of Extensive and Intensive Margins (Exports to China)

| | Total Value of Export | Extensive margin (Number of products) | Intensive margin (Average Value) |
|---|---|---|---|
| GDP of China | 0.848 ** | 0.092 ** | 0.755 ** |
| | (8.35) | (5.27) | (6.92) |
| GDP of Japan | 0.017 | 0.361 ** | −0.344 |
| | (0.03) | (3.96) | (−0.61) |
| Exchange rate (¥/$) | −0.634 | 0.246 * | −0.880 |
| | (−0.98) | (2.21) | (−1.27) |
| WTO dummy | 0.404 * | 0.007 | 0.397 * |
| | (2.97) | (0.29) | (2.72) |
| Constant | 0.847 | −5.765 | 6.612 |
| | (0.05) | (−1.87) | (0.34) |
| Number of observations | 18 | 18 | 18 |
| R2 | 0.963 | 0.894 | 0.950 |

The figures in parenthesis are t-statistics.

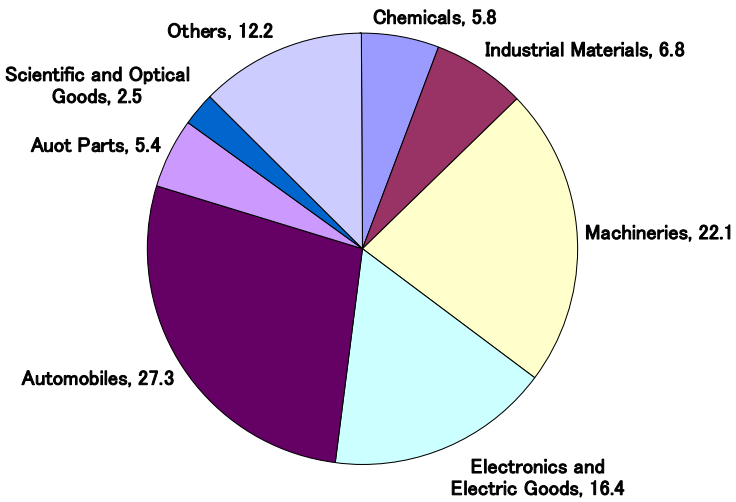
* and ** present 1percent and 5 percent statistics of significance, respectively

Figure 1. Trend of US Imports, by Countries




(Source) US, DOC

Figure 2. Composition of Japanese Exports to the US, 2008




(Source) Statistics of International Trade, Japanese Ministry of Finance

Figure 3-1 Extensive Margin of Exports to the U.S.

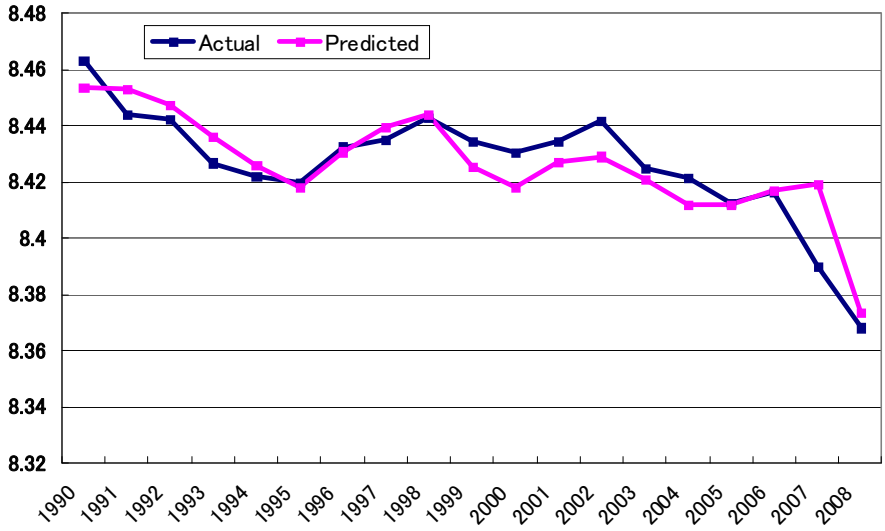



Figure 3-2 Intensive Margins of Exports to the U.S.

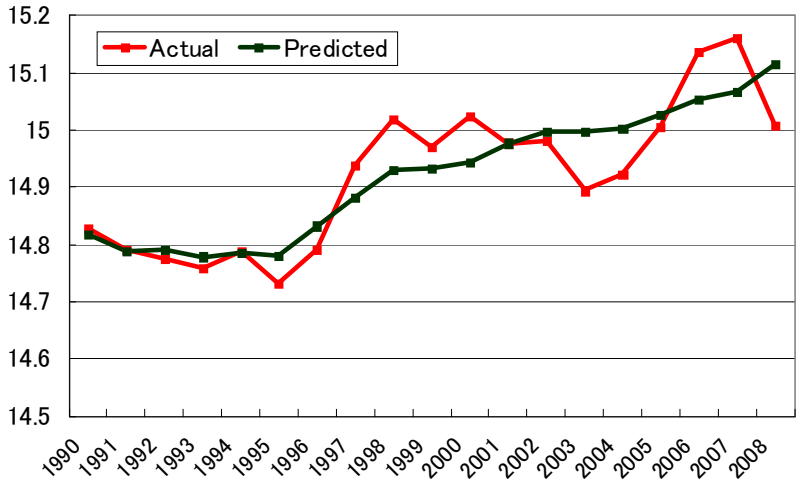


Figure 4-1. Extensive Margin of Exports to China

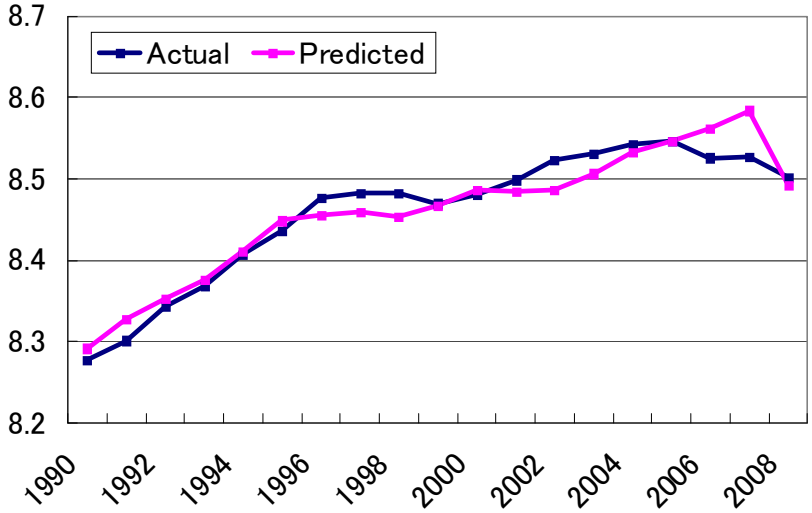



Figure 4-2. Intensive Margin of Exports to China