The Rise of China and the Japanese Economy:
Evidence from Macro and Firm-level Micro Data[*]

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Abstract

 After prolonged recessions, the Japanese economy finally recovered in the first half of the 2000s, and recorded sustained growth until summer 2007. The purpose of this paper is to examine, from both macro and micro perspectives, the role of international trade with China in the recovery of Japanese firms in the 2000s. Using aggregated data, VAR suggests that the increased exports to China had a strong positive impact on Japanese manufacturing production but had an insignificant impact on small firms and non-manufacturing production during the last decade. It also shows that the increased imports from China had no significant impact on Japanese production. However, using firm-level data, we find that various connections with China improved the performance of small and medium size manufacturing firms and those in wholesale and retail industries. At the micro level, imports from China improved growth of sales in manufacturing firms and both profits and growth of sales in wholesale and retail firms in the early 2000s. Exports to China, which had no significant impact in the early 2000s, came to improve both profits and growth of sales of Japanese firms after the mid 2000s. However, not all connections with China had beneficial impacts on the small and medium size firms. The micro findings suggest that the increased dependence on China had highly heterogeneous impacts on Japanese firms in the 2000s.

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1. Introduction

    After the stock market crash in the early 1990s, the Japanese economy experienced recessions that last more than a decade.   The problems became especially serious in the late 1990s, when several major financial institutions turned out to be in deep trouble. But the economy recovered from the crisis in the first half of the 2000s and recorded sustained growth for several years.   Tremendous structural changes during and after the crisis were a main driving force for the recovery.   Dramatic increases in international trade were another.   In particular, increased international trade with China was substantial in the 2000s and supported the recovery of the Japanese economy from both the demand and supply sides.   An exogenous increase of exports to China could have been a big push that raised aggregate demand in the Japanese economy.   An exogenous increase of imports from China may have reduced costs of production for many Japanese firms and supported the Japanese economy from the supply side.

    Figure 1 depicts Japan's monthly total exports and imports since 1993.   The amounts of Japan's total exports and imports, which had been stable until the end of the 1990s, have shown dramatic increases since the early 2000s.   These increases were accompanied by dramatic increases in exports to and imports from China.   The amount of Japan's monthly exports to China, which was only 250 billion yen in the early 2000s, exceeded 1 trillion yen in 2007.   The amount of Japan's monthly imports from China, which was only 400 billion yen in the late 1990s, exceeded 1.2 trillion yen in 2007.

    The purpose of this paper is to examine the role of international trade with China for the recovery of Japanese firms in the 2000s by using both aggregated macro and firm-level micro data.   An exogenous increase in exports could have positive multiplier effects on aggregate production.   To the extent that the role is complementary, the increased exports to China would have benefited Japanese firms. But the rise of China was harmful to the competitive abilities of the other Japanese firms in several international markets.   The problem may be especially serious for labor-intensive small firms.   In contrast, imports from China might have reduced the costs of production of many manufacturing firms.   They could have benefited firms in wholesale and retail industries that have some business connection with China.   On the other hand, increased imports from China could have overtaken market shares in the domestic market.   The negative impacts could be especially serious for labor-intensive small firms.

    In the following analysis, we first explore what impacts the increased exports and imports had on Japanese production by using aggregated macro data.   Using the

method of Vector Autoregression (VAR), we investigate whether exports to China and imports from China had significant impacts on production.[1] The results show that Japanese industry production, which was explained well by exports to the United States until the mid-1990s, came to be explained better by exports to China after the late 1990s. The impacts were limited, however, on small firms and non-manufacturing firms. They also show that imports from China had no significant impact on aggregate production.

In the second part of this paper, we explore what impacts the increased exports and imports had Japanese production by using firm-level micro data. The sustained growth in the 2000s was accompanied by widening inequalities across firms in Japan. Using firm-level data, we explore which connections with China benefited Japanese small and medium size firms and which did not. Contrary to our macro evidence, we find that various connections with China improved the performance of small and medium size firms in manufacturing, wholesale, and retail industries. Imports from China have improved sales in manufacturing, and both profits and growth of sales in wholesale and retail industries since the early 2000s. Exports to China—which had no significant impact in the early 2000s—came to improve both profits and growth of sales of Japanese firms in the mid 2000s. However, not all connections with China had beneficial impacts on the small and medium size firms. The micro findings suggest that the increased dependence on China had highly heterogeneous impacts on Japanese firms in the 2000s.

There is growing literature that discussed recent issues on the effects of China's international trade (see, for example, Rodrik [2006] and Feenstra and Wei [2008]). In particular, several studies investigated the impact of China's international trade on the other Asian economies. These contributions include Ahearne, Fernald, Loungani and Schindler (2003, 2006), Eichengreen, Rhee, and Tong (2004), Ianchovichina and Walmsley (2005), and so on[2]. They commonly supported the view that the effects of increased China's international trade are very different between developed and less-developed Asian countries; increases in China's international trade have a positive effect on Japan and the NIEs (Hong Kong, Korea, Singapore, and Taiwan) due to increased exports of high quality products to China. But they have a negative effect on ASEAN economies (Vietnam, the Philippines, Thailand, Indonesia, and Malaysia) due to

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[1] There are a number of papers that explored the determinants of Japanese business cycles by VAR, including Bayoumi (2001), Miyao (2005), and Shioji (2000). However, except for Fukuda (2008), few studies have explored the impacts of exports on production.

[2] See also Weinstein and Broda (2008) and Kiyota (2008) for recent studies that focused on the impacts of increased imports from China on the Japanese economy.

declines of export competitiveness among labor-intensive manufacturers in these countries.

Our empirical results share a common view with these studies in that the increases in international trade with China had very different effects across different firms. In Japan, increases in the exports to China had beneficial effects on manufacturing industries, although it took nearly five years for them to increase profits, according to the firm-level data. In contrast, they had no significant aggregate effect on non-manufacturing industries, nor on small and medium size firms. The imports from China had no significant impact on aggregate production. Firm-level data suggest, however, that Japanese firms benefited from having some business connection with China even if their size is not large or even if they're in non-manufacturing industries.

The overall effects of the increased role of China as a trade partner—in other words, the sum of positive and negative effects—were dominated by the positive effects for many Japanese firms. To support a sustained recovery of Japanese economy, the role of increased international trade with China had been indispensable in the early 2000s. Increased dependence on China, however, brought highly heterogeneous impacts on Japanese firms. The negative effects dominated for some Japanese firms. The sustained recovery in the 2000s was accompanied by widening inequalities across firms in Japan.

The paper proceeds as follows. Section 2 investigates the impacts of increased exports on aggregate manufacturing production and discusses how they changed after the mid 1990s. Section 3 explores the impacts of increased exports to China on small firms' production and on tertiary industry activity. Section 4 investigates the effects of increased imports from China on aggregate manufacturing production. Sections 5, 6, 7, and 8 examine the impacts of the increased connections with China on individual Japanese firms based on the firm-level micro data. Section 9 summarizes our main results and discusses their implications.

2. Impacts on Aggregate Manufacturing Production

The purpose of the first four sections is to estimate the effects of international trade with China on Japanese production. In this section, we investigate the effects of exports on manufacturing production. We estimate the following Vector Autoregression (VAR) that consists of three macro variables: production index (Y_t), price index (P_t), and the amount of exports (EX_t).

Except for the data, we follow the standard estimation method of VAR. We use the Ministry of Economy, Trade, and Industry (METI)'s Indices of Industrial Production (IIP) for the production index, the Bank of Japan's Corporate Goods Price Index (CGPI, the 2005 base) for the price index, and the Ministry of Finance's Trade Statistics of Japan for the amount of exports. All of the data series are monthly. The data series of production and exports are seasonally adjusted. We use logged differences of these variables and take four lags for all of the variables.[3] Assuming that changes of the exports are exogenous, the order of the series in the Cholesky factor is exports, production index, and price index.

We first explore what different impacts the exports had on aggregate manufacturing industrial production (IIP) before and after 1995. Using total exports, exports to China, and exports to the United States, we estimate VARs with three variables for two alternative sample periods: Jan. 1980 to Dec. 1994 and Jan. 1995 to Dec. 2007. The former period is when exports to the United States were dominant in Japan's exports, while the latter period is when the exports to China increased dramatically.

Figure 2 reports accumulated impulse responses of manufacturing IIP to exports to China, to exports to the United States, and to total exports based on the estimated VARs for the two alternative sample periods. When we use exports to China, the impulse responses, which are computed for 10 periods, show very different features between the two periods (Figure 2-1). The responses were close to zero and statistically insignificant for the period from Jan. 1980 to Dec. 1994. But they exceeded 0.006 and are statistically significant for the period from Jan. 1995 to Dec. 2007. The comparison of the two impulse responses clearly shows that the role of China increased dramatically in explaining Japanese business cycles during the last decade.

In contrast, when we use the exports to the United States, the impulse responses show significantly positive responses in both periods (Figure 2-2). However, the accumulated responses are around 0.006 for the period from Jan. 1980 to Dec. 1994, while they are around 0.005 for the period from Jan. 1995 to Dec. 2007. In explaining Japanese business cycles, the role of the exports to the US declined in the 2000s, although its significance is still not negligible. The results suggest that the exports to the United States were a determinant of Japan's business cycles until the mid-1990s but their role has been replaced by the exports to China since the late 1990s.

Similarly, when we use total exports, the impulse responses show significantly positive responses in both periods (Figure 2-3). The results suggest that although some months are required to diffuse the impacts, exports have been an important

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[3] We also estimated by taking longer lags. But it did not change our essential results.

determinant of Japan's business cycles throughout the two alternative periods. [4] However, the accumulated responses are around 0.006 for the period from Jan. 1980 to Dec. 1994, while they exceed 0.01 for the period from Jan. 1995 to Dec. 2007. The impulse responses in the latter period were magnified by the increased role of China in explaining Japanese business cycles.

3. Impacts on Production of Small Firms and on Tertiary Industry Activity

In the last section, we found that the increased exports to China had significantly positive impacts on Japanese manufacturing firms. However, it is likely that the impacts are heterogeneous among Japanese firms with different sizes or in different industries. The rise of China might have pumped up external demand to large manufacturing firms with advanced technology, but it might also have deteriorated the competitive abilities of small Japanese firms both in both the domestic and international markets. It is also likely that the dramatic increases of external demand from China might be irrelevant for most of non-manufacturing firms, because they produce non-tradable goods. The purpose of this section is to investigate what impacts the exports to China had on the production of small manufacturing firms and on the non-manufacturing production. In Japan, more than 90% of firms are small to medium size firms. The share of tertiary industry activity in GDP is 70%. Exploring the impacts on small manufacturing firms and on non-manufacturing firms is indispensable to understand one source of overall business cycles in Japan.

As in the last section, we estimate VAR with three variables. Except for using production of small and medium size enterprises or of non-manufacturing industries, the estimation method and the variables remain the same. The data on small and medium size manufacturing production are based on the Indices of Industrial Production of Small and Medium Size Enterprises (SIP) supplied by the Small and Medium Enterprise Agency. The sample period is from Jan. 1998 to Dec. 2007. For the non-manufacturing production index, we use either overall tertiary industry activity (TIA) or production of service industry based on METI's Indices of Tertiary Industry Activity. The sample period is from Jan. 1995 to Dec. 2007. For the price index, we use the total price index in the Bank of Japan's Corporate Services Price Index (CSPI, 2000 base).

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[4] The variance decomposition of our VAR shows that shocks to the total exports explain 18.1% of 10 period production variation in the former period and 14.2% in the latter period.

Figure 3-1 reports accumulated impulse responses of the industrial production of small firms and of tertiary industry activity to the exports to China. For comparison, it also reports the corresponding responses of aggregate production of large manufacturing enterprises. The responses in small manufacturing firms are smaller than those in large manufacturing industry. The majority of small manufacturing firms are labor-intensive firms with less advanced technology where the rise of China harmed the competitive abilities of Japanese firms both in international and domestic markets. The smaller impacts may reflect the negative effects for small firms in these industries.

However, the responses in tertiary industry activity are far lower. The result does not change even when we use production of service industry for the production index (see Figure 3-2). This suggests that exports to China had the least-positive impacts on non-manufacturing firms, most of which produce non-tradable goods. Under sustained recovery, dramatic increases of external demand were irrelevant for most non-manufacturing firms.

4. The Effects of Imports from China

We have thus far investigated the impacts of increased exports to China on the Japanese economy. The rise of China, however, increased not only exports to China but also imports from China. The purpose of this section is to examine what impacts increased imports from China had on aggregate industrial production and on production of the service industry in Japan. We estimate VARs that consist of four macro variables: production index (Y_t), price index (P_t), the amount of total exports to China (EX_t), and the amount of total imports from China (IM_t). We use either an aggregate industrial production index or overall tertiary industry activity for Y_t.

The estimation method and the data are the same as those in previous sections, with the exception of imports from China, which are added as additional variables. We use the Ministry of Finance's Trade Statistics of Japan for the amount of imports from China. All of the data series are monthly. Except for the price index that does not show conspicuous seasonality, the data series are seasonally adjusted. We use the logged differences of these variables and take four lags for all variables.[5] The sample period is from Jan. 1995 to Dec. 2007. Assuming that Japan's imports are endogenously determined by income and prices, the order of the series in the Cholesky factor is exports, production index, price index, and imports from China.

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[5] Estimations with longer lags did not change our essential results.

Figure 4 shows accumulated impulse responses of aggregate industrial production to imports from China. For comparison, it also reports the accumulated impulse responses to the exports to China. It is easy to see that the responses to the imports from China are much smaller than the responses to the exports to China. Like the amount of exports to China, the amount of imports from China has increased dramatically in Japan. The accumulated impulse responses, however, suggest that, unlike exports to China, imports from China had no significant impacts on aggregate manufacturing production in Japan in the late 1990s and the 2000s.

Figure 5-1 depicts accumulated impulse responses of overall tertiary industry activity to imports from China and to exports to China. For the reference, we also report the corresponding accumulated impulse responses of wholesale and retail (Figure 5-2). It is easy to see that the responses to imports from China are much smaller than the responses to exports to China both in overall tertiary industry activity and in wholesale-retail. They suggest that imports from China had no significant impacts on aggregate activity of tertiary industry and wholesale-retail in Japan in the late 1990s and the 2000s.

Increased imports from China may have negative effects on Japan's production through substituting production in labor-intensive firms with less-advanced technology. Increased imports from China may however benefit Japanese firms that imports cheap intermediate goods from China. This is particularly true for Japanese firms that have intra-firm international trade with China. Our results imply that these positive and negative effects offset one another and had ambiguous impacts on aggregate production in Japan.

5. Evidence from Firm-level Data

We have thus far investigated the effects of international trade with China on Japanese economy by using aggregate macro data. The purpose of the following sections is to explore similar issues by using firm-level data. The sustained growth in the 2000s was accompanied by widening inequalities across firms. It is thus likely that our macro evidence may not necessarily be supported by micro evidence. Using the firm-level data, we explore which Japanese firms gained from exports to China and imports from China.

We collected the firm-level financial data from "CD-EYES 50" supplied by TSR (Tokyo Shoko Research) Database Service. The "CD-EYES 50" contains financial

data on 500,000 Japanese firms, most of which are unlisted on stock exchanges for each year. The data set thus includes a large number of small and medium size firms in Japan. The sample period of the data is 2000, 2004, 2005, 2006, and 2007 in "CD-EYES 50."[6]

In the following analysis, we confine our analysis to Japanese firms that belong to either manufacturing industry or wholesale-retail industry. This is because the number of firms that have business connections with China is highly limited in the other industries. In addition, the majority of firms belong either to the manufacturing industry or to wholesale-retail industry in the "CD-EYES 50." Thus, even if we restrict our analysis to specific industries, they are representative industries in our data base. We also confine our analysis to Japanese firms that were capitalized at 11 million yen and over. One may argue that we should use the data of very small firms as well. The use of data from smaller-size firms may provide some useful information because smaller firms tend to be more labor-intensive and to have less-advanced technology. However, the accounting data of smaller unlisted firms are likely to be missing or, if available, to be less reliable. There thus exist costs and benefits when using the data of smaller size firms in the analysis. Given the constraints, it allows us to use the data of over 100,000 Japanese firms in each year.

What is crucial in the following analysis is how to identify which firms had business connections with China. "CD-EYES 50" provides useful qualitative information, including financial data, on each firm. The qualitative information includes the list of major trade partners to which the firm sold its output and from which the firm purchased its input. If the trade partners are Japanese corporations, it only specifies their names. However, if they are foreign corporations, it also specifies names of their locations such as country, city, or province. In the following analysis, we suppose that the firm exported to China if it sold its output to a firm for which the list refers to names of either China, cities in China, or provinces in China. We also suppose that the firm imported from China if it purchased its input from a firm for which the list refers to names of either China, cities in China, or provinces in China.

In the following analysis, we consider not only the firms which had direct connections with China but also those which had indirect connections with China. We suppose that the firm had indirect connections with China if its trade partner had direct connections with China. Specifically, we define that the firm exported to China indirectly if it sold

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[6] Our data is based on November issue of "CD-EYES 50" which includes the latest financial data and qualitative information available at the end of October in the year. Japanese accounting rules thus suggest that the financial data and qualitative information are those in March of the year in question for most firms.

its output to a firm that exported to China directly.   We also define that the firm imported from China indirectly if it purchased its input from a firm that imported from China directly.

Table 1 summarizes some basic statistics to see to what extent our sampled firms had connections with China in each year.   It includes the number of sampled firms, the share of firms that exported to China, and the share of firms that imported from China in each industry.   The share of firms that exported to China directly is small, both in manufacturing and in wholesale-retail.   This is because our sample only includes the firms that export to China as a major partner.   It is unlikely that small and medium size firms have connections with a foreign corporation as a major sales destination.   The rise of China has meant, however, that the share increased steadily throughout the 2000s.   More interestingly, the share of the firms which exported to China indirectly is not negligible.   It was less than 2% in 2000.   But it increased to 8.5% in manufacturing industry and to 4.8% in wholesale-retail industry in 2007.   Even small firms have come to export to China indirectly since the mid 2000s.

Since small and medium size firms rarely have connections with foreign corporations as major suppliers, the share of firms that imported from China directly is not substantial either.   But it is bigger than the share of firms that exported to China directly.   This is especially true for the wholesale-retail industry.   The share increased to 1.7% in manufacturing and to 2.9% in wholesale-retail in 2007.   The share of firms that imported from China indirectly has been more substantial.   This is especially true in manufacturing.   The share, which was 8.9% in manufacturing and 6.2% in wholesale-retail in 2000, increased to 18.0% and 11.1% respectively in 2008.   The imports from China have become important for many small and medium size firms since the mid 2000s.

6. Basic Statistics for Firms with Different Sizes

One key feature in our data set is the inclusion of a large number of Japanese firms with different sizes.   But the distribution of the firms is highly skewed toward smaller firms.   Table 2 summarizes the shares of the firms with five alternative sizes in 2007 for each industry.   It shows that nearly 65% of the firms are capitalized at less than 50 million yen in manufacturing, and more than 70% are capitalized at less than 50 million yen in wholesale-retail.   According to the Small and Medium Enterprise Basic Law, "small and medium size firms" are defined as those capitalized at 300 million yen and

less in manufacturing, at 100 million yen and less in wholesale, and at 50 million yen and less in retail.   The larger firms that dominate Japan's international trade in volume have small shares in our sample.

To see how different features the larger firms had, Table 3 summarizes the basic statistics only for the firms capitalized at 500 million yen and over in our sample.   It shows to what extent large firms had connections with China in each year.   The table implies two interesting features.

First, the larger manufacturing firms have a higher tendency to have a Chinese corporation as a major trade partner than the smaller manufacturing firms do.   The share of manufacturing firms that exported to China directly exceeded 1% in 2005 and increased to 1.6% in 2007.   Although it is still not large, it is more than four times as much as the corresponding share in Table 1.   The share of firms that imported from China directly is also substantially bigger in Table 3 than in Table 1.   In contrast, the shares of firms that had indirect connections with China are not so different between the larger firms and the smaller firms.   For both exports and imports, the shares of firms that had indirect connections with China are slightly larger for the large firms than for the small and medium size firms.   But the difference is marginal.   This implies that the small and medium size firms increased their indirect connections with China through their major trade partners in the manufacturing industry.

Second, as in the manufacturing industry, the shares of firms that had indirect connections with China are not different between the larger firms and the smaller firms in the wholesale-retail industry.   In contrast, we see no tendency that the larger firms had more direct connections with China than the smaller firms did.   The shares of the firms that exported to China directly in Table 3 are similar to those in Table 1.   More interestingly, the shares of the firms that imported from China directly in Table 3 are smaller than those in Table 1.   This implies that the smaller firms tended to have more direct imports from China than the larger firms did.   The results are in marked contrast with those in the manufacturing industry.   They may reflect the fact that the fixed costs to have direct connections with China, which are large in the manufacturing industry, may be small in wholesale or retail trading.

7.   Regressions Using Firm-level Data

In this section, we estimate how exports to China and imports from China changed the performance of Japanese firms in manufacturing and wholesale-retail.   Specifically,

by using both the financial data and the qualitative information of individual firms, we examine what impacts business connections with China had on the profitability and growth of sales of Japanese firms. For each of five alternative years in the 2000s, that is, for 2000, 2004. 2005, 2006, and 2007, we run the following cross-sectional equations with a constant term:

(1) $Profits_j = \gamma_1 Edummy1_j + \gamma_2 Edummy2_j + \gamma_3 Idummy1_j + \gamma_4 Idummy2_j + \gamma_5 X_j,$

(2) $\Delta Sales_j = \phi_1 Edummy1_j + \phi_2 Edummy2_j + \phi_3 Idummy1_j + \phi_4 Idummy2_j + \phi_5 X_j.$

In the above equations, $Profits_j$ is the firm j's profit ratio, which is net income divided by sales, while $\Delta Sales_j$ is the firm j's growth rate of sales, that is, the logged difference of firm j's sales. We regress these dependent variables on China dummy variables and several auxiliary financial variables X_j's. The China dummy variables consist of $Edummy1_j$, $Edummy2_j$, $Idummy1_j$, and $Idummy2_j$.

$Edummy1_j$ is a dummy variable that takes 1 if firm j sells its output to China directly, but zero otherwise. We use this dummy to capture the impacts of firm j's direct exports to China. In contrast, $Edummy2_j$ is a dummy variable that takes 1 if firm j sells its output to a firm that sells its output to China, but is zero otherwise. We use this dummy to capture the impacts of firm j's indirect exports to China through a major trade partner.

$Idummy1_j$ is a dummy variable that takes 1 if firm j purchases its input from China but is zero otherwise, while $Idummy2_j$ is a dummy variable that takes 1 if the firm j purchases its input from a firm that purchases its input from China but is zero otherwise. We use these two dummies to capture the impacts of firm j's direct and indirect imports from China, respectively. In the wholesale-retail industry, we also include a dummy variable, $Dummy$, that takes 1 if the firm j purchases its input from a firm which sells its output to China but is zero otherwise.

Concerning the auxiliary financial variables, we use the log of stock capitalization to control the scale effect. To control the degree of labor-intensity in the technology, we use the labor-sales ratio, which is the number of employees divided by sales, and the labor-stock capitalization ratio, which is the number of employees divided by stock capitalization. In the manufacturing industry, we also include LID_j (Light Industry Dummy) which takes one if the firm j belongs to light industry but zero otherwise[7]. The auxiliary financial variables may capture the delayed recovery of small Japanese

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[7] Light industry includes industries such as Foods and tobacco, Textiles, Wood and wood products, Furniture, Pulp, paper and paper products, and Printing.

firms or those in light industry in the 2000s.

One key feature in our data set is that it includes a large number of small and medium size firms. Our estimation will thus reveal what impacts business connections with China had on the performance of labor-intensive small firms. However, some financial data of small and medium size firms may include serious measurement errors. To exclude outliers, we use only the data of the firm whose *Profits_j* lies between -0.5 and 0.5 for equation (1) and whose *ΔSales_j* lies between -2 and 2 for equation (2).

8. Basic Results Using Firm-level Data

(1) Manufacturing Firms

Table 4 summarizes the estimation results of equations (1) and (2) for the manufacturing industry. We ran the regressions with and without including *Edummy2_j* and *Idummy2_j*. The coefficients of the three auxiliary financial variables were statistically significant in almost all of the regressions and their signs were relatively stable over time. That is, the coefficient of stock capitalization was significantly positive, except for the manufacturing industry in 2000. The coefficient of *LID_j* was significantly negative. Larger firms and those in non-light industries tended to have higher profit ratios and higher sales growth. The coefficient of labor-sales ratio was significantly positive, while the coefficient of labor-stock capitalization ratio was significantly negative in all cases. These mixed results indicate that the degree of labor intensity may have mixed impacts on profit ratios and sales growth.

Except for *Idummy1_j* in equations (2) and *Idummy2_j* in equations (1), the coefficients of the China dummies showed structural changes. The coefficient of *Edummy1_j*, which was negative in 2000, became positive after 2004 for both equations (1) and (2). In particular, it became significantly positive in 2006 for equation (1) and in 2007 for equation (2). The results remain the same even when we include *Edummy2_j*. This implies that direct exports to China, which had no significant impact in the early 2000s, came to improve both profits and sales growth of Japanese firms after the mid 2000s. China was not an attractive export destination for Japanese manufacturing firms in the early 2000s. But its remarkable development made China attractive as an export destination for Japanese manufacturing firms after the mid 2000s. Noting that most firms in our sample are small and medium size firms, the results after the mid 2000s are in marked contrast with our findings that used macro data, where no significant impacts were observed for small and medium size firms.

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The coefficient of *Edummy2ⱼ* shows similar features as the coefficient of *Edummy1ⱼ*. The coefficient of *Edummy2ⱼ*, which was negative in 2000 and 2004, became statistically positive in 2007 for both equations (1) and (2).   This implies that not only direct but also indirect exports to China came to improve both profits and sales growth of Japanese firms in 2007.   Compared with direct exports, indirect exports experienced a delayed reaction in improving the performance of Japanese firms.   But in 2006 and 2007, the impacts became almost the same between direct and indirect exports.

The coefficient of *Idummy1ⱼ* in equation (1), which was positive but insignificant in 2000 and 2004, became significantly negative in 2005 and 2007.   In contrast, the coefficient of *Idummy1ⱼ* in equation (2) is positive for all years and is statistically significant in all years except 2005.   The results remain the same even when we include *Idummy2ⱼ*.   The results imply that, in the manufacturing industry, direct imports of inexpensive intermediate goods from China have increased the growth of sales since the early 2000s, but did not contribute to improving their profit ratios.   It is likely that the manufacturing firms that imported inexpensive intermediate goods from China faced serious price competition in the sales of their products.   Thus, although their sales expanded, it did not improve their profit ratios, especially after the mid 2000s.

The coefficient of *Idummy2ⱼ* in equation (1) was significantly negative except in 2004. In manufacturing, neither direct nor indirect imports improved the profit rates of small and medium size firms.   In addition, the coefficient of *Idummy2ⱼ* in equation (2) became significantly negative in 2006 and 2007.   Unlike direct imports, indirect imports from China did not improve the sales growth of Japanese manufacturing firms. In the manufacturing industry, direct connections with China might be desirable in importing inexpensive intermediate goods from China.

⑵ Firms in Wholesale and Retail Industries
  Table 5 shows the estimation results for firms in the wholesale-retail industry.   As in Table 4, the coefficients of the three auxiliary financial variables were statistically significant in almost all of the regressions, and their signs were relatively stable over time.   The labor-sales ratio and labor-stock capitalization ratio in the wholesale-retail industry had essentially the same impacts as those in manufacturing.   The coefficient of stock capitalization, however, had mixed signs.   As in manufacturing, larger firms tended to have higher sales growth in wholesale-retail.   But smaller firms tended to have higher profit ratios.   The size effects are not always positive in the wholesale-retail industry.

The coefficient of *Idummy1ⱼ* is positive for both equations (1) and (2) in all years.   In particular, it is statistically significant except for equation (2) in 2005.   The results remain the same even if we include *Idummy2ⱼ*.   In the wholesale-retail industry, direct importers of lower-priced commodities from China have improved both their profits and sales growth since the early 2000s.   In case of manufacturing, direct importers from China have improved their sales since the early 2000s, but did not improve their profit ratios.   The increased imports from China were more beneficial in wholesale-retail than in manufacturing in Japan.

Except for *Idummy1ⱼ*, the coefficients of the China dummy variables changed their signs over time.   In particular, both coefficients of *Edummy1ⱼ* and *Edummy2ⱼ* showed substantial structural changes.   Those in equation (2), which were negative in 2000, became significantly positive after 2004.   This suggests that both direct and indirect exports to China, which had no significant impact in the early 2000s, came to improve the sales of Japanese firms after the mid 2000s in the wholesale-retail industry.   The pattern of the structural change is similar to what we observed in manufacturing firms. This remarkable development made the Chinese market attractive as a sales destination for Japanese firms after the mid 2000s.   But the structural change occurred earlier in wholesale-retail industry.   The results are in marked contrast with our findings that used macro data, where no significant impacts were observed in non-manufacturing industries.

Exports to China, however, had a less-drastic structural change in improving the ratio of net income to net sales in the wholesale-retail industry.   The coefficient of *Edummy1ⱼ* in equation (1), which was significantly negative in 2000, turned to positive after 2005 but remained statistically insignificant.   The coefficient of *Edummy2ⱼ* in equation (1) remained negative by 2005, although it became statistically positive in 2007.   This implies that in the wholesale-retail industry, increased demand from China has increased the growth of sales since the early 2000s, but did not contribute to improving their profit ratios.   The market in China might be too competitive for Japanese wholesale and retail firms to improve their profits substantially.

It is also noteworthy that the coefficient of *Idummy2ⱼ* was significantly negative for most cases in both equations (1) and (2).   This is in marked contrast with the fact that the coefficient of *Idummy1ⱼ* was significantly positive in both equations (1) and (2).   In wholesale-retail industry, direct connections, not indirect connections, are important when importing from China.   The coefficient of *Dummyⱼ* in equation (2), which was negative in 2000, became significantly positive after 2004.   The coefficient of *Idummy2ⱼ* in equation (1), which remained negative by 2004, became significantly

positive in 2006 and 2007.   This implies that in the wholesale-retail industry, having some connections with firms that export to China might be beneficial.

9. Estimations with Lags

In the last section, we explored whether Japanese firms gained from exports to China and imports from China in the 2000s by using the firm-level data.   In the analysis, we estimated how the present connections with China changed the profit rates and the sales growth of Japanese firms.   One natural criticism for the estimations is a possible simultaneous bias.   To the extent that the present connections are used, we cannot reject reverse causality even if the China dummies are statistically significant.   The purpose of this section is to explore the robustness of our results when we use the past connections with China as explanatory variables.

In the estimation, we replace the China dummies by their one-year lagged values. The use of lagged China dummies has a cost of losing a number of samples because the "CD-EYES 50" may not contain the sampled firms in two consecutive years.   But the reverse causality is less likely when the lagged China dummies are still statistically significant.

Table 6 summarizes the estimation results of equations (1) and (2) in manufacturing industry and Table 7 summarizes those in wholesale-retail industry.   The tables report the case where $Idummy2_j$ was excluded as an explanatory variable.   In both industries, the coefficients of the three auxiliary financial variables were statistically significant in almost all of the regressions and had the same signs as those we obtained in the last section.

Most of the coefficients of the China dummy variables had the same signs as those we obtained in the last section.   In the wholesale-retail industry, they also had similar significance levels.   However, in the manufacturing industry, the coefficients of some China dummy variables had different significance levels from those we obtained in the last section.   For example, the coefficient of $Edummy1_j$ in equation (1) became significant in 2004 and 2005 but became insignificant in 2006.   The coefficient of $Edummy1_j$ in equation (2) became significantly negative in 2000 and became less significant in 2007. The negative coefficient of $Idummy1_j$ in equation (1) became less significant in 2005, while the positive coefficient of $Idummy1_j$ in equation (2) became significant in 2005 and insignificant in 2006.   But taking the lags of the China dummies did not change the essential results of our regression, even in manufacturing.

This implies that reverse causality is less problematic for what we obtained in the last section.

10.   Concluding Remarks

In this paper, we examined the role of Japanese international trade with China regarding the recovery in the 2000s.   The dependence of the Japanese firms on the Chinese economy has risen since the late 1990s.   Our VARs showed that Japanese production, which had been led by exports to the United States until the mid-1990s, started to be led by exports to China after the late 1990s.   The effects on production were, however, highly different across sectors and firms.   At the macro level, increased exports to China were beneficial for the recovery of the manufacturing industry.   Their impacts were, however, insignificant for the recovery of labor-intensive small firms and non-manufacturing firms.   In contrast, at the micro level, we find that various connections with China improved the performance of small and medium size firms in manufacturing and in wholesale-retail.   The results suggest that the sustained growth in the 2000s was accompanied by widening inequalities across sectors.

Heterogeneous effects across firms in different industries and with different firm seizes might be problematic in terms of income distribution.   Even in terms of resource allocation, the heterogeneous effects may cause efficiency losses if sectoral adjustment costs exist.   It is the sectoral adjustment costs that magnify a threat of the rise of China. Policies that mitigate these adjustment costs may increase the complementarities between the Chinese and Japanese economies.

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Table 1

Shares of Firms That Have Connections with China: Case of Whole Sample

(1) Manufacturing Industry

	number of sample	Direct Exports	Indirect Exports	Direct Imports	Indirect Imports
2000	52412	0.109%	1.967%	0.662%	10.171%
2004	51252	0.230%	4.291%	1.210%	12.786%
2005	51134	0.264%	4.979%	1.334%	13.093%
2006	50602	0.306%	7.727%	1.411%	13.332%
2007	50009	0.358%	8.508%	1.670%	15.495%

(2) Wholesale and Retail Industry

	number of sample	Direct Exports	Indirect Exports	Direct Imports	Indirect Imports
2000	59254	0.467%	1.225%	1.696%	9.685%
2004	56975	0.576%	3.101%	2.387%	13.808%
2005	56593	0.606%	3.265%	2.560%	14.242%
2006	55747	0.640%	4.506%	2.682%	13.881%
2007	54827	0.677%	4.759%	2.915%	16.357%

Table 2

Shares of Firms with Five Alternative Sizes in 2007

	500 million yen and over	100 million to 500 million yen	50 million to 100 million yen	2.5million to 50 million yen	1.1million to 2.5 million yen
manufacturing	5.6%	10.5%	19.2%	29.7%	35.0%
wholesale-retail	2.6%	8.7%	17.3%	30.4%	40.9%

Table 3

Shares of Firms That Have Connections with China: Case of Large Firms

(1) Manufacturing Industry

	number of sample	Direct Exports	Indirect Exports	Direct Imports	Indirect Imports
2000	2820	0.390%	2.340%	1.064%	9.043%
2004	2870	0.941%	4.286%	1.882%	14.390%
2005	2857	1.225%	4.795%	2.310%	12.916%
2006	2853	1.472%	8.412%	2.489%	13.565%
2007	2811	1.601%	9.178%	2.810%	17.147%

(2) Wholesale and Retail Industry

	number of sample	Direct Exports	Indirect Exports	Direct Imports	Indirect Imports
2000	1457	0.275%	1.373%	0.755%	9.128%
2004	1488	0.470%	4.032%	1.008%	13.307%
2005	1501	0.600%	4.131%	1.399%	14.257%
2006	1457	0.892%	5.903%	1.304%	13.246%
2007	1412	0.850%	5.737%	1.416%	15.439%

Table 4

Estimation Results in Manufacturing Industry

(i) Estimation of Equation (1)

Variable	2000 coefficient	t-value	2004 coefficient	t-value	2005 coefficient	t-value	2006 coefficient	t-value	2007 coefficient	t-value
constant	−0.0250	−7.322	−0.0155	−4.646	−0.0141	−4.187	−0.0246	−7.116	−0.0259	−7.493
Edummy1	−0.0036	−0.554	0.0047	1.028	0.0041	0.917	0.0077	1.809	0.0063	1.618
Idummy1	0.0028	1.011	0.0014	0.664	−0.0044	−2.162	−0.0014	−0.710	−0.0044	−2.374
stock capitalization	−0.0012	−5.976	0.0004	1.918	0.0007	3.600	0.0012	5.786	0.0019	8.837
labor−sales ratio	0.0035	12.741	0.0027	10.232	0.0017	6.198	0.0031	10.974	0.0035	12.664
labor−stock cap ratio	−0.0073	−20.609	−0.0047	−13.390	−0.0038	−10.812	−0.0053	−14.624	−0.0051	−14.172
light industry dummy	−0.0014	−2.868	−0.0050	−9.991	−0.0088	−17.221	−0.0097	−18.387	−0.0116	−21.770
# of firms	44924		43293		43422		42861		42089	

Variable	2000 coefficient	t-value	2004 coefficient	t-value	2005 coefficient	t-value	2006 coefficient	t-value	2007 coefficient	t-value
constant	−0.0248	−7.287	−0.0154	−4.611	−0.0137	−4.076	−0.0246	−7.092	−0.0263	−7.587
Edummy1	−0.0035	−0.532	0.0047	1.041	0.0041	0.912	0.0076	1.795	0.0062	1.583
Edummy2	−0.0021	−1.310	−0.0016	−1.426	−0.0021	−2.016	0.0007	0.819	0.0036	4.210
Idummy1	0.0030	1.085	0.0014	0.686	−0.0041	−2.047	−0.0013	−0.642	−0.0042	−2.269
Idummy2	−0.0024	−3.287	−0.0007	−1.039	−0.0029	−4.155	−0.0024	−3.394	−0.0025	−3.659
stock capitalization	−0.0012	−5.994	0.0004	1.951	0.0008	3.643	0.0012	5.786	0.0019	8.797
labor−sales ratio	0.0035	12.803	0.0028	10.282	0.0017	6.339	0.0031	11.004	0.0035	12.581
labor−stock cap ratio	−0.0074	−20.691	−0.0047	−13.413	−0.0039	−10.894	−0.0053	−14.687	−0.0052	−14.250
light industry dummy	−0.0013	−2.759	−0.0050	−10.001	−0.0087	−17.167	−0.0096	−18.001	−0.0113	−21.132
# of firms	44924		43293		43422		42861		42089	

(ii) Estimation of Equation (2)

Variable	2000 coefficient	t-value	2004 coefficient	t-value	2005 coefficient	t-value	2006 coefficient	t-value	2007 coefficient	t-value
constant	0.3276	24.302	0.3631	28.092	0.3433	27.081	0.3085	24.745	0.2786	22.639
Edummy1	−0.0368	−1.373	0.0210	1.130	0.0086	0.499	−0.0111	−0.705	0.0309	2.119
Idummy1	0.0388	3.523	0.0263	3.227	0.0102	1.316	0.0175	2.363	0.0198	2.922
stock capitalization	0.0677	40.638	0.0694	41.747	0.0634	38.422	0.0537	32.928	0.0541	33.622
labor−sales ratio	0.0456	31.331	0.0516	35.913	0.0458	32.054	0.0406	28.679	0.0385	27.514
labor−stock cap ratio	−0.0551	−39.570	−0.0521	−38.594	−0.0473	−35.699	−0.0403	−31.052	−0.0389	−30.542
light industry dummy	0.0074	3.873	−0.0248	−12.989	−0.0449	−23.678	−0.0412	−21.910	−0.0438	−23.424
# of firms	51165		50123		49821		49348		48745	

Variable	2000 coefficient	t-value	2004 coefficient	t-value	2005 coefficient	t-value	2006 coefficient	t-value	2007 coefficient	t-value
constant	0.3276	24.304	0.3632	28.097	0.3430	27.052	0.3082	24.699	0.2781	22.575
Edummy1	−0.0366	−1.366	0.0212	1.142	0.0086	0.500	−0.0113	−0.716	0.0306	2.100
Edummy2	−0.0035	−0.546	−0.0042	−0.950	0.0023	0.575	0.0042	1.268	0.0071	2.286
Idummy1	0.0389	3.536	0.0263	3.224	0.0100	1.297	0.0179	2.421	0.0203	2.987
Idummy2	−0.0016	−0.527	0.0000	0.001	0.0017	0.667	−0.0067	−2.630	−0.0058	−2.424
stock capitalization	0.0677	40.612	0.0694	41.741	0.0634	38.426	0.0536	32.845	0.0540	33.560
labor−sales ratio	0.0456	31.319	0.0517	35.915	0.0458	32.045	0.0405	28.591	0.0384	27.427
labor−stock cap ratio	−0.0551	−39.539	−0.0521	−38.573	−0.0473	−35.707	−0.0402	−30.973	−0.0389	−30.483
light industry dummy	0.0074	3.885	−0.0249	−13.008	−0.0449	−23.592	−0.0407	−21.468	−0.0432	−22.993
# of firms	51165		50123		49821		49348		48745	

Table 5

Estimation Results in Wholesale and Retail Industries

(i) Estimation of Equation (1)

Variable	2000 coefficient	t-value	2004 coefficient	t-value	2005 coefficient	t-value	2006 coefficient	t-value	2007 coefficient	t-value
constant	0.0183	7.390	0.0282	10.219	0.0170	5.857	0.0110	3.812	0.0043	1.400
Edummy1	−0.0052	−2.157	−0.0015	−0.613	0.0017	0.663	0.0034	1.360	0.0032	1.242
Idummy1	0.0058	4.566	0.0053	4.335	0.0057	4.574	0.0061	4.999	0.0045	3.545
stock capitalization	−0.0004	−2.497	−0.0006	−3.166	−0.0005	−2.578	−0.0002	−0.774	−0.0008	−3.824
labor−sales ratio	0.0004	2.349	0.0013	6.639	0.0005	2.462	0.0003	1.379	0.0007	3.397
labor−stock cap ratio	0.0003	1.360	0.0003	1.210	−0.0002	−0.770	−0.0003	−1.052	−0.0018	−6.901
# of firms	49212		46684		46440		45588		44464	

Variable	2000 coefficient	t-value	2004 coefficient	t-value	2005 coefficient	t-value	2006 coefficient	t-value	2007 coefficient	t-value
constant	0.0184	7.430	0.0283	10.217	0.0176	6.042	0.0119	4.083	0.0053	1.736
Edummy1	−0.0052	−2.144	−0.0015	−0.614	0.0017	0.684	0.0035	1.400	0.0033	1.278
Edummy2	−0.0018	−1.229	−0.0012	−1.131	−0.0007	−0.608	0.0012	1.318	0.0024	2.473
Idummy1	0.0059	4.625	0.0053	4.336	0.0057	4.525	0.0060	4.895	0.0043	3.425
Idummy2	−0.0011	−1.989	−0.0005	−0.862	−0.0020	−3.503	−0.0019	−3.345	−0.0016	−2.788
Dummy	−0.0004	−0.539	0.0000	−0.007	0.0004	0.646	0.0012	1.722	0.0012	1.789
stock capitalization	−0.0004	−2.511	−0.0006	−3.166	−0.0005	−2.637	−0.0002	−0.813	−0.0008	−3.905
labor−sales ratio	0.0004	2.365	0.0013	6.673	0.0005	2.480	0.0003	1.358	0.0007	3.307
labor−stock cap ratio	0.0003	1.323	0.0003	1.170	−0.0002	−0.711	−0.0002	−0.804	−0.0017	−6.515
# of firms	49212		46684		46440		45588		44464	

(ii) Estimation of Equation (2)

Variable	2000 coefficient	t-value	2004 coefficient	t-value	2005 coefficient	t-value	2006 coefficient	t-value	2007 coefficient	t-value
constant	0.3106	23.434	0.2148	16.999	0.1574	12.187	0.1983	15.642	0.1234	9.838
Edummy1	−0.0094	−0.730	0.0701	6.184	0.0576	5.088	0.0538	4.895	0.0901	8.521
Idummy1	0.0178	2.631	0.0214	3.836	0.0066	1.186	0.0222	4.129	0.0156	3.042
stock capitalization	0.0646	43.742	0.0546	37.591	0.0434	28.911	0.0481	32.558	0.0368	25.137
labor−sales ratio	0.0459	38.115	0.0390	33.124	0.0305	25.157	0.0343	28.692	0.0240	20.394
labor−stock cap ratio	−0.0476	−43.337	−0.0354	−33.531	−0.0263	−24.269	−0.0307	−29.160	−0.0221	−21.422
# of firms	57469		55438		54799		53971		52999	

Variable	2000 coefficient	t-value	2004 coefficient	t-value	2005 coefficient	t-value	2006 coefficient	t-value	2007 coefficient	t-value
constant	0.3122	23.535	0.2196	17.341	0.1631	12.604	0.2045	16.097	0.1301	10.346
Edummy1	−0.0094	−0.730	0.0708	6.244	0.0581	5.132	0.0536	4.886	0.0904	8.559
Edummy2	0.0121	1.537	0.0186	3.798	0.0284	5.784	0.0336	8.066	0.0333	8.277
Idummy1	0.0186	2.753	0.0200	3.573	0.0055	0.993	0.0222	4.111	0.0143	2.784
Idummy2	−0.0097	−3.355	−0.0074	−3.047	−0.0099	−3.988	−0.0090	−3.634	−0.0042	−1.846
Dummy	−0.0080	−2.231	0.0117	3.875	0.0077	2.511	0.0013	0.422	0.0104	3.779
stock capitalization	0.0646	43.714	0.0549	37.791	0.0437	29.127	0.0484	32.737	0.0373	25.516
labor−sales ratio	0.0460	38.138	0.0393	33.372	0.0309	25.431	0.0346	28.931	0.0245	20.795
labor−stock cap ratio	−0.0476	−43.279	−0.0359	−33.888	−0.0267	−24.675	−0.0312	−29.584	−0.0229	−22.114
# of firms	57469		55438		54799		53971		52999	

Table 6

Estimation Results with Lags in Manufacturing Industry

(i) Estimation of Equation (1)

Variable	2000 coefficient	t-value	2004 coefficient	t-value	2005 coefficient	t-value	2006 coefficient	t-value	2007 coefficient	t-value
constant	−0.0262	−7.605	−0.0166	−4.928	−0.0171	−5.045	−0.0260	−7.502	−0.0269	−7.683
Edummy1	0.0030	0.405	0.0128	2.590	0.0214	4.604	0.0037	0.808	0.0018	0.422
Edummy2	−0.0022	−1.354	−0.0026	−2.356	−0.0024	−2.096	−0.0017	−1.509	0.0025	2.812
Idummy1	0.0026	0.915	−0.0002	−0.071	−0.0028	−1.294	−0.0031	−1.493	−0.0038	−1.857
stock capitalization	−0.0011	−5.299	0.0006	3.171	0.0011	5.271	0.0014	6.676	0.0021	9.599
labor-sales ratio	0.0037	13.317	0.0030	10.923	0.0020	7.347	0.0031	11.094	0.0037	13.024
labor-stock cap ratio	−0.0074	−20.637	−0.0047	−13.189	−0.0040	−11.127	−0.0053	−14.511	−0.0051	−13.943
light industry dummy	−0.0013	−2.696	−0.0048	−9.641	−0.0087	−17.045	−0.0096	−18.102	−0.0113	−20.876
# of firms	43197		51252		41985		41736		40838	

(ii) Estimation of Equation (2)

Variable	2000 coefficient	t-value	2004 coefficient	t-value	2005 coefficient	t-value	2006 coefficient	t-value	2007 coefficient	t-value
constant	0.2650	19.740	0.3024	23.732	0.2801	22.460	0.2708	19.744	0.2215	18.328
Edummy1	−0.0627	−2.124	0.0024	0.122	0.0060	0.336	−0.0100	−0.537	−0.0038	−0.249
Edummy2	0.0006	0.090	−0.0120	−2.766	0.0025	0.585	0.0001	7.461	0.0083	2.606
Idummy1	0.0305	2.706	0.0205	2.438	0.0221	2.767	0.0103	1.279	0.0174	2.426
stock capitalization	0.0615	37.127	0.0611	37.415	0.0556	34.221	0.0476	26.794	0.0468	29.570
labor-sales ratio	0.0442	30.498	0.0493	34.883	0.0435	30.991	0.0393	25.234	0.0363	26.390
labor-stock cap ratio	−0.0469	−33.618	−0.0428	−31.979	−0.0381	−29.083	−0.0341	−23.609	−0.0306	−24.304
light industry dummy	0.0089	4.757	−0.0240	−12.874	−0.0437	−23.513	−0.0389	−19.200	−0.0418	−22.718
# of firms	49233		48782		48323		48180		47448	

Table 7

Estimation Results with Lags in Wholesale and Retail Industries

(i) Estimation of Equation (1)

Variable	2000 coefficient	t-value	2004 coefficient	t-value	2005 coefficient	t-value	2006 coefficient	t-value	2007 coefficient	t-value
constant	0.0188	7.696	0.0276	10.091	0.0164	5.691	0.0103	3.616	0.0045	1.516
Edummy1	−0.0044	−1.813	0.0000	0.017	0.0007	0.276	0.0027	1.083	0.0036	1.409
Edummy2	−0.0006	−0.387	−0.0008	−0.764	−0.0009	−0.829	−0.0002	−0.232	0.0026	2.739
Idummy1	0.0063	4.823	0.0054	4.331	0.0051	4.008	0.0070	5.699	0.0047	3.707
Dummy	0.0000	−0.019	−0.0007	−0.970	0.0009	1.299	0.0014	2.088	0.0000	−0.019
stock capitalization	−0.0003	−1.700	−0.0004	−2.249	−0.0004	−1.817	0.0001	0.548	−0.0005	−2.529
labor-sales ratio	0.0005	2.748	0.0013	6.795	0.0006	2.771	0.0003	1.704	0.0006	2.750
labor-stock cap ratio	0.0004	2.091	0.0004	1.655	−0.0001	−0.517	−0.0001	−0.364	−0.0013	−5.367
# of firms	46998		45260		44791		44189		42988	

(ii) Estimation of Equation (2)

Variable	2000 coefficient	t-value	2004 coefficient	t-value	2005 coefficient	t-value	2006 coefficient	t-value	2007 coefficient	t-value
constant	0.2437	18.941	0.1585	12.828	0.0937	7.478	0.1423	11.566	0.0765	6.217
Edummy1	−0.0126	−0.994	0.0619	5.545	0.0460	4.101	0.0463	4.276	0.0740	6.972
Edummy2	−0.0037	−0.469	0.0195	4.066	0.0185	3.821	0.0246	5.252	0.0335	8.375
Idummy1	0.0120	1.751	0.0095	1.701	0.0059	1.063	0.0190	3.559	0.0086	1.656
Dummy	−0.0081	−2.280	0.0076	2.488	0.0102	3.402	0.0002	0.066	0.0018	0.584
stock capitalization	0.0541	37.599	0.0463	32.569	0.0351	24.090	0.0396	27.474	0.0305	21.150
labor-sales ratio	0.0429	36.589	0.0360	31.283	0.0274	23.261	0.0315	27.160	0.0217	18.705
labor-stock cap ratio	−0.0370	−34.289	−0.0271	−25.987	−0.0175	−16.571	−0.0221	−21.371	−0.0156	−15.244
# of firms	54916		53915		53065		52554		51496	

Figure 1-1
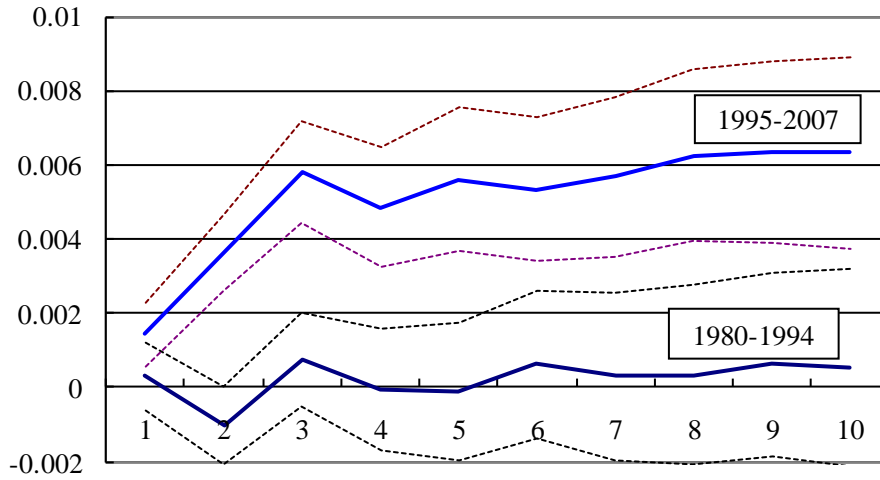
Japan's Exports Since the Early 1990s
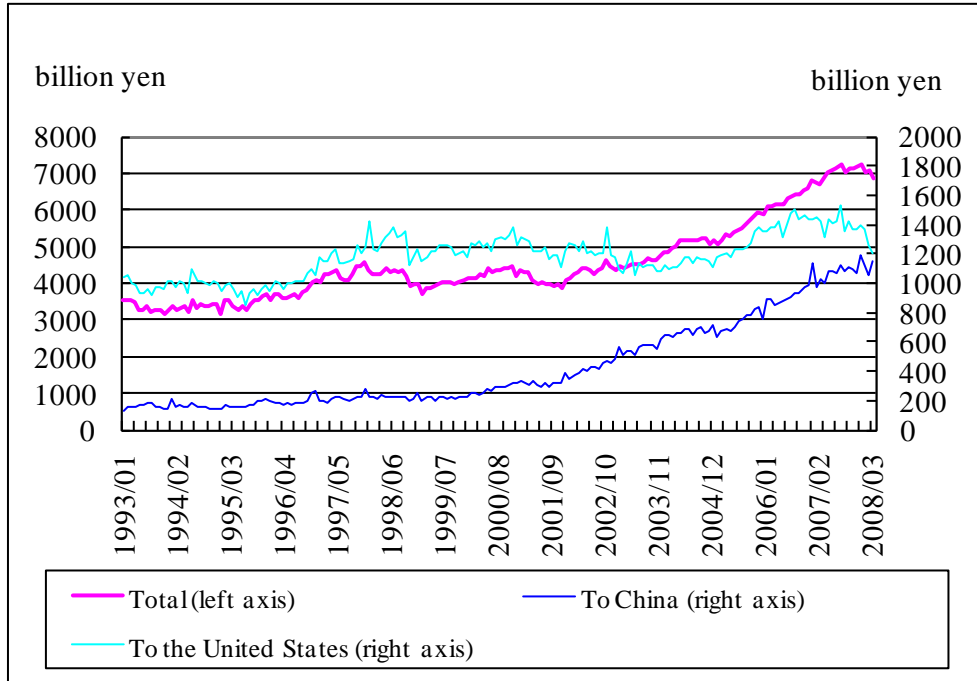
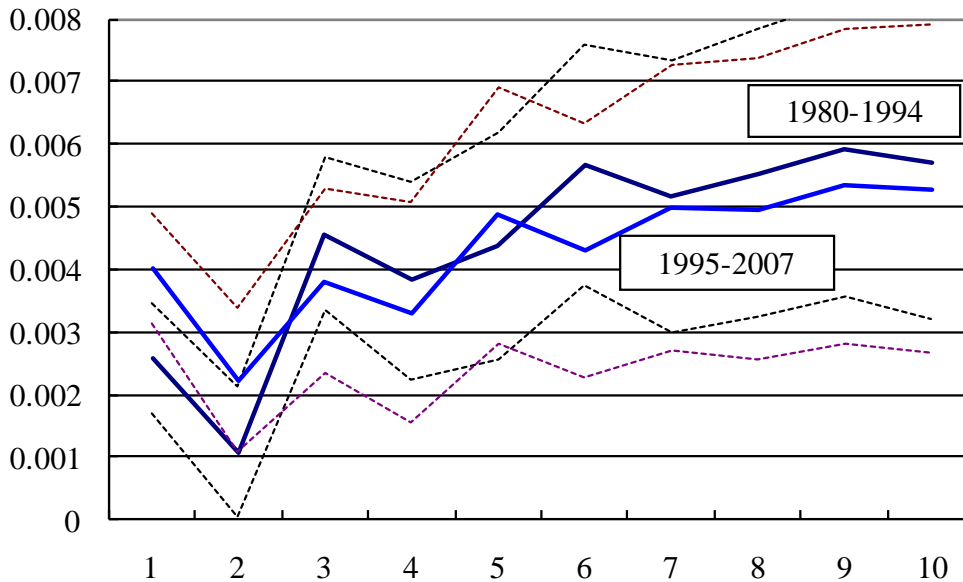
Fig 1-2

Japan's Imports Since the Early 1980s
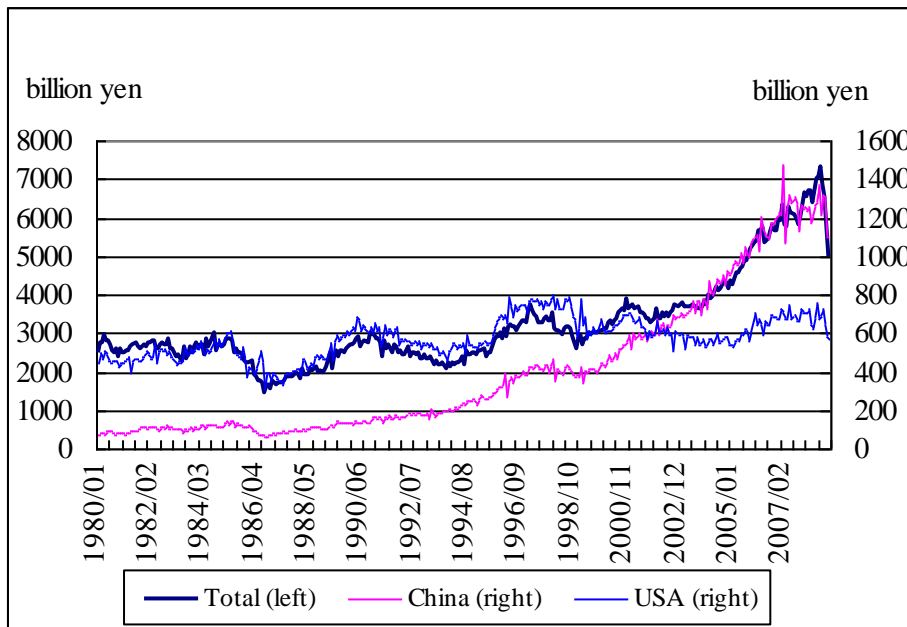
Source: Ministry of Finance, Trade Statistics of Japan.

**Figure 2-1. Accumulated Impulse Responses
of Manufacturing IIP to the Exports to China**

1995-2007

1980-1994

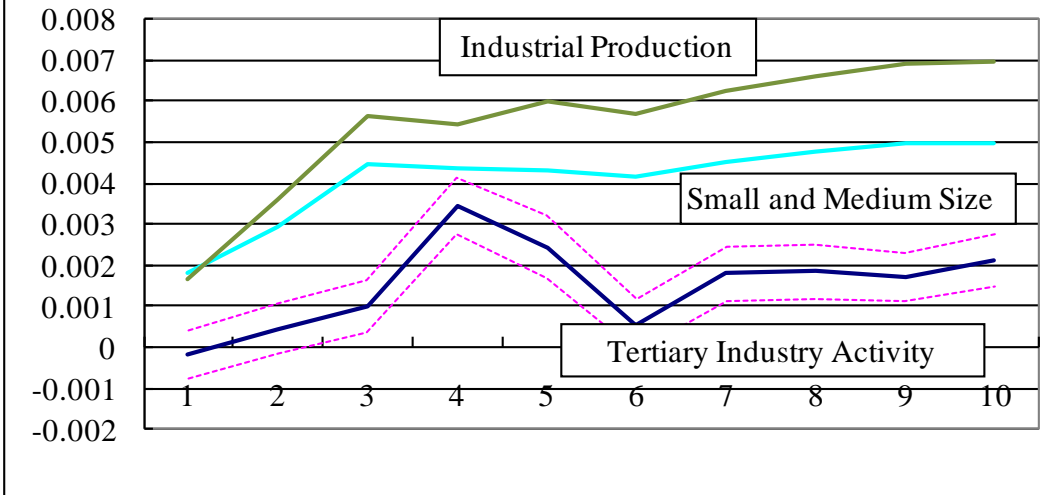**Figure 2-2. Accumulated Impulse Responses
of Manufacturing IIP to the Exports to the USA**

1980-1994

1995-2007

**Figure 2-3. Accumulated Impulse Responses
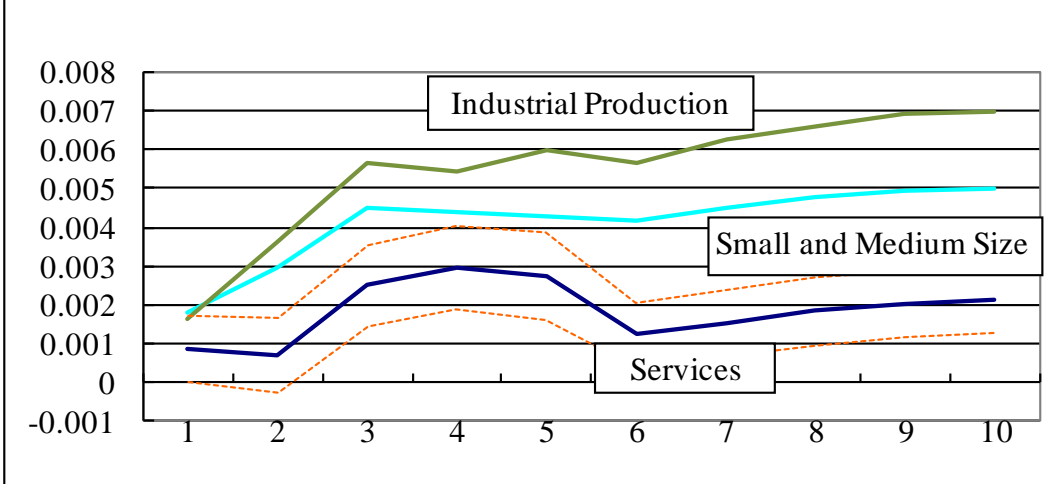of Manufacturing IIP to the Total Exports**

1995-2007

1980-1994
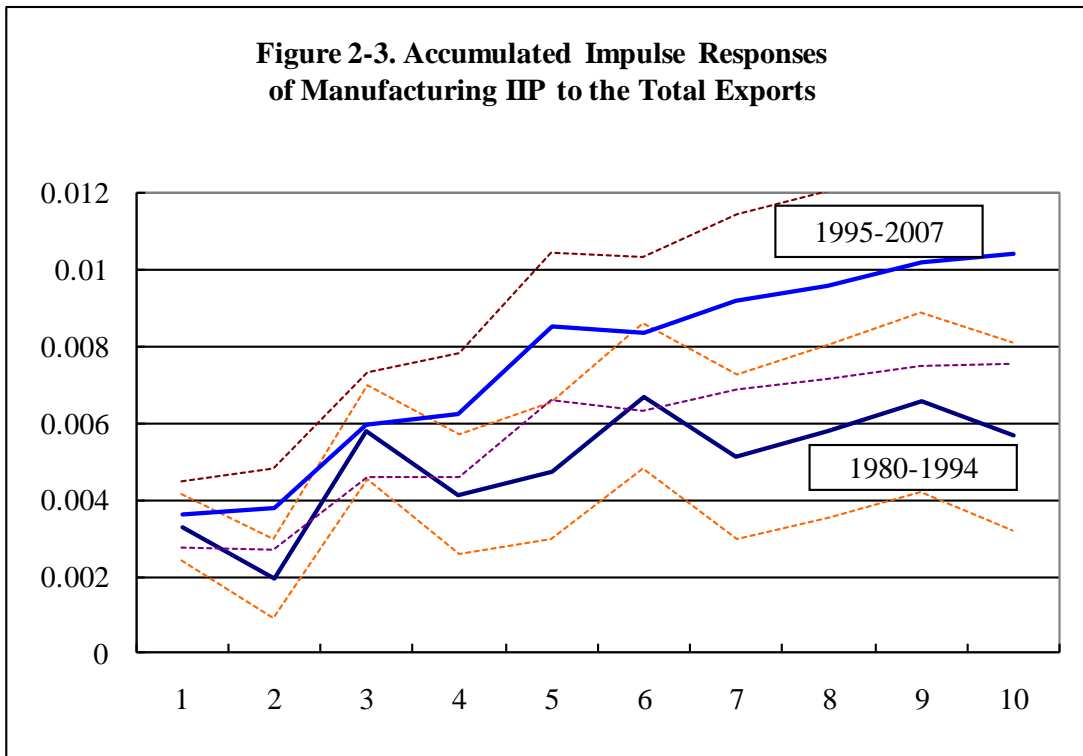
Note: Dotted lines denote ±σ respectively.
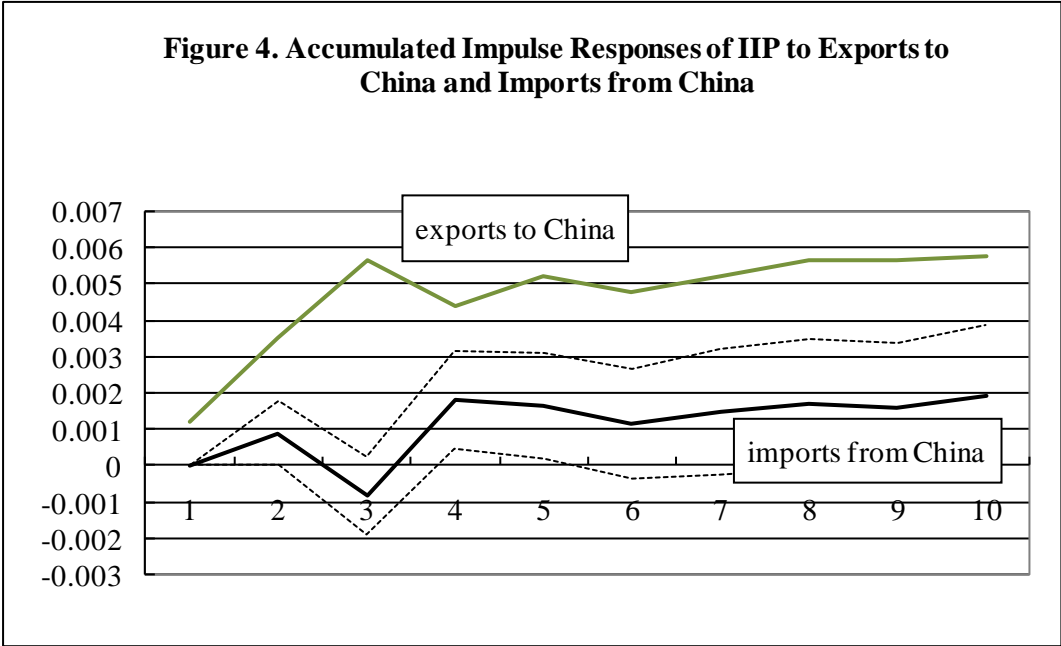
Figure 3-1. Accumulated Impulse Responses of TIA

- Industrial Production
- Small and Medium Size
- Tertiary Industry Activity

Figure 3-2. Accumulated Impulse Responses of Services

- Industrial Production
- Small and Medium Size
- Services

Note: Dotted lines denote $\pm\sigma$ for the impulse responses to tertiary industry activity and services respectively.

Figure 4. Accumulated Impulse Responses of IIP to Exports to China and Imports from China
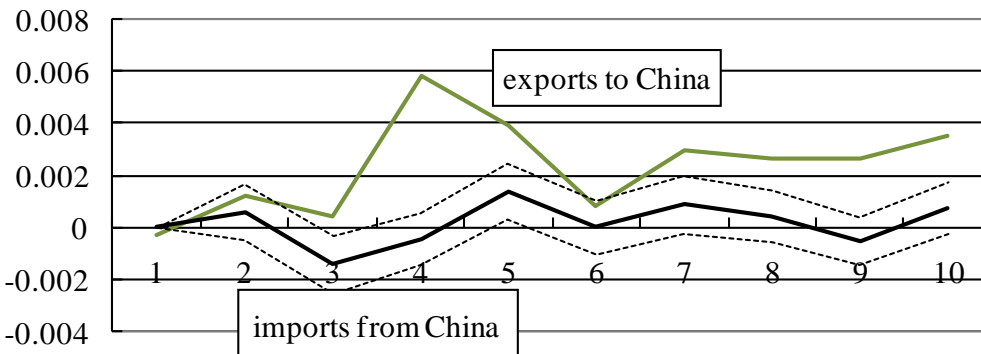

Note: Dotted lines denote ±σ for the impulse responses to the imports from China.

Figure 5-1. Accumulated Impulse Responses of TIA to Exports to China and Imports from China

0.004
0.003
0.002
0.001
0
-0.001
-0.002

exports to China

imports from China

1 2 3 4 5 6 7 8 9 10
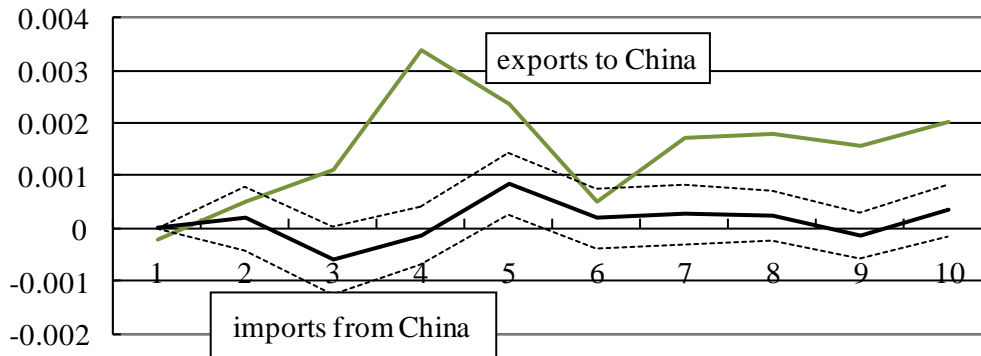
Figure 5-2. Accumulated Impulse Responses of Wholesale-Retail to Exports to China and Imports from China

0.008
0.006
0.004
0.002
0
-0.002
-0.004

exports to China

imports from China

1 2 3 4 5 6 7 8 9 10

Note: Dotted lines denote $\pm\sigma$ for the impulse responses to the imports from China.