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The Rise of China and Sustained Recovery of Japan*

By **Shin-ichi FUKUDA (Professor, Faculty of Economics, University of Tokyo)****

Abstract

After prolonged recessions, the Japanese economy had recovered from the crisis in the first half of the 2000s and has recorded sustained growth in the last several years. Tremendous structural changes during and after the financial crisis were one of the main driving forces for the recovery. However, dramatic increases in exports were another. In particular, increases of Japanese exports to China were substantial in the 2000s and supported the recovery of the Japanese economy from its demand side. The purpose of this paper is to examine the role of the exports to China for the recovery in the 2000s.

The dependence of the Japanese export sectors on the Chinese economy has risen in the past ten years. China is now almost surpassing the United States as destination of Japanese exports. Vector autoregressions (VARs) show that the Japanese production was caused by exports to the United States until the mid-1990s but was caused by exports to China after the late 1990s. However, the effects on the production were highly different across firms. The increased exports to China were beneficial for the recovery of manufacturing industries with advanced technology. Their impacts were, in contrast, insignificant for the recovery of labor-intensive small firms and non-manufacturing firms. Consequently, the sustained growth in the last several years was accompanied by widening inequalities across firms.

Keywords: exports, China, Japan's recovery, complementarities

JEL classification: F10, F31, O53

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1. Introduction

After the crash of the stock market in the early 1990s, the Japanese economy had experienced prolonged recessions. The problems became especially serious in the late 1990s, when several major financial institutions turned out to be in default. However, the Japan's economy had recovered from the crisis in the first half of the 2000s and has recorded sustained growth in the last several years. Tremendous structural changes during and after the financial crisis were one of the main driving forces for the recovery. However, dramatic increases in exports were another. In particular, increases of Japanese exports to China were substantial in the 2000s and supported the recovery of the Japanese economy from its demand side. An exogenous increase of exports can be a big push that raises aggregate output directly and indirectly.¹

Figure 1 shows Japan's exports since 1993. The amount of Japan's monthly total exports, which had been stable around 4 trillion yens until the end of 2001, started to show dramatic increases after 2002. The dramatic increases were accompanied by dramatic increases in exports to China.² The amount of Japan's monthly exports to China, which was only 250 billion yens in the early 2000s, exceeded 1 trillion yens in 2007. China is now almost surpassing the United States as destination of Japanese exports.

The starting point of dramatic increases in the exports almost coincided with that of sustained recovery of Japanese economy from prolonged recessions. Figure 2 shows business conditions in Japan by the Coincident Composite Index. Japan's business cycles had a trough in January 2002 and have achieved long recovery after that. The length of the recovery is now the longest in history after the World War II.³ Non-performing loan ratio, which had its peak in March 2002, dropped dramatically. Based on the definition of the Financial Reconstruction Law, the ratio of non-performing loans for all banks, which rose up to 8.4% in March 2002, declined to 2.5% in March 2007. These coincidences imply that there are some link between the increased exports to China and the significant recovery of Japanese economy after 2002.

The purpose of this paper is to examine what role the exports to China played for

¹ There are a large number of studies that discussed roles of exports for economic growth. See, for example, Frankel and Romer (1999). Fukuda and Toya (1995) discussed a special role of exports in East Asia.

² The correlation between total exports and exports to China, which was 0.75 for the sample period from Jan. 1993 to Dec. 2001, rose up to 0.98 for the period from Jan. 2002 to Dec. 2007. This is in marked contrast that the correlation between total exports and exports to the United States was 0.91 for both periods.

³ Based upon the view of the Working Group of Indexes of Business Conditions, the ESRI, Cabinet Office, Japanese government determines when a peak and a trough in business cycle occurred in the Japanese economy.

Japan's recovery in the 2000s. Exogenous increases in exports have positive multiplier effects on aggregate production. To the extent that the role is complementary, the increased dependence on the Chinese economy would have benefited Japanese firms during the last decade. This is particularly true for Japanese firms that have intra-firm international trade with China. However, if the substitution effect exists, the increased dependence might not have benefited all of Japanese firms. The increased role of China would have had highly heterogeneous impacts on Japanese firms, depending on their industries and firm sizes. A rise of China pumped up external demand to some manufacturing industries with advanced technology. Significant increases were noted in exports of electric equipment, including semiconductors & other electronic parts and high-end digital cameras, reflecting a global trend towards multi-functional and advanced computers and digital home appliances. However, a rise of China deteriorated the other Japanese firms' competition in several international markets. Increased imports from China overtook market shares in domestic market. The negative impacts could be especially serious for labor-intensive small firms.

Figure 3 shows Indices of Industrial Production (IIP), Indices of Industrial Production of Small and Medium Size Enterprises (SIP), and Indices of Tertiary Industry Activity (ITA).⁴ All of these indexes are normalized to be 100 in 2000. IIP shows that the recovery after 2002 was strong and substantial for industry production. However, SIP implies that the recovery was slow and limited for small and medium size firms. Tertiary industry activity, which has an upward trend throughout the period, showed no conspicuous upward deviation from the trend around 2002.

The slow recovery among small firms was unique feature that had not been observed in previous recovery phases of Japanese business cycles. Figure 4 shows "Diffusion Index of the Short-term Economic Survey of Enterprises in Japan (TANKAN)" by the Bank of Japan from 1983 to 2007. It is a quarterly survey that asks judgment of general business conditions of the responding enterprise, primarily in light of individual profits. Responses are aggregated into Diffusion Index (DI).⁵ DI moves procyclically and shows booms and recessions over the business cycles. Cyclical changes had been commonly observed not only for large manufacturing firms but also for non-manufacturing firms and for small firms until the late 1990s. However, the recovery of DI, which was clearly observed for large manufacturing firms, could not be observed for small firms after 2002.

⁴ IIP and ITA are from Ministry of Economy, Trade, and Industry (METI), while SIP is from Small and Medium Enterprise Agency.

⁵ DI (% points) = Percentage share of enterprises responding "favorable" minus Percentage share of enterprises responding "unfavorable".

In the following analysis, we explore what impacts the increased total exports had on various industries in Japan during the last 15 years. Using the method of Vector Autoregression (VAR), we investigate whether the exports to China had significant impacts on production in various industries.⁶ 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 the exports to China after the late 1990s. However, the impacts were highly heterogeneous across industries. The increased exports to China were beneficial in high-tech manufacturing sectors such as electrical machinery, precision instruments, electronics, and information-communication equipment. They also had strong positive impacts on iron-steel and general machinery. However, they had small impacts on the other industries. These industries include not only labor intensive industries such as textiles, pulp-paper, plastic products, and foods-tobacco but also industries with standardized technology such as fabricated metals, nonferrous metals, ceramics, chemicals, and petroleum products.

We also find that the impacts were limited in small firms and in non-manufacturing firms. Small labor-intensive firms with less advanced technology could not compete in international markets. Non-manufacturing firms which produces non-tradable goods did not have benefits from the increased external demand from China. Consequently, the sustained growth in the last several years was accompanied by widening inequalities across firms. Using industry-level data, we explore which Japanese firms gained and which other firms did not from the increased exports to China.

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. 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

⁶ In previous literature, there are a number of papers that explored the determinants of Japanese business cycles by VAR. They include Bayoumi (2001), Braun and Shioji (2006), Miyao (2005), Shioji (2000), and Nakashima (2006). However, these studies did not explore the impacts of exports on production.

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

Our empirical results share a common view with these studies in that the increases in China's international trade had very different effects across industries. In Japan, increases in the exports to China had a large positive effect on the industries that produce high quality products. But they had no significant effect on industries that produce labor-intensive products. The overall effects, which are the sum of the positive effects and the negative effects, were dominated by the positive effects in the 2000s. Our results are, however, in contrast with most of recent studies that focused on the impacts of increased imports from China on Japanese economy.⁷ To support sustained recovery of Japanese economy, the role of increased exports to China had been indispensable in the early 2000s. The sustained recovery in the 2000s was accompanied by widening inequalities across firms in Japan not only because of increased imported from China but also because of increased exports to China.

The paper proceeds as follows. Section 2 investigates the impacts of increased exports on aggregate manufacturing production and discusses how they changed during the past decades. Section 3 compares the impacts of increased exports to China on production across 16 manufacturing industries. Section 4 explores the impacts of increased exports to China on small firms' production and Section 5 examines the impacts on tertiary industry activity. Section 6 investigates the effects of increased imports from China on aggregate manufacturing production. Section 7 summarizes our main results and discusses their implications.

2. The Impacts on Aggregate Manufacturing Production

The purpose of the following sections is to estimate the effects of exports on production in Japan. 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).

$$(1) \quad \Delta Y_t = \text{constant} + \sum_{i=1}^4 \alpha_{1,i} \Delta Y_{t-i} + \sum_{i=1}^4 \alpha_{2,i} \Delta P_{t-i} + \sum_{i=1}^4 \alpha_{3,i} \Delta EX_{t-i} + u_{1,t},$$

$$(2) \quad \Delta P_t = \text{constant} + \sum_{i=1}^4 \beta_{1,i} \Delta Y_{t-i} + \sum_{i=1}^4 \beta_{2,i} \Delta P_{t-i} + \sum_{i=1}^4 \beta_{3,i} \Delta EX_{t-i} + u_{2,t},$$

⁷ For example, see Weinstein and Broda (2008) and Kiyota (2008).

$$(3) \quad \Delta EX_t = \text{constant} + \sum_{i=1}^4 \gamma_{1,i} \Delta Y_{t-i} + \sum_{i=1}^4 \gamma_{2,i} \Delta P_{t-i} + \sum_{i=1}^4 \gamma_{3,i} \Delta EX_{t-i} + u_{3,t},$$

Except for the data, we follow the standard estimation method of VAR. We use 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 difference of these variables and take four lags for all variables. 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 the total exports, the exports to China, and the 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 a period when the exports to the United States were dominant in Japan's exports, while the latter period is a period when the exports to China increased dramatically.

Table 1 reports the estimated coefficients of the lagged exports in equation (1). If some of $\alpha_{3,i}$'s are statistically significant, we can conclude that exports caused production in the sense of Granger. When we use total exports, the estimated coefficients of exports with a two month lag are significantly positive in both periods. The result suggests that although it needs two months to diffuse the impacts, the exports have been one of the important determinants of Japan's business cycles throughout the two alternative periods.⁸

However, when we use the exports to the United States, the estimated coefficients of the exports with a two month lag were significantly positive in the former period but none of the estimated coefficients of the exports turned to be significant in the latter period. In contrast, when we use the exports to China, the estimated coefficients were close to zero in the former period and the estimated coefficients of the exports with a one and two month lags were significantly positive in the latter period. 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.

⁸ 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 5 reports accumulated impulse responses of manufacturing IIP to the total exports, to the exports to China, and to the exports to the USA based on the estimated VARs for the two alternative sample periods. When we use the exports to China, the impulse responses, which are computed for 10 periods, show very different features between the two periods (Figure 5-2). The responses were close to zero and statistically insignificant for the period from Jan. 1980 to Dec. 1994. But they exceeded 0.006 and 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 USA, the impulse responses show significantly positive responses in both periods (Figure 5-3). 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 USA declined during the last decade, although its significance is still not negligible.

Similarly, when we use the total exports, the impulse responses show significantly positive responses in both periods (Figure 5-1). 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 after 2002.

3. The Impacts on Industry-level Production

The increased dependence on the Chinese economy might have benefited several exporting sectors in Japan during the last decade. However, it might not have benefited all of Japanese firms. The increased role of China has had highly heterogeneous impacts on Japanese firms, depending on their industries. The purpose of this section is to investigate what impacts the exports to China had on production of each manufacturing industry.

The industries we investigate are 16 manufacturing industries: iron-steel, non-ferrous metals, fabricated metals, ceramics-stone-clay products, general machinery, electrical machinery, transport equipment, information -communication equipment, electronics parts and devices, precision instruments, textiles, pulp-paper products, plastic products, foods-tobacco, chemicals, and petroleum products. For each of these industries, we estimate VAR with three variables: industry-level production index ($Y_{j,t}$),

industry-level price index ($P_{j,t}$), and the aggregate exports to China (EX_t).

$$(4) \quad \Delta Y_{j,t} = \text{constant} + \sum_{i=1}^4 a_{1,i} \Delta Y_{j,t-i} + \sum_{i=1}^4 a_{2,i} \Delta P_{j,t-i} + \sum_{i=1}^4 a_{3,i} \Delta EX_{t-i} + v_{1,t},$$

$$(5) \quad \Delta P_{j,t} = \text{constant} + \sum_{i=1}^4 b_{1,i} \Delta Y_{j,t-i} + \sum_{i=1}^4 b_{2,i} \Delta P_{j,t-i} + \sum_{i=1}^4 b_{3,i} \Delta EX_{t-i} + v_{2,t},$$

$$(6) \quad \Delta EX_{j,t} = \text{constant} + \sum_{i=1}^4 c_{1,i} \Delta Y_{j,t-i} + \sum_{i=1}^4 c_{2,i} \Delta P_{j,t-i} + \sum_{i=1}^4 c_{3,i} \Delta EX_{t-i} + v_{3,t},$$

where j is the index of industry.

Except for the data, the estimation method remains the same as that in the last section. The monthly data series are based on industry-level IIP for the production index and industry level CGPI for the price index. However, aggregate exports are used for the exports to China. This is because our focus is to explore what impacts a rise of China had on each industry not only directly but also indirectly. The sample period is from Jan. 1998 to Dec. 2007.⁹ The data series of production and exports are seasonally adjusted.

Figure 6 reports accumulated impulse responses of each industry's production to the exports to China. The largest impacts were observed in general machinery that includes semiconductor and flat-panel display manufacturing equipment. The impulse responses exceed 0.015 in this industry.¹⁰ The second largest impacts were observed in electrical machinery and electronics, where the impulse responses exceed 0.008. The responses were also big in iron-steel, precision instruments, and information-communication equipment, where the accumulated impulse responses were around 0.006. These industries are those with advanced technology, where Japanese firms have had comparative advantage in international markets. A rise of China pumped up external demand in these industries.

However, the accumulated impulse responses were small in the other 10 industries. These industries include not only labor intensive industries such as textiles, pulp-paper products, plastic products, fabricated metals, non-ferrous metals, and foods-tobacco but also industries with standardized technology such as ceramics-stone-clay products, chemicals, and petroleum products. Although we still observe statistically significant responses in some industries, the impacts were around 0.002 in these industries. A rise of China deteriorated some firms' competition in international market. Increased

⁹ We start from Jan. 1998 because there was discontinuity of the industry classification in the data.

¹⁰ Note that unit of vertical axis in general machinery is different from those in the other industries.

imports from China took over some other firms' market shares in domestic market. Despite sustained recovery of aggregate production, the recovery was limited in these industries under a rise of China.

4. The Impacts on Small Firms' Production

In the last section, we found that the increased role of China had highly heterogeneous impacts across industries. However, it is also likely that the impacts are heterogeneous among Japanese firms with different sizes. A rise of China might have pumped up external demand to large manufacturing industries. However, a rise of China might have deteriorated small firms' competition both in international market and in domestic market. The purpose of this section is to investigate what impacts the total exports to China had on the production of small Japanese firms in each manufacturing industry.

As in the last section, we estimate VAR with three variables. Except for using industry-level production of small and medium size enterprises, the estimation method and the variables remain the same. The data of industry-level production is based on industry-level SIP, which provides the same industry classification as IIP. As in the last section, we investigate the production indexes of 16 manufacturing industries. The sample period is from Jan. 1998 to Dec. 2007.

Figure 7 reports accumulated impulse responses of small firms' production to the total exports to China in each industry. As in Figure 6, the largest impacts were observed in general machinery. However, the impulse responses, which were around 0.013, are smaller than those in Figure 6. This implies that the exports to China had smaller positive impacts on small firms than on large firms in general machinery. The second largest impacts were observed in electrical machinery and precision instruments, where the impulse responses are close to 0.01. In contrast with general machinery, these industries had the impulse responses that are larger than those in Figure 6. The responses were also big in iron-steel, electronics, and information-communication, where the accumulated impulse responses were almost similar to those in Figure 6. In these industries, even small firms have had advanced technology, so that a rise of China might have benefited Japanese firms regardless of firm sizes.

As in Figure 6, the accumulated impulse responses were small in the other 10 industries. The impulse responses are similar to those in Figure 6 in the industries such as ceramics-stone-clay products, chemicals, and petroleum products. However, they are smaller than those in Figure 6 in the industries such as fabricated metals,

non-ferrous metals, textiles, pulp, plastic products, and foods-tobacco. These industries are labor intensive industries where a rise of China deteriorated Japanese firms' competition both in international market and in domestic market. The smaller impacts may suggest that a rise of China did not benefit small firms in these industries.

5. The Effects on Tertiary Industry Activity

Until the last sections, we have explored the effects of the increased exports to China on manufacturing production in Japan. The analysis deserves to be noted because manufacturing production is a major source of business cycles in Japan. However, the share of total manufacturing industry in GDP has declined to nearly 20% in Japan. The share of tertiary industry activity in GDP, in contrast, has exceeded 70% (see Table 2). Exploring the impacts on tertiary industry activity is indispensable to understand a source of overall business cycles in Japan.

Although the effects were heterogeneous, the increased role of China increased external demand in manufacturing industries and improved their profitability in the 2000s. However, 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 tertiary industry activity in Japan.

As in the last section, we estimate VAR with three variables. For the production index, we use either overall tertiary industry activity (TIA) or production of service industry based on METI's Indices of Tertiary Industry Activity. For the price index, we use total price index in the bank of Japan's Corporate Services Price Index (CSPI, 2000 base). The sample period is from Jan. 1995 to Dec. 2007.

Figure 8 reports accumulated impulse responses of tertiary industry activity to the exports to China. For comparison, it also reports the corresponding responses of aggregate production of all manufacturing enterprises and those of small and medium enterprises. The responses in small manufacturing firms are smaller than those in manufacturing industry. But, the responses in tertiary industry activity are far below from them. The result does not change even when we use production of service industry for the production index. This suggests that the exports to China had least positive impacts on non-manufacturing firms most of which produce non-tradable goods. Under sustained recovery, dramatic increases of external demand was irrelevant for most of non-manufacturing firms

However, comparing with Figure 7, the accumulated impulse responses in tertiary industry activity are not so different from those in labor-intensive small manufacturing firms. The exports to China had least positive impacts not only on non-manufacturing firms but also on small labor intensive manufacturing firms under sustained recovery in the 2000s.

6. The Effects of Imports from China

Until the last section, we have investigated the impacts of increased exports from China on Japanese economy. A rise of China, however, increased not only exports from Japan to China but also imports of Japan from China. The purpose of this section is to examine what impacts increased imports from China had on aggregate industrial production in Japan. We estimate the following VAR that consists 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).

Except that the imports from China are added as additional variables, the estimation method and the data are the same as those in Section 2. 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, the data series are seasonally adjusted. We use logged difference of these variables and take four lags for all variables. 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.

Table 3 reports the estimated coefficients of lagged exports and imports in the following equation:

$$(7) \quad \Delta Y_t = \text{constant} + \sum_{i=1}^4 \delta_{1,i} \Delta Y_{t-i} + \sum_{i=1}^4 \delta_{2,i} \Delta P_{t-i} \\ + \sum_{i=1}^4 \delta_{3,i} \Delta EX_{t-i} + \sum_{i=1}^4 \delta_{4,i} \Delta IM_{t-i} + \varepsilon_t,$$

If some of $\delta_{4,j}$'s are statistically significant, we can conclude that the imports from China caused production in the sense of Granger. Even when we include the imports from China as explanatory variables, the estimated coefficients of the exports to China are significantly positive with one and two month lags. However, none of the estimated coefficients of the imports from China are statistically significant. The

result suggests that in contrast with the exports to China, the imports from China have not had significant impacts on Japan's business cycles during the last decade.

Figure 9 reports accumulated impulse responses of aggregate industrial production to the 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 exports to China, the imports from China have increased dramatically in Japan during the last decade. The accumulated impulse responses, however, suggest that unlike the exports to China, the imports from China had no significant impacts on aggregate manufacturing production in Japan during the last decade.

Increased imports from China may have negative effects on Japan's production through substituting production in labor intensive industries. However, increased imports from China may benefit Japanese firms which 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 each other and had ambiguous impacts on aggregate production in Japan during the last decade.

7. Concluding Remarks

In this paper, we examined the role of Japanese exports to China for the recovery in the 2000s. The dependence of the Japanese export sectors on the Chinese economy has risen during the past ten years. Our VARs showed that the Japanese production, which had been caused by exports to the United States until the mid-1990s, started to be caused by exports to China after the late 1990s. However, the effects on the production were highly different across sectors. The increased exports to China were beneficial for the recovery of large firms in manufacturing industries with advanced technology. They also had beneficial impacts on small firms with advanced technology. Their impacts were, in contrast, insignificant for the recovery of labor-intensive small firms and of non-manufacturing firms. Consequently, the sustained growth during the last several years was accompanied by widening inequalities across sectors. The results suggest that the rise of China is an opportunity for several large firms with advanced technology but a threat to other Japanese firms, particularly labor-intensive small firms.

Heterogeneous effects across firms in different industries and with different firm sizes 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. Some policy that mitigates the adjustment costs may increase complementarities between Chinese economy and Japanese economy.

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Table 1. The Effects of Exports on Industrial Production

(1) Sample : 1980M06 1994M12

	total export	export to China	export to US
Export(-1)	0.002 [0.072]	-0.012 [-1.244]	-0.008 [-0.378]
Export(-2)	0.124 [3.500]**	0.009 [0.862]	0.065 [2.904]**
Export(-3)	-0.003 [-0.078]	0.003 [0.310]	0.018 [0.763]
Export(-4)	-0.006 [-0.181]	0.003 [0.325]	0.009 [0.431]
Adj. R-squared	0.331	0.269	0.302

(2) Sample: 1995M01 2007M12

	total export	export to China	export to US
Export(-1)	0.047 [1.223]	0.039 [3.025]**	-0.020 [-0.875]
Export(-2)	0.075 [1.917]*	0.058 [4.037]**	-0.001 [-0.061]
Export(-3)	0.019 [0.467]	0.016 [1.075]	-0.009 [-0.371]
Export(-4)	0.055 [1.430]	0.005 [0.349]	0.012 [0.541]
Adj. R-squared	0.210	0.276	0.184

Note: The estimated coefficients of the other explanatory variables are not shown in the table to economize the space.

Table 2. Gross Domestic Product classified by Economic Activities (at current prices)

Items	Percentage distribution (%)		
	1996	2001	2006
1. Industries	93.5	92.7	91.7
(1) Agriculture, forestry and fishing	1.9	1.7	1.5
(2) Mining	0.2	0.1	0.1
(3) Manufacturing	23.2	20.9	21.3
(4) Construction	8.2	7.1	6.3
(5) Electricity ,gas and water supply	2.7	2.8	2.2
(6) Wholesale and retail trade	15.0	14.0	13.5
(7) Finance and insurance	6.2	6.4	6.9
(8) Real estate	10.8	11.8	11.9
(9) Transport and communications	7.0	6.9	6.6
(10) Service activities	18.4	20.8	21.4
2. Producers of government services	8.6	9.3	9.3
3. Producers of private non-profit services to households	1.8	1.8	2.1
Gross domestic product	100.0	100.0	100.0

Notes 1) Year is based on Calendar Year.

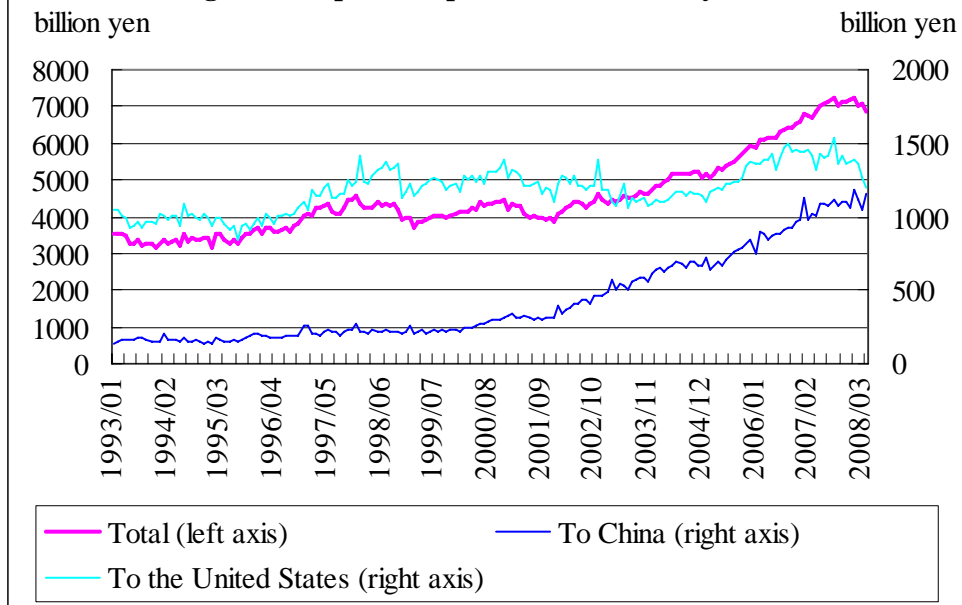
2) Tertiary industry activities are the sum of (4), (5), (6), (7), (8), (9), and (10).

Table 3. The Effects of Exports to China and Imports from China

dependent variable = aggregate manufacturing IIP		
explanatory var	export to China	imports from China
lag 1	0.039 [3.083]**	0.015 [1.015]
lag 2	0.052 [3.585]**	-0.018 [-0.857]
lag 3	0.017 [1.156]	0.006 [0.283]
lag 4	0.005 [-0.103]	0.012 [0.833]
Adj. R-squared	0.213	

Note: The estimated coefficients of the other explanatory variables are not shown in the table to economize the space.

Figure 1. Japan's Exports since the Early 1990s



**Figure 2. Coincident Composite Index in Japan
(2005 = 100)**

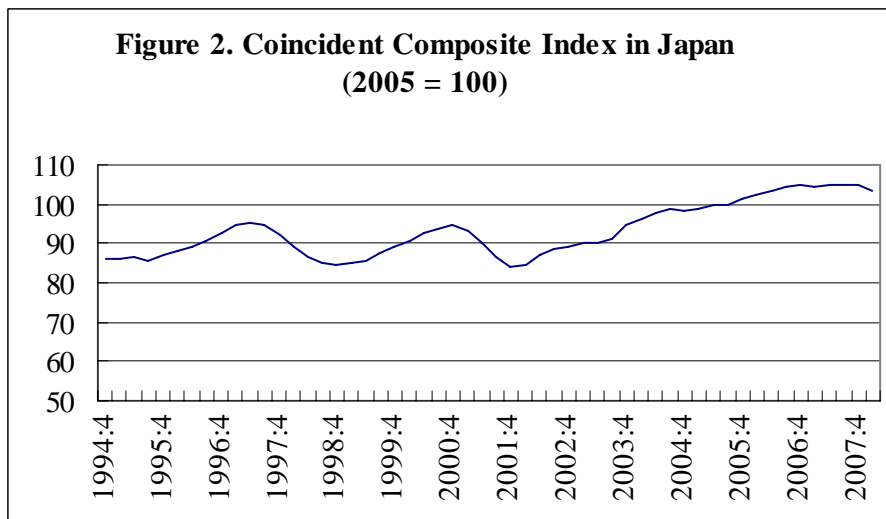


Figure 3. Industrial Production Index (2000 = 100)

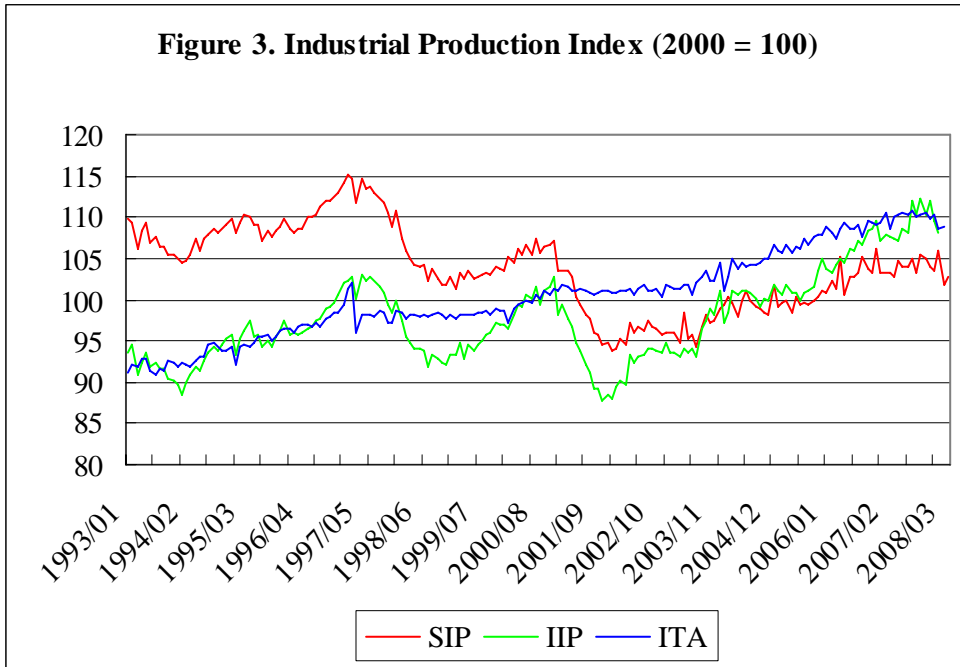


Figure 4. Diffusion Index of Tankan Business Survey

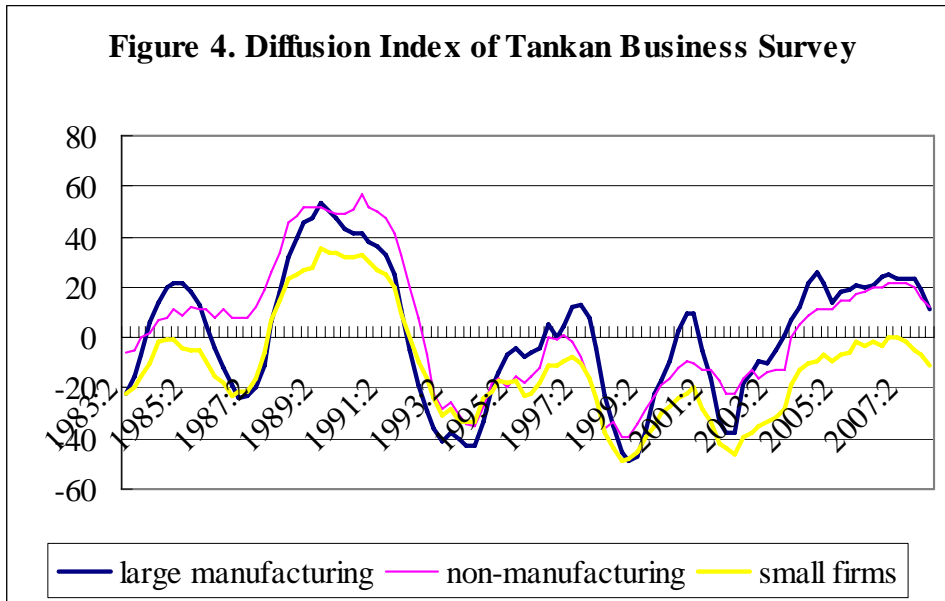


Figure 5-1. Accumulated Impulse Responses of manufacturing IIP to the Total Exports

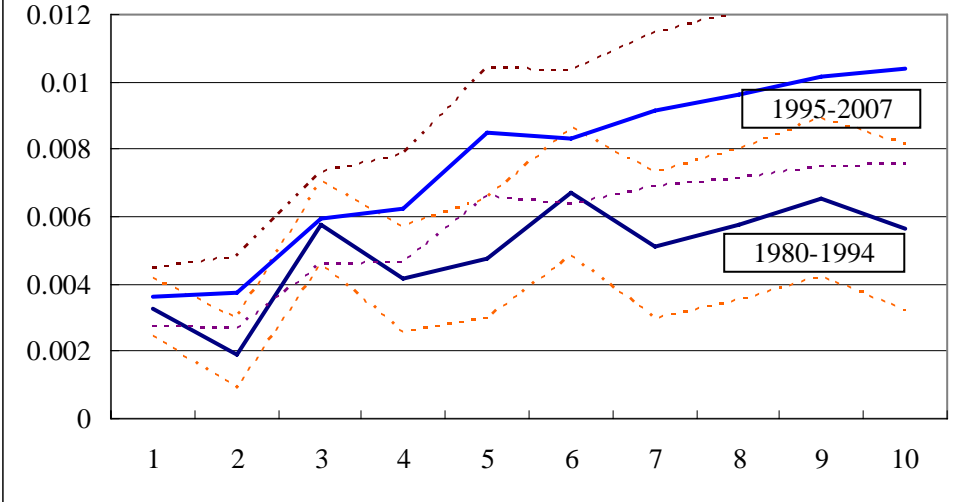
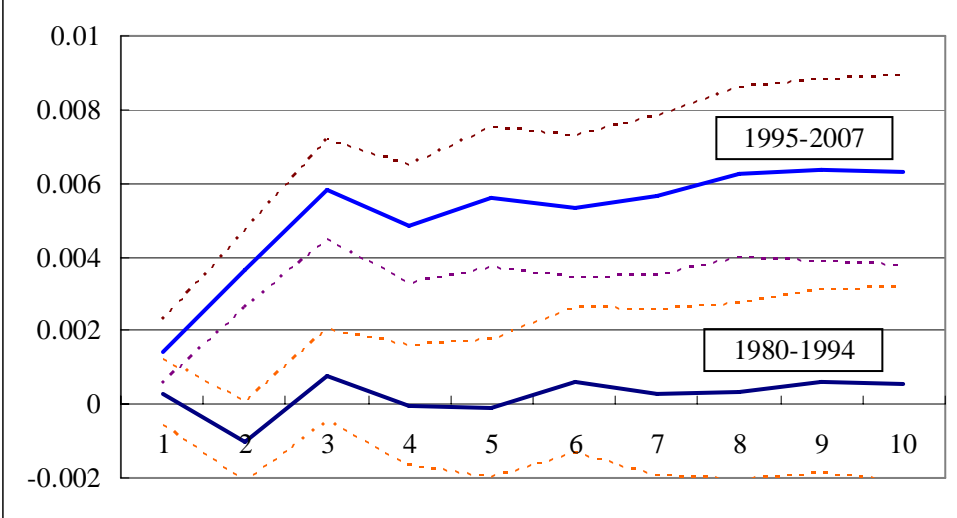
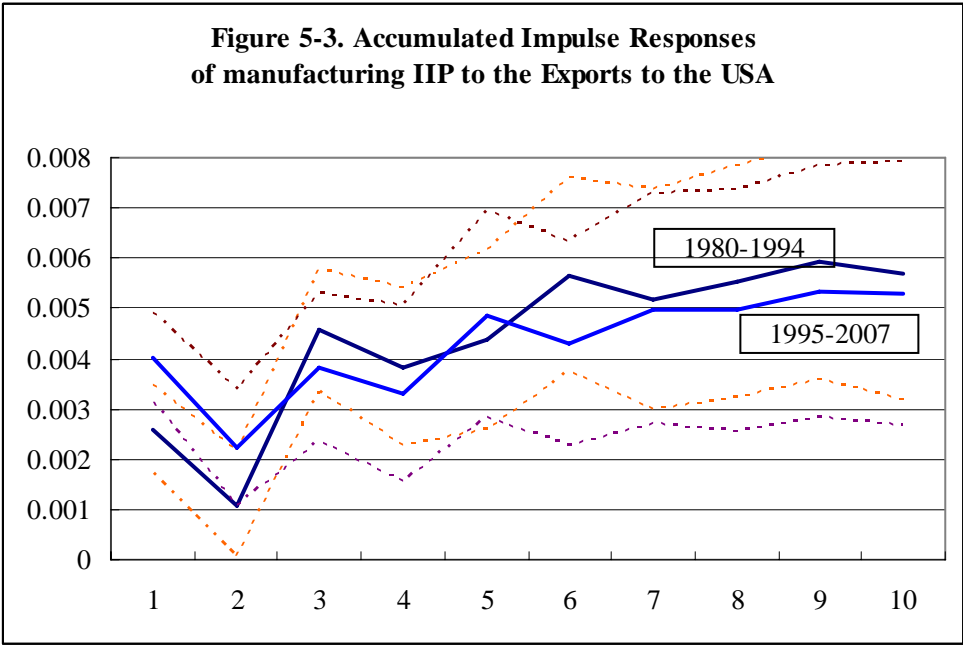


Figure 5-2. Accumulated Impulse Responses of manufacturing IIP to the Exports to China





Note: Dotted lines denote $\pm\sigma$ respectively.

Figure 6. Accumulated Impulse Responses of Industry-level Production



Figure 6. Accumulated Impulse Responses of Industry-level Production (continued)

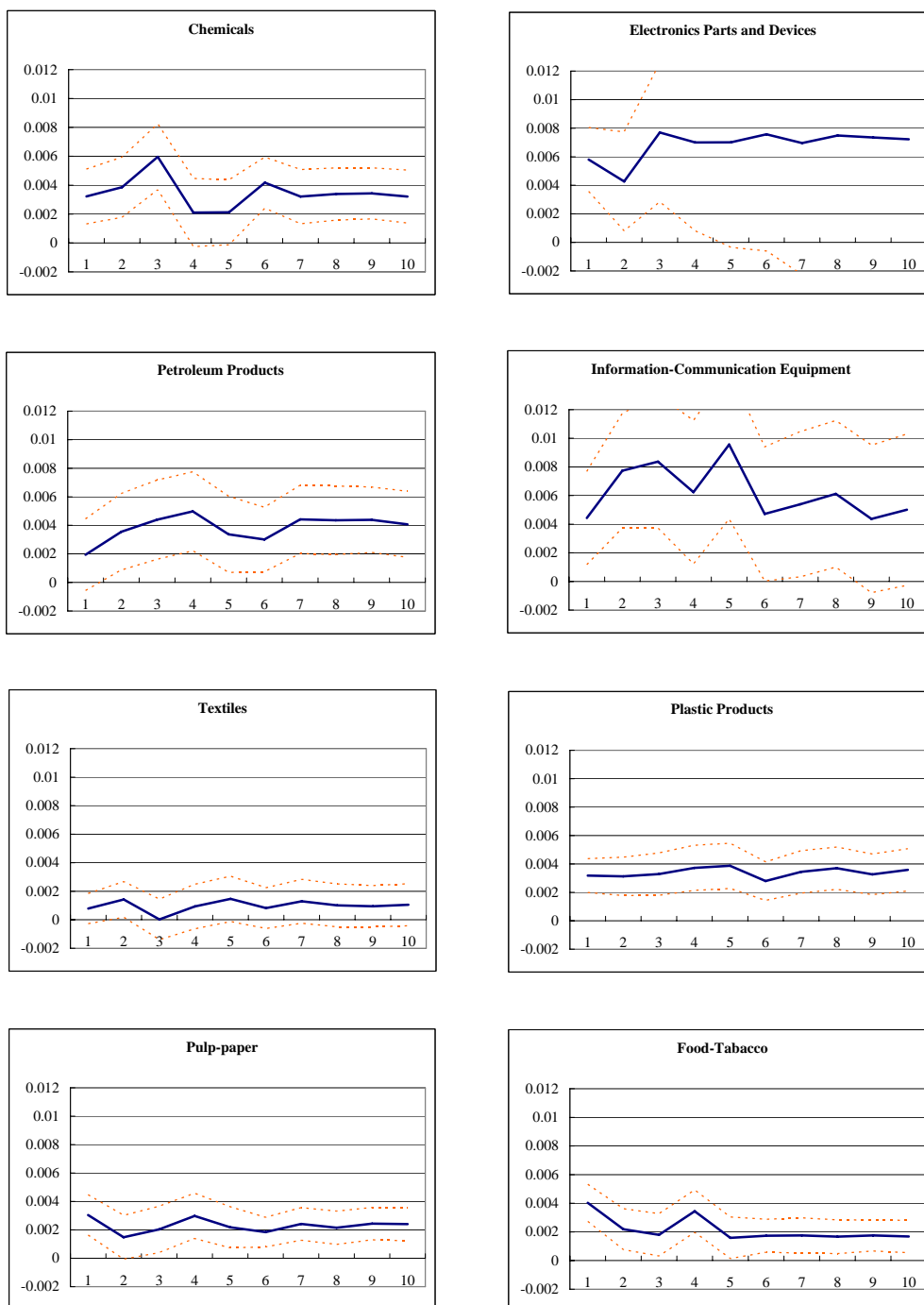


Note: Dotted lines denote $\pm\sigma$ respectively.

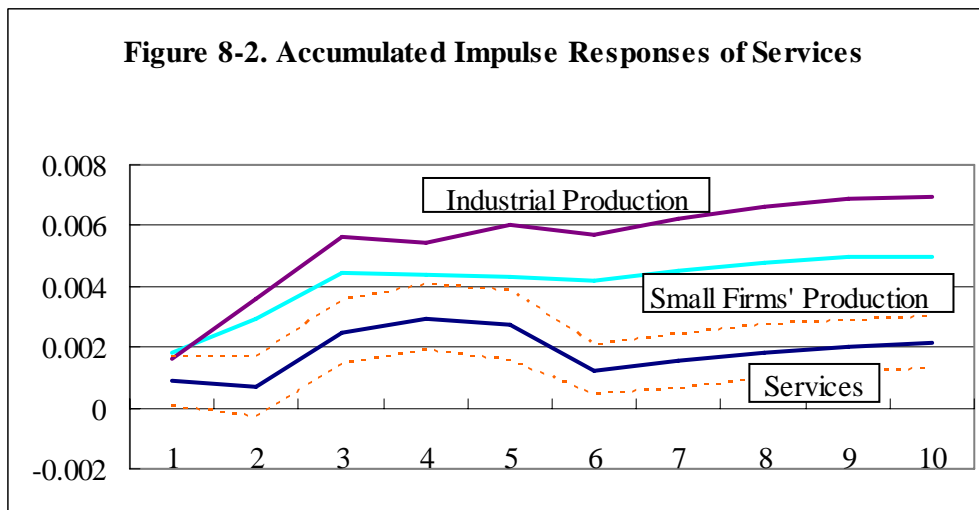
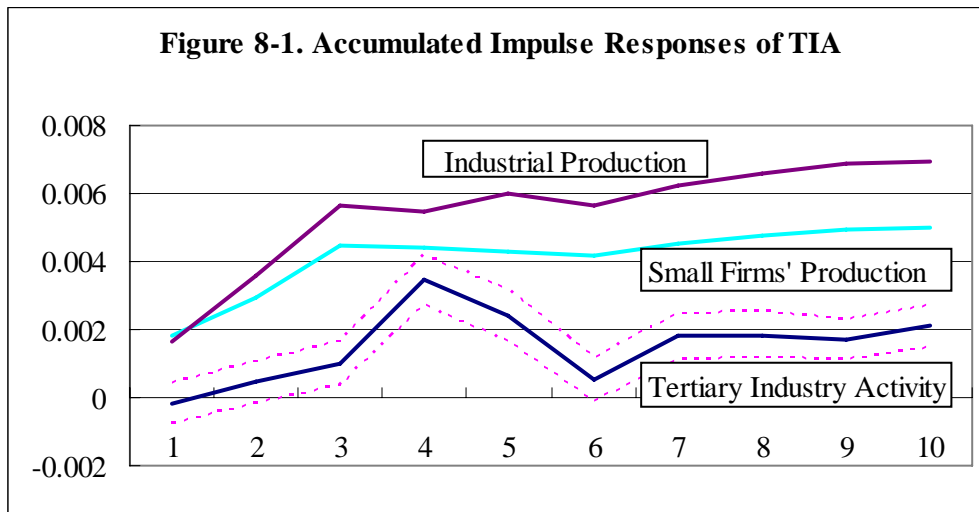
Figure 7. Accumulated Impulse Responses of Small Firms' Production



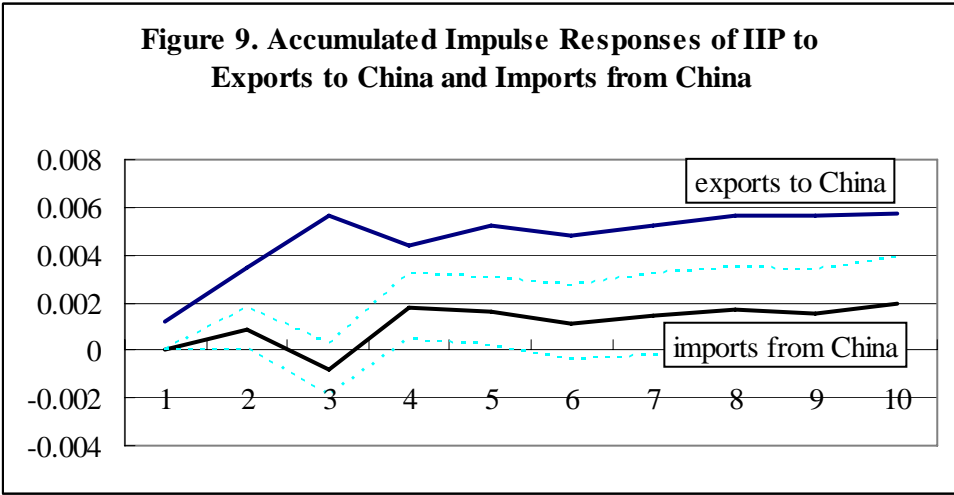
Figure 7. Accumulated Impulse Responses of Small Firms' Production (continued)



Note: Dotted lines denote $\pm\sigma$ respectively.



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



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