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Working Paper

Why was Japan hit so hard by the global financial crisis?

ADB Working Paper, No. 153

Provided in Cooperation with:

Asian Development Bank Institute (ADBI), Tokyo

Suggested Citation: Kawai, Masahiro; Takagi, Shinji (2009) : Why was Japan hit so hard by the global financial crisis?, ADB Working Paper, No. 153, Asian Development Bank Institute (ADBI), Tokyo

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ADB Working Paper Series

**Why was Japan Hit So Hard by
the Global Financial Crisis?**

Masahiro Kawai and Shinji Takagi

No. 153
October 2009

Asian Development Bank Institute

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Suggested citation:

Kawai, M., and S. Takagi. 2009. Why was Japan Hit So Hard by the Global Financial Crisis? ADBI Working Paper 153. Tokyo: Asian Development Bank Institute. Available: <http://www.adbi.org/working-paper/2009/10/05/3343.japan.gfc/>

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Abstract

Japan was hit hard by the global financial crisis even though its relatively resilient financial system initially limited the direct impact. The severe collapse of industrial production that followed was no doubt attributable to a confluence of factors, but the paper highlights the impact that came from the contractionary effect of global deleveraging on the real economy. In this environment, Japan was particularly vulnerable because of the structural changes that had taken place over the past decade in its trade and industrial structures. Vector autoregression analysis confirms that, as a result of these structural changes, Japanese output became much more responsive to output shocks in the advanced markets of the United States and Western Europe.

The structural changes had two components. First, over 90% of Japan's exports consisted of highly income-elastic industrial supplies, capital goods, and consumer durables. Though emerging Asia is Japan's largest export market, its imports from Japan largely consist of intermediate goods used in the production of final goods destined for the US and Western Europe. Second, Japan's trade dependence had increased since the early 2000s, as evidenced by a rising export to gross domestic product ratio and a declining share for the non-tradable sector. Though increasing trade openness is a natural part of economic globalization and regional integration, the manner in which this process had played out made Japan particularly vulnerable to a negative demand shock coming from outside.

To make Japan more resilient to external shocks, policymakers could promote the export of finished goods to emerging Asia by establishing a region-wide free trade arrangement. To promote domestic demand, the social protection system needs to be strengthened so as to reduce households' uncertainty for the future; a more liberal immigration policy should help invigorate private investment in an aging society. To facilitate a better allocation of resources, further deregulatory measures in the more regulated non-tradable goods sector are called for; a substantial lifting of restrictions in agriculture, especially regarding the corporatization of production, would be especially helpful. With little available fiscal space, these measures will help create a climate in which private investment can flourish, driven by final domestic demand.

JEL Classification: F40, F41

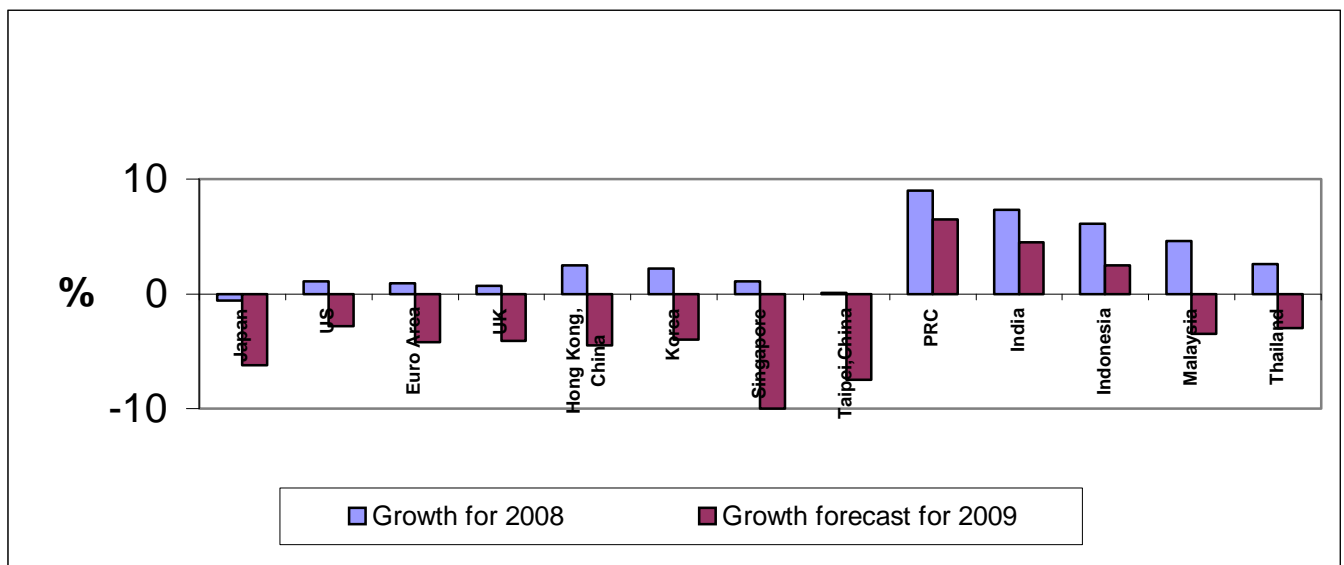
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1. INTRODUCTION

Japan was hit hard by the global financial crisis of 2008-2009; it was the only major advanced economy that experienced negative economic growth in 2008 and continues to contract sharply in 2009 (Figure 1). Although most advanced countries are now in recession, according to the latest World Economic Outlook (IMF, 2009a), the economic contraction that Japan will likely experience in 2009 (-6.2%) is forecast to surpass the projected contractions for the United States (US) (-2.8%), the Euro Area (-4.2%),¹ and the United Kingdom (-4.1%), where the financial crisis for the most part originated. Among the major economies, Japan is only surpassed by Singapore (-10.0%) and Taipei,China (-7.5%) in the severity of the real impact of the global financial crisis.

Figure 1: Economic Growth for Selected Countries in 2008 and 2009 (in %, annual change)



Source: International Monetary Fund (IMF) (2009a).

When the US subprime loan problem came to the surface in the summer of 2007, many observers thought that Japan was immune to the subsequent global deleveraging, given its limited exposure to “toxic” assets. Indeed, various indicators suggested that the direct financial impact of the global financial crisis on Japan was relatively small. In fact, Japan’s banking sector in particular was hardly affected directly, as was evident in the small estimated value of write-downs and the limited cost of public sector support which were only a fraction of the corresponding amount in the US and Europe (Table 1).

¹ The Euro area includes 16 countries: Austria, Belgium, Cyprus, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, Malta, the Netherlands, Portugal, Slovakia, Slovenia, and Spain.

Table 1: The Direct Impact of the Global Financial Crisis on the US, Europe, and Japan

	Credit-related write-downs in the banking sector (in billions of US dollars) ^a	Public outlays for the banking sector (in billions of euro) ^b
US	2,712	825
Europe ^c	1,193	1,116
Japan	149	3

Notes:

^a IMF Estimates for 2007-10, as of April 2009.

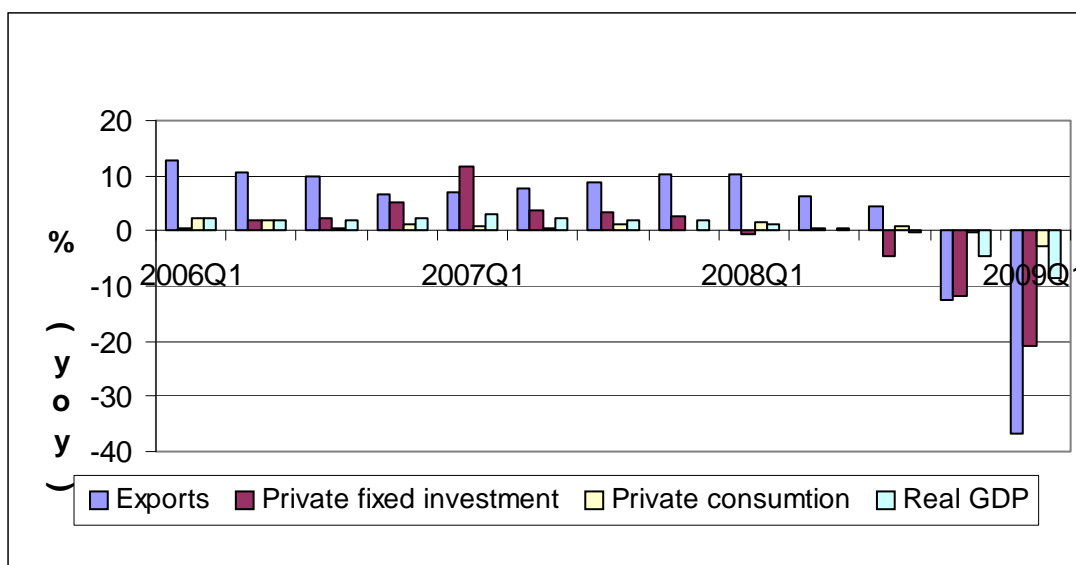
^b The magnitude of government actions taken up to 10 June 2009, to intervene in the banking sector.

^c Europe means France, Germany, Italy, the Netherlands, Spain, Switzerland, and the United Kingdom.

Sources: International Monetary Fund (2009b), Table 1.3; Bank for International Settlements (2009), Table 1.2.

When the US and much of Europe went into recession in early 2008 (Bosworth and Flaaen 2009; Wyplosz 2009), Japan’s real economy did not seem to be affected materially. However, Japan was adversely affected by the large negative terms of trade shock in 2008, with a sharp increase in energy and other commodity prices, but it still maintained positive growth in real gross domestic product (GDP) and private fixed investment through the second quarter; export growth was steady through the third quarter (Figure 2). It was only in the fourth quarter that the evidence of a severe economic contraction was apparent, with a 12.5% (year-on-year) fall in exports. This was followed by a 36.8% fall in the first quarter of 2009. Similarly, industrial production also contracted sharply; it declined by 15.0%, 34.0% and 27.6% (year-on-year) in the fourth quarter of 2008 and the first and second quarters of 2009, respectively. This decline was one of the worst among the major developed countries—in Europe and North America—and Asian economies. When Japan was finally hit, the impact was indeed very severe.

Figure 2: Growth Rates of GDP and Its Components



Source: Japan Cabinet Office (available: www.esri.cao.jp/jpsna).

Why was Japan hit so hard by the global financial crisis when its financial system was considered much more robust than those in other developed countries? The rest of this paper attempts to offer an explanation in the following sequence. Section 2 describes what happened in terms of manufacturing production and exports. Section 3 argues that the sharp contraction of economic activity occurred largely as a result of the structural changes in the Japanese economy that had taken place over the past decade. Section 4 quantifies the impact of the structural changes on the responsiveness of Japanese output to global

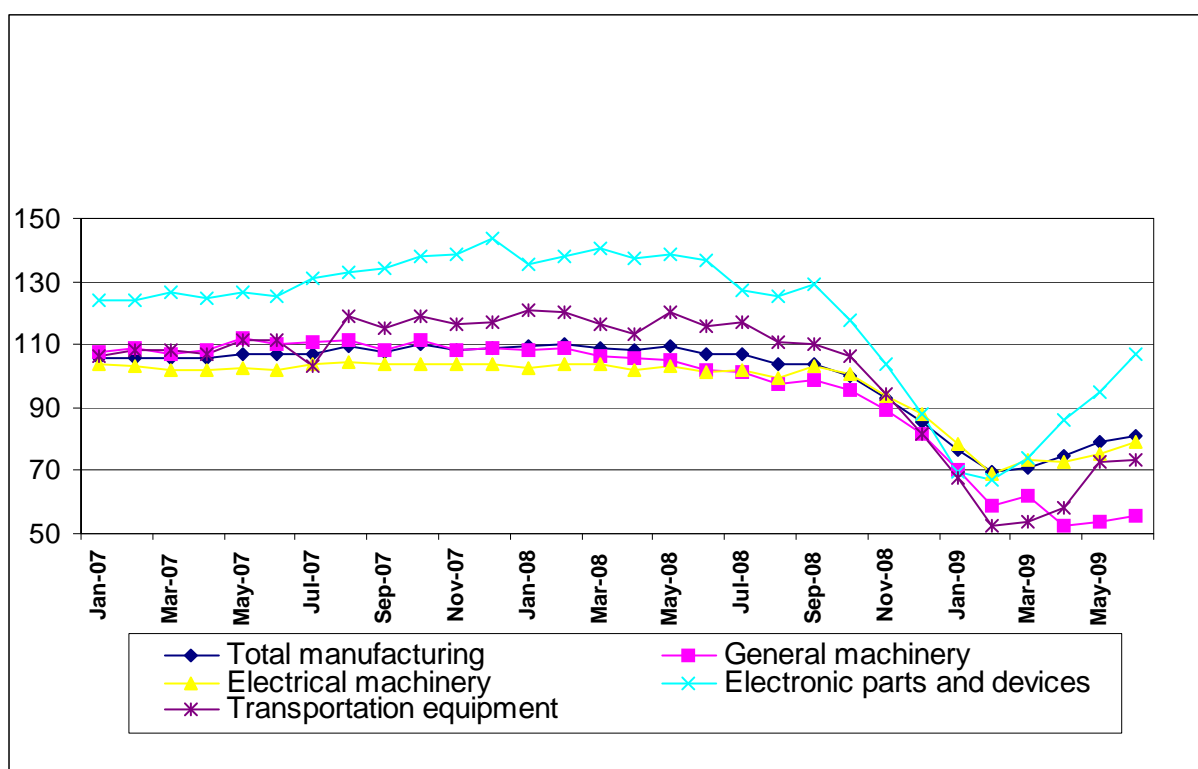
demand shocks by using a vector autoregression (VAR) model of the world economy. Finally, Section 5 offers concluding remarks.

2. WHAT HAPPENED?

Japanese stock prices reached a recent peak in the summer of 2007 and, with the outbreak of the US subprime loan crisis, began a gradual but substantial decline through the fall of 2008. The decline in stock prices placed a strain on the balance sheet and capital adequacy ratios of commercial banks and, as a result, limited their willingness to lend by the summer of 2008. The Lehman Brothers shock in September 2008 further depressed the stock market and aggravated the strains on Japanese commercial banks. Bank of Japan data indicate that new loans for equipment funds declined by 9% (year-on-year) in the third quarter of 2008, followed by a 10% decline in the fourth quarter. This, coupled with the lagged impact of the negative terms of trade shock (arising from the sharp rise in oil and other commodity prices until the summer of 2008), may to some extent explain the sluggishness of industrial activity in some sectors starting from the summer of 2008 (see below).

Even so, overall manufacturing production held up through September and October 2008 (Figure 3). Notable exceptions were electronic parts and devices as well as transportation equipment, the production of which had shown earlier signs of softening. In November, however, manufacturing production collapsed precipitously in all major sectors (from 100 in October to 93, seasonally adjusted). Overall manufacturing production continued to fall and reached 70 in February 2009 before recovering somewhat. The collapse was even more spectacular for transportation equipment (52 in February 2009 compared with 110 in September 2008) and general machinery (59 compared with 99). The production of general machinery remained depressed even after production began to pick up in other sectors from the spring of 2009.

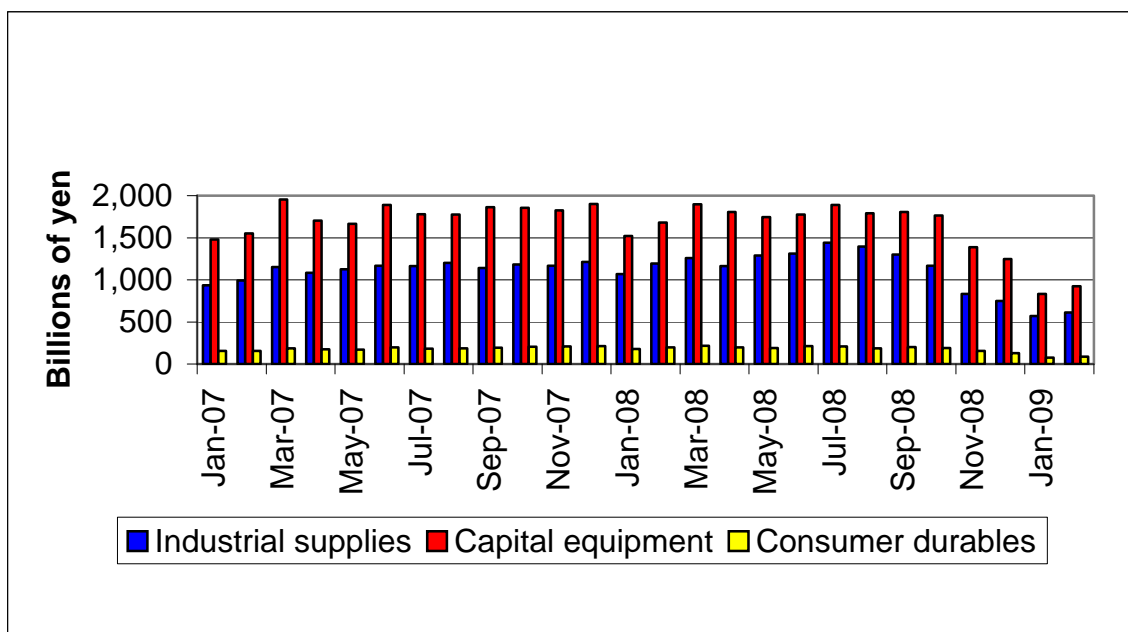
Figure 3: Japanese Industrial Production (2005=100)



Source: Ministry of Economy and Industry (available: www.meti.go.jp/statistics/tyo/iip).

The downward movement of industrial production closely followed the downward movement of exports. Although the major factor behind the collapse of Japanese exports was a worldwide shrinkage of demand and trade following the Lehman shock, the sharp appreciation of the yen was an additional blow to Japan's export-oriented firms.² The total value of exports, which stood at 7,360 billion yen (¥) in September 2008, declined moderately to ¥6,915 billion in October and collapsed thereafter. Exports in January 2009, at ¥3,480 billion, were less than 50% of the previous peak in September 2008. The decline was across the board, but most pronounced in the export of industrial supplies, capital equipment, and consumer durables, Japan's three main categories of export products (which together account for over 90% of Japan's total exports). The decline was also registered not only for exports to the US and Western Europe (which together account for over 40% of Japan's total exports), where the financial crisis originated, but also for exports to emerging and developing Asia, Japan's largest export market now accounting for over 50% of total exports (Figures 4–6).

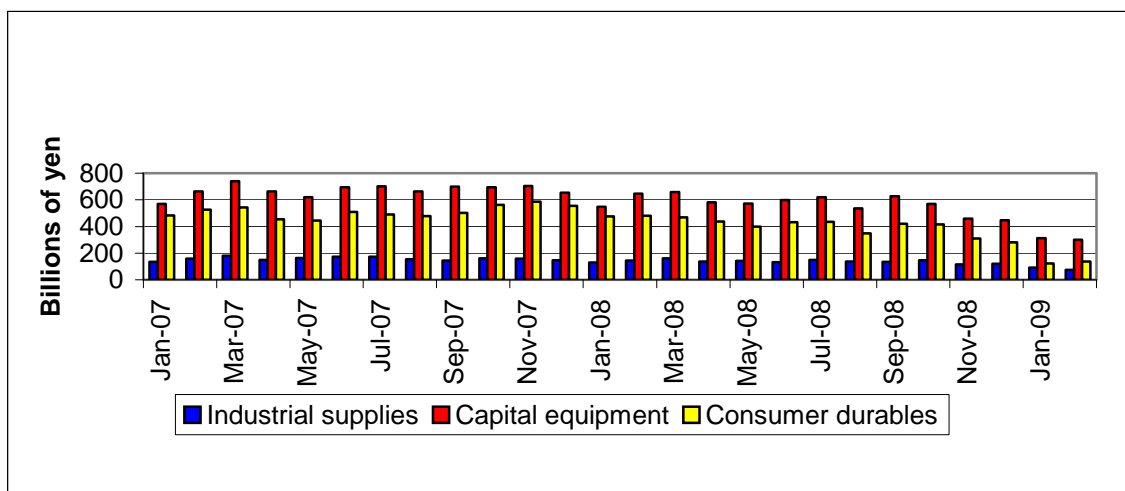
Figure 4: Japanese Exports to Emerging Asia by Product Category



Sources: Japan Tariff Association (2007, 2008, and 2009) (available: kanzei.or.jp/English/index.htm).

² The nominal value of the yen appreciated by 17% against the US dollar and by 27% against the euro, from September 2008 to January 2009.

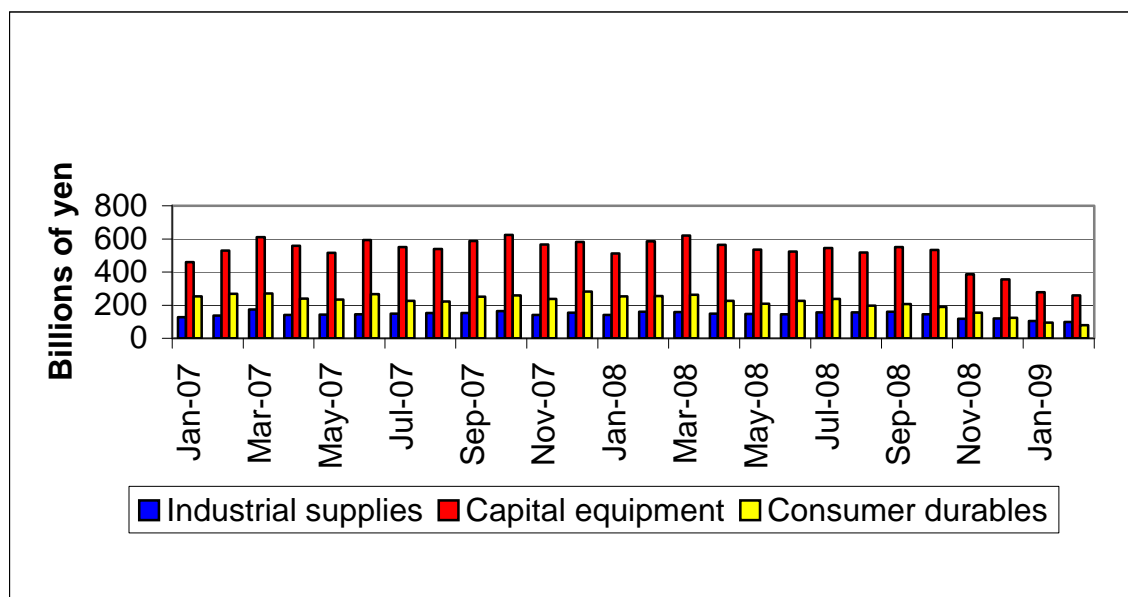
Figure 5: Japanese Exports to the US by Product Category



Sources: Japan Tariff Association (2007, 2008, and 2009) (available: kanzei.or.jp/English/index.htm).

Figure 6: Japanese Exports to Western Europe by Product

Product



Sources: Japan Tariff Association (2007, 2008, and 2009) (available: kanzei.or.jp/English/index.htm).

Of the decline in exports of ¥3,880 billion from September 2008 to January 2009, emerging (and developing) Asia accounted for over 51%, which is roughly the share of emerging Asia in Japan’s total exports. This implies that Japanese exports collapsed almost uniformly across destination markets. The composition of export declines, however, differed across regions, reflecting the different content of trade. Within emerging Asia, 86% of the decline was in industrial supplies and capital goods, whereas this share for the US and Western Europe was smaller at 60%. On the other hand, only 6% of the export decline for emerging Asia was consumer durables, while the share for the advanced markets was larger at 36%.³ This is a reflection of the fact that, though emerging Asia is the largest export market, it is not

³ US imports, on a customs basis, declined by more than 30% from July to December 2008; the import of transportation equipment showed an even sharper decline of about 40%.

the dominant market for consumer durables; more consumer durables are shipped to the advanced markets of the US and Western Europe.

Essentially, the export of industrial supplies and capital goods to emerging Asia was most severely affected as the region's demand for Japanese parts, components, and capital goods—all critical inputs for the production of final consumer products—declined steeply. Japan was affected by the shrinkage of “triangular trade” where Japan and the Asian newly industrialized economies (the Republic of Korea (hereafter Korea), Singapore, and Taipei,China) export parts and components to the PRC and other emerging Asian economies, which in turn assemble them to produce final products for the US and European markets. Thus, Japanese exports collapsed because both the export of consumer durables to the advanced markets and the export of industrial supplies and capital goods to emerging Asia fell sharply, as a consequence of the contraction of private consumption and the softening of investment spending in the US and Europe.

3. WHY IT HAPPENED

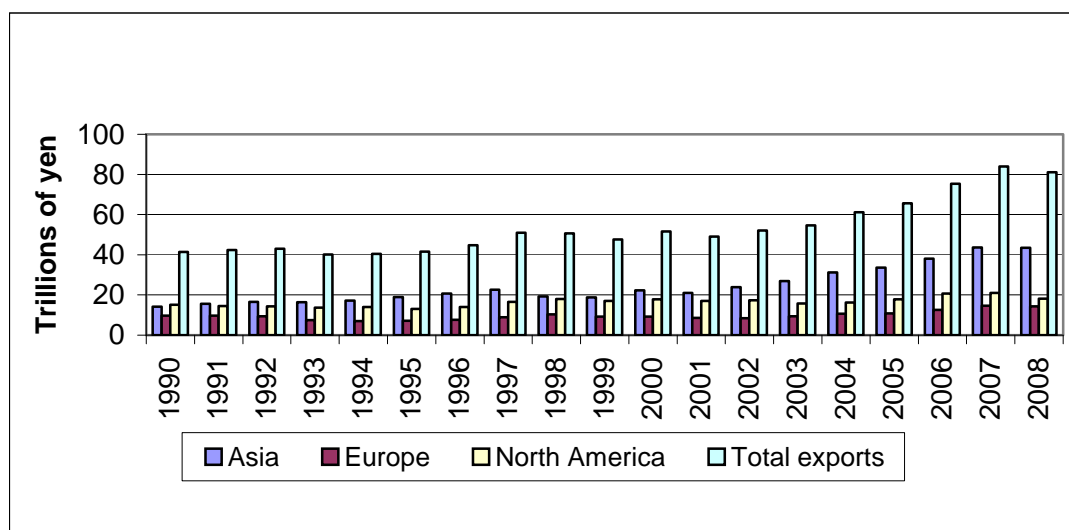
There are two aspects to the mechanism whereby Japan's output was so much affected by the collapse of exports in late 2008 and early 2009, Japan's trade structure and its industrial structure. We will examine each of these.

3.1 Japan's Trade Structure

As noted in the previous section, over 90% of Japanese exports consist of highly income-elastic industrial supplies, capital goods, and consumer durables. Hence a collapse of the US and European markets exerted a severe negative influence on Japanese exports. Japan was not alone in this. Sommer (2009) shows that economies with a greater share of advanced manufacturing in GDP tended to experience sharper output declines than others, with Singapore and Taipei,China belonging to this group of economies. In Japan, as discussed above, both the export of consumer durables to the advanced markets (accounting for less than 15% of total exports) and the export of industrial supplies and capital goods to emerging Asia (constituting over 40% of total exports) were adversely and severely affected by the financial crisis. In particular, the export of industrial supplies and capital goods declined along with the softening of investment demand throughout the world.

Much has been said about the recent growth of intra-regional trade within Asia (see Kawai and Urata 2004; Takagi and Kozuru 2009). For example, within the member countries of the Association of Southeast Asian Nations (ASEAN), the PRC, Japan, and Korea (ASEAN+3), the share of intra-regional trade rose from around 30% during 1980-1990 to over 38% in 2006; with Hong Kong, China and Taipei,China included, the share was almost 55%. Closely related to intra-regional trade is intra-regional foreign direct investment (FDI), which has recently accounted for as much as half of the region's total FDI. Direct investment in plant and equipment has created production networks and supply chains in industries such as electronics, automobiles, and other machinery products, that cut across national borders—a flipside of the growing intra-regional trade. Japan has been the center of this increasing intra-regional trade, mainly in parts, components, and capital equipment. This explains why Japanese exports to emerging Asia expanded sharply over the last two decades (Figure 7), with the share of exports to emerging Asia in total exports rising from 34% in 1990 to 54% in 2008.⁴

⁴ In contrast the share of exports to the US and Europe declined precipitously from 55% to 35% over the same period.

Figure 7: Japanese Exports by Destination

Sources: Japan Tariff Association, The Summary Report of Trade of Japan, Monthly issues 1990–2009. (Available: kanzei.or.jp/English/index.htm.)

3.2 Japan's Industrial Structure

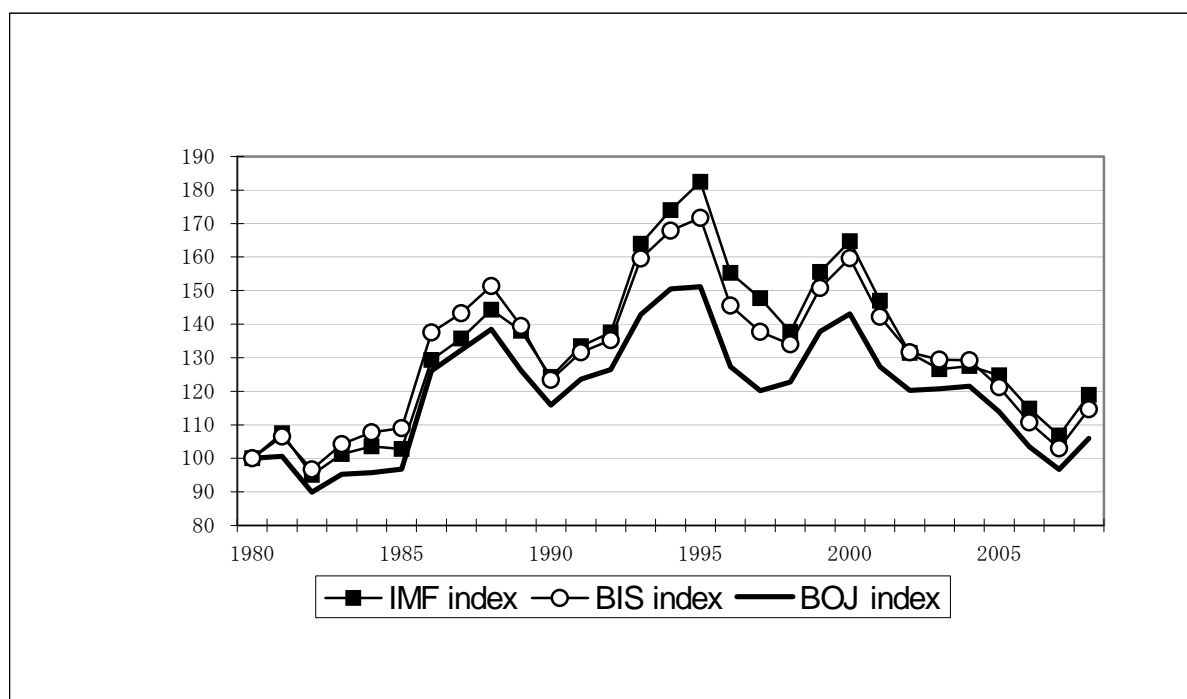
The industrial structure of Japan has undergone significant changes over the past twenty years. In particular it changed since around 2005 as the real effective exchange rate of the yen finally returned to a level more consistent with the long-run average (Figure 8). The yen, which had begun to appreciate in real effective terms in early 1985, peaked in 1995 when the level was some 80% higher than in 1980. Then the yen began to decline as a trend until 2007, except for the brief 1999–2001 period when the value rose temporarily.⁵

⁵ When the yen began to appreciate sharply following the Plaza Accord, there was a contraction of manufacturing activity. The Japanese policymakers reacted by expanding both fiscal and monetary policies. Coupled with the favorable terms of trade changes (caused by a fall in energy and commodity prices) at the time, these policy actions allowed economic growth to pick up from the fall of 1987 but subsequently led to the emergence of a bubble economy, with sharp rises in stock, real estate and other asset prices. Monetary policy then was reversed.

With a bursting of the bubble economy in 1991, the Japanese economy decelerated and, in 1992, entered a prolonged period of stagnation. Annual growth over the next decade averaged less than 1% , compared with over 4% during the previous decade. Growth appeared to pick up in 1995–1996, only to fall back. In 1998, in the midst of a systemic banking crisis, a severe recession set in and the economy contracted in 1998 and 1999. The stagnation was compounded by sustained deflationary pressure; annual Consumer Price Index inflation averaged less than 1% over the “lost decade.” Although annual economic growth finally exceeded 2% in 2003 and 2004, this moderate recovery did not end the deflation. The corporate goods price level was 13 % lower in 2003 than in 1991.

During the prolonged period of stagnation, the authorities eased both fiscal and monetary policies substantially to support domestic demand and to fend off deflationary pressure. The general government balance, which was in small surpluses in the early 1990s, deteriorated sharply; it has been in deficit every year since 1993—with deficits exceeding 7% of GDP in virtually every year from 1999 to 2003. As a result, the balance of gross public debt rose from about 70% of GDP in the early 1990s to over 180% in 2005. As to monetary policy, the BOJ lowered the discount rate in several steps from 4.5% in December 1991 to 0.5% in September 1995. With no additional room left to maneuver, in February 1999, it reduced the overnight call rate to virtually zero, a policy it continued to follow until March 2006, except for the brief period of August 2000–March 2001. A new framework of “quantitative easing”—with the de facto “zero” policy rate—was adopted in March 2001.

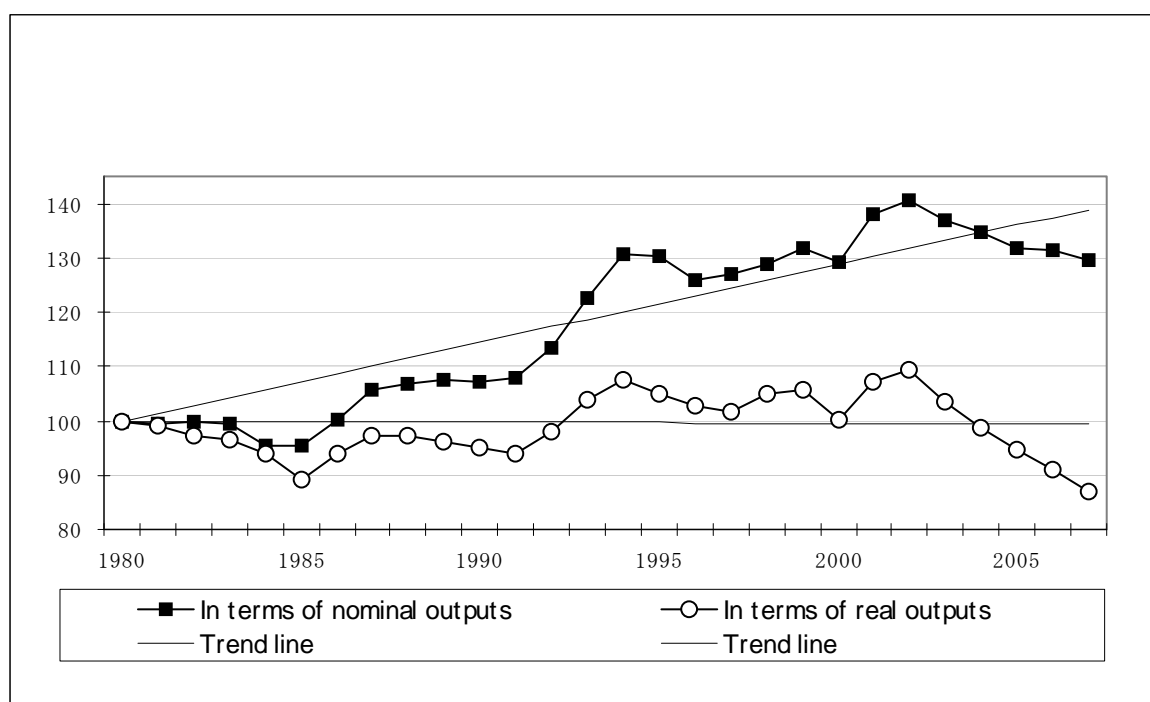
Figure 8: Alternative Measures of the Real Effective Exchange Rate of the Yen to the US\$ (1980=100)



Sources: International Monetary Fund, International Financial Statistics online database; Bank for International Settlements online database (available: www.bis.org/statistics/eer); and Bank of Japan online database (available: www.boj.or.jp/theme/research/stat/market/forex).

During the period of the “lost decade,” the share of the non-tradable goods sector in the Japanese economy expanded, in a way consistent with the real exchange rate level that was higher than the historical average. From theoretical perspectives, a high real value of the yen increases the relative price of non-tradable goods, thus encouraging their production; resources therefore should shift away from the production of tradable goods. This relative price change, moreover, should reduce the price competitiveness of manufacturing firms that produce tradable goods, so that it also encourages them to shift their production activities abroad through FDI. Indeed, this is what we observed.

Figure 9 depicts the production of non-tradable goods relative to tradable goods from 1980 to 2007 in terms of both nominal and real outputs; the two solid lines represent the respective trend lines (for our purposes here the non-tradable goods sectors include construction, electricity, gas, water, wholesale and retail trade, banking and insurance, real estate, transportation, telecommunication, and services; the tradable goods sector includes manufacturing). The figure clearly indicates that the share of the non-tradable goods sector rose steadily over this period in terms of nominal value, although the rise in the share of non-tradable goods was not pronounced when measured in terms of real value (reflecting the relatively more rapid growth of non-tradable goods prices). An important point is that, during the period of a strong yen, i.e., 1993–2002, the production of non-tradable goods relative to tradable goods exceeded the trend, regardless of whether it is measured in nominal or real value.

Figure 9: Production of Nontradable Goods Relative to Tradable Goods (%; 1980=100)

Source: Authors' estimates based on Cabinet Office, National Income Accounts.

What is more important to observe for our purpose is that, the share of non-tradable goods began to decline from a peak achieved in 2002. When Japan began slowly to emerge out of the prolonged recession, it relied on the export sector as an engine of growth as the yen fell in real effective terms, especially given the limited space for expansionary fiscal policy. As a result, not only did the GDP share of exports increase, but also Japan's overall openness rose from the early 2000s to 2008 when the country was hit by the global financial crisis (Table 2). For instance, Japan's export to GDP ratio, which was 11% in 2000, rose to over 17% in 2008. Over the same period, trade openness increased from about 20% of GDP to almost 35%.

Table 2: Japan's Exports, Imports, Net Exports, and Trade Openness (in % of GDP)

	Exports	Imports	Net exports	Trade openness ^a
1995	9.1	7.7	1.4	16.8
1996	9.8	9.3	0.5	19.2
1997	10.9	9.8	1.1	20.6
1998	10.9	9.0	1.9	19.9
1999	10.3	8.7	1.6	19.0
2000	11.0	9.5	1.5	20.5
2001	10.6	9.9	0.6	20.5
2002	11.4	10.1	1.3	21.4
2003	12.0	10.4	1.6	22.4
2004	13.3	11.4	1.9	24.7
2005	14.3	12.9	1.4	27.3
2006	16.1	14.9	1.3	31.0
2007	17.6	15.9	1.7	33.5
2008	17.4	17.3	0.1	34.7

Note: ^a Defined as (exports+imports)/GDP.

Source: Cabinet Office, Government of Japan (available: www.esri.cao.go.jp/jp/sna).

Although net exports did not show an upward trend during this period, they positively contributed to economic growth when there was a withdrawal of fiscal stimulus from 2003 to 2006 (Table 3). Undoubtedly, the export-led recovery and growth was made possible by the

expansion of the global economy, particularly that of the US economy that followed the post-IT bubble recession. The restructuring of the banking sector and the resolution of bank nonperforming loans also likely supported the recovery process in Japan. This export-led growth, however, became increasingly vulnerable to US economic turbulence because the export expansion was being fueled by an unsustainable increase in US personal consumption backed by the housing price bubble, a bubble that eventually burst in the summer of 2006 and led to the subsequent eruption of the global financial crisis.

Table 3: Contribution to Real GDP Growth (in % annual growth rate)

	Real GDP growth	Domestic demand		Net exports
		Private sector	Public sector	
1995	1.5	1.5	0.6	-0.6
1996	2.3	2.0	0.8	-0.5
1997	1.3	0.9	-0.5	1.0
1998	-2.1	-2.3	-0.1	0.3
1999	-0.3	-1.2	1.1	-0.1
2000	2.7	2.3	-0.0	0.4
2001	0.2	0.7	0.3	-0.8
2002	0.3	-0.5	0.1	0.7
2003	1.7	1.3	-0.2	0.6
2004	3.1	2.4	-0.1	0.8
2005	2.3	2.4	-0.2	0.1
2006	1.8	1.5	-0.2	0.6
2007	3.5	2.2	0.1	1.2

Source: Cabinet Office, Government of Japan (Available: [www.esri.cao.go.jp/sna](http://www.esri.cao.go.jp/jp/sna)).

4. QUANTIFYING THE NATURE OF THE STRUCTURAL CHANGE

How these changes in Japan's trade and industrial structures may have affected the response of the Japanese economy to global demand shocks can be analyzed by a vector autoregression (VAR) technique. VAR is a standard statistical procedure to investigate how shocks are transmitted from one entity to another. Using this statistical technique, we examined the impact of a shock that originates within Japan (a Japan shock), within emerging Asia (an emerging Asia shock), and in the rest of the world (a global shock), in order to see how changes in Japan's economic structure over the past decade or so affected the responsiveness of its GDP to supply or demand shocks originating abroad.⁶

For convenience, we used the Asian financial crisis of 1997–1998 to divide the sample. We then used two measures of the responsiveness of Japanese GDP to global and Asian shocks. The first measure is the response to a one-standard deviation shock to the global and regional outputs. The second measure is the extent to which the total variance is explained by the variance of respective shocks. In order to quantify the nature of the structural change that may have taken place in Japan over the past decade, we compared these measures obtained from the pre-crisis and post-crisis samples. It should be noted, however, that VAR only helps uncover temporal statistical relationships among several variables but gives no indication of how and why they affect each other.

Consider the following moving average (MA) representation of the VAR model, which consists of three equations representing global, Japanese, and emerging Asian outputs:

⁶ Takagi and Kozuru (2009) used the same methodology and data set to analyze the macroeconomic interdependence of Asia.

$$X_t = \sum \phi_{1j} u_{t-j} + \sum \phi_{2j} v_{t-j} + \sum \phi_{3j} w_{t-j} \quad (1)$$

$$Y_t = \sum \lambda_{1j} u_{t-j} + \sum \lambda_{2j} v_{t-j} + \sum \lambda_{3j} w_{t-j} \quad (2)$$

$$Z_t = \sum \eta_{1j} u_{t-j} + \sum \eta_{2j} v_{t-j} + \sum \eta_{3j} w_{t-j} \quad (3)$$

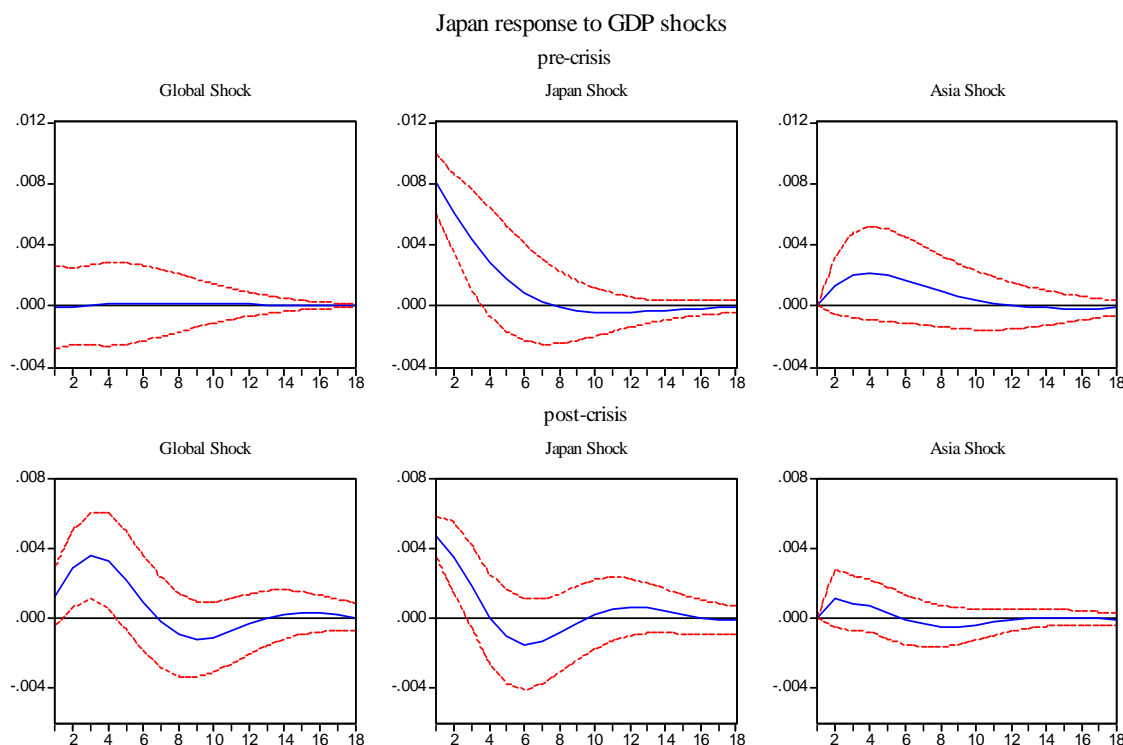
where X_t is real GDP in the US and Europe (henceforth referred to as “global”), Y_t real GDP in Japan, and Z_t real GDP in emerging Asia, all expressed as indices in order to remove the influence of nominal exchange rate changes; u , v and w are, respectively, a shock to global GDP (a global shock), a shock to Japanese GDP (a Japan shock), and a shock to emerging Asia’s GDP (an emerging Asia shock). We are particularly interested in examining the pattern of response of Japanese GDP (Y) to the past global and emerging Asia shocks, before and after the Asian financial crisis of 1997-1998.

The simplified setup of equations (1)–(3) is dictated by the small number of observations, especially when the data are divided into the pre-Asian crisis and the post-Asian crisis period. Even with this simple setup, various data limitations have restricted the coverage of countries as well as the choice of sample.⁷ The results reported below are based on the assumptions that in the long run global GDP affects both Japanese and emerging Asian GDPs; Japanese GDP affects only emerging Asian GDP; and emerging Asian GDP affects neither. In the short run, all the GDPs affect each other. We have verified, however, that the substantive results are robust to the choice of ordering. Lag length is determined by the Akaike Information Criterion (AIC). The pre-crisis period refers to Q1:1988–Q4:1996, while the post-crisis period covers Q1:1999–Q4:2006.

Figure 10 shows the responses of Japanese GDP to a one-standard deviation shock to global, Japan, and emerging Asia GDP. Before the Asian financial crisis of 1997, Japanese GDP did not respond significantly to a global shock (in each graph, the red dotted lines indicate a confidence interval). In the post-crisis period, however, Japan’s output became significantly responsive to a global shock, while the response to its own shock declined significantly. There was little change in the responsiveness to an emerging Asia shock across the two samples.

⁷ The sample countries include: (i) for Asia, in addition to Japan; PRC; Hong Kong, China; India; Indonesia; Korea; Malaysia, Philippines; Singapore; Taipei, China; and Thailand; and (ii) for the rest of the world, Belgium, France, Germany, Italy, the Netherlands, Spain, the US, and the United Kingdom. Global and regional GDPs (or prices) are the weighted averages of the individual country GDPs (or prices) in the respective regions, with 2000 US\$-GDPs used as the weights. The underlying data comes from the IMF, International Financial Statistics online database; for Taipei, China only, the central bank of Taipei, China, Financial Statistics Monthly, monthly issues.

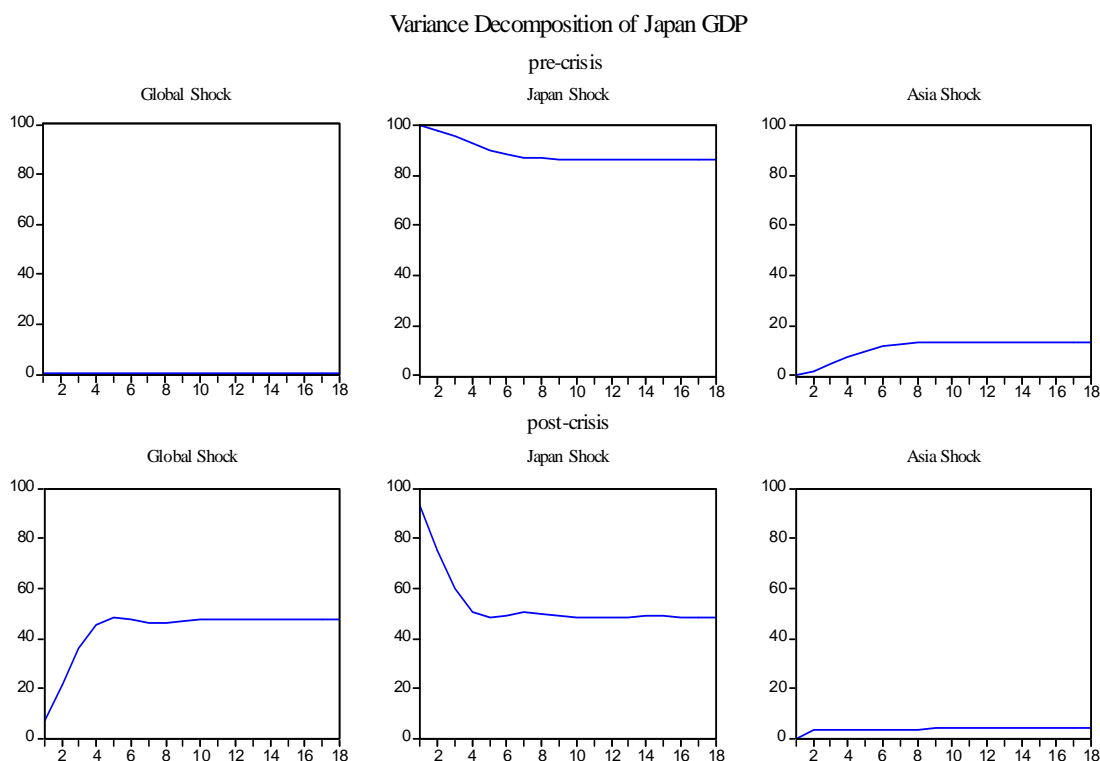
**Figure 10: Impulse Responses of Japanese GDP:
Comparing the Pre- and Post-Asian Financial Crisis Periods**



Source: Authors' calculations.

Next, Figure 11 indicates the variance of Japanese GDP that can be explained by a global shock, a Japan shock, and an emerging Asia shock. Before the Asian financial crisis of 1997-1998, virtually 100% of the variance of Japanese GDP was explained by a Japan shock alone. Global and emerging Asia shocks had no role. In the post-crisis period, however, the portion explainable by a global shock increased significantly (to about 40% after a few quarters), with little change observed for the emerging Asia shock. Consistent with the impulse response analysis reported above, global GDP shocks tend to have a much more significant impact on Japanese GDP in recent years. As a result, the variance of Japanese GDP can be explained almost equally by Japan and global shocks.

Figure 11: Variance Decomposition of Japanese GDP: Comparing the Pre- and Post-Asian Financial Crisis Periods



Source: Authors' calculations.

5. CONCLUSION

Japan was hit hard by the global financial crisis even though its relatively resilient financial system initially limited the direct impact. The severe collapse of industrial production that followed was no doubt attributable to a confluence of factors, including the stock price declines that eroded the capital base of commercial banks and thus limited their willingness to lend as well as the lagged impact of the sharp rise in oil and other commodity prices in the summer of 2008. As a primary cause of the severe recession, however, this paper has highlighted the impact that came from the contractionary effect of global deleveraging on the real economy. In this environment, Japan was particularly vulnerable because of the structural changes that had taken place over the past decade in its trade and industrial structures. VAR analysis has confirmed that, as a result of these structural changes, Japanese output became much more responsive to output shocks in the advanced markets of the US and Western Europe.

Japan's structural changes had two components. First, over 90% of Japan's exports consisted of highly income-elastic industrial supplies, capital goods, and consumer durables. Though emerging Asia is Japan's largest export market, the region's imports from Japan largely consist of industrial supplies and capital goods that are necessary at least in part for the production of final consumer goods destined for the advanced markets of the US and Western Europe. Asia's intra-regional trade had expanded rapidly until the outbreak of the global financial crisis, with Japan as the most important supplier of foreign direct investment and technology intensive products, but much of it had been in the trade of parts, components, and capital equipment. With final demand coming from the developed markets outside the region, the demand contraction in these developed economies due to global

deleveraging had direct and secondary impacts on Japan—and other similar emerging economies like Korea, Singapore and Taipei,China.

Second, Japan's trade dependence had increased since the early 2000s, as evidenced by a rising export to GDP ratio and a declining share of the non-tradable sector. This was induced by the return of the real effective exchange rate of the yen to a level more in line with the long-run average, allowing the Japanese economy to finally come out of a decade-long stagnation. Fundamentally, increasing trade openness can be thought of as a natural part of the process of economic globalization and regional integration that has been advancing throughout the world and especially in Asia. But the manner in which this process played out made Japan particularly vulnerable to a large output shock coming from outside.

In looking to the future, one must make a distinction between the outcome of the natural process of economic globalization and integration, of which Japan has been a part, and the need to manage that process. As Japan continues to integrate with the regional and global economies, as it should, a rise in the ratio of exports to GDP is likely to continue; a share of emerging Asia in Japan's total exports may well continue to increase, especially as the region's income levels rise. What matters is the geographical and product diversification of the likely increases in exports. To make Japan more resilient to external shocks, policymakers could create enabling environments to stimulate the export of finished goods to emerging Asia, for example, through the establishment of a region-wide free trade arrangement. In this context, it is instructive to note the experience of Germany during the current crisis. Although Japan and Germany share similar industrial structures, German industrial production did not decline as much despite the fact that its export dependence was even greater than that of Japan.⁸

Domestically, there is no rational ground where one can advocate a policy of reducing trade openness just to minimize vulnerability to external shocks. Japan, as a relatively large economy, however, cannot rely on external demand alone to sustain its economic growth over the medium-term. To the extent that there are impediments that may inhibit the vigorous expansion of domestic demand or the non-tradable goods sector, policy needs to address them. To promote domestic demand, the social sector protection system (for education, health, unemployment, and pensions) needs to be substantially reformed so as to reduce households' uncertainty for the future. To promote a better allocation of resources between the more regulated non-tradable goods sector (such as medical, health, and young- and old-age caretaking) and the less regulated tradable goods sector, further deregulatory measures are called for. A substantial lifting of restrictions in agriculture, especially the corporatization of agricultural production, would be especially helpful. More liberal immigration policy should help invigorate private investment in an aging society. With little available fiscal space, these and other measures will help create a climate in which private investment can flourish, driven by final domestic demand.

⁸ German industrial production did not decline noticeably during the last quarter of 2008; even during the first quarter of 2009, the decline was around 20% from a year earlier—significantly less than Japan's decline (IMF, International Financial Statistics online database).

REFERENCES

- Bank for International Settlements (BIS). 2009. *An Assessment of Financial Sector Rescue Programmes*. BIS Papers 48. Geneva, Switzerland: BIS.
- Bosworth, B., and A. Flaaen. 2009. *America's Financial Crisis: The End of An Era*. A paper presented at the ADBI conference "Global Financial and Economic Crisis: Impacts, Lessons, and Growth Rebalancing," Tokyo, 22–23 April.
- International Monetary Fund (IMF). 2009a. *World Economic Outlook*. Washington, DC: IMF.
- . 2009b. *Global Financial Stability Report*. Washington, DC: IMF.
- Japan Tariff Association. 2007. *The Summary Report of Trade of Japan, January–December*.
- . 2008. *The Summary Report of Trade of Japan, January–December*.
- . 2009. *The Summary Report of Trade of Japan, January*.
- Kawai, M., and S. Urata. 2004. Trade and Foreign Direct Investment in East Asia. In *Exchange Rate Regimes in East Asia*, edited by G. de Brouwer and M. Kawai. London and New York, NY: Routledge Curzon.
- Sommer, M. 2009. *Why Has Japan Been Hit So Hard by the Global Recession?* IMF Staff Position Note SPN/09/05. Washington, DC: IMF.
- Takagi, S., and I. Kozuru. Forthcoming. Output and Price Linkages in Asia's Post-Crisis Macroeconomic Interdependence. *Singapore Economic Review*.
- Wyplosz, C. 2009. *The Euro Area in the Current Crisis*. Paper presented at the ADBI conference "Global Financial and Economic Crisis: Impacts, Lessons, and Growth Rebalancing," Tokyo, 22–23 April.