Section 4   Events that caused a material impact on Japan's trade environment, etc. ----- trade deficit, earthquake, and higher yen ------

Last year, a series of events had a material impact on Japan's trade environment. While such events started with the Great East Japan Earthquake in March last year, damage caused by the floods in Thailand started to have a full impact in and after last October, which is discussed in detail in a previous section. In addition, Japanese enterprises had to face a severe external environment, including the appreciation of the yen throughout the year and soaring energy prices. As a result of these events, Japan recorded its first trade deficit in 31 years in 2011 on a calendar year basis.

First of all, this section reviews Japan's trade environment in 2011 and fiscal 2011, which was strongly affected by such events as the earthquake and the flooding in Thailand. Then, it analyzes the impact of domestic events, namely the earthquake and the appreciation of the yen, on Japanese enterprises. In particular, this section considers an increase in overseas procurement by Japanese enterprises. It also analyzes characteristics of profitability of Japanese exporting companies amid the current higher yen from such aspects as terms of trade and export prices, while making a comparative analysis of Japan, South Korea and Germany.

1. Last year's trade deficit

(1) Overview of trade balance

As to Japan's trade amount in 2011, total exports stood at about 65.55 trillion yen and total imports amounted to about 68.11 trillion yen, thus posting a deficit of 2.56 trillion yen, the first since 1980 (See Figure 2-4-1-1).[91]

Figure 2-4-1-1

Japan's trade amount (calendar year basis)

Note: All values are a decision level.
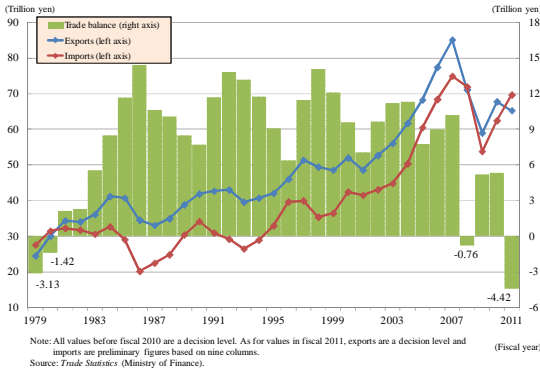Source: *Trade Statistics* (Ministry of Finance).
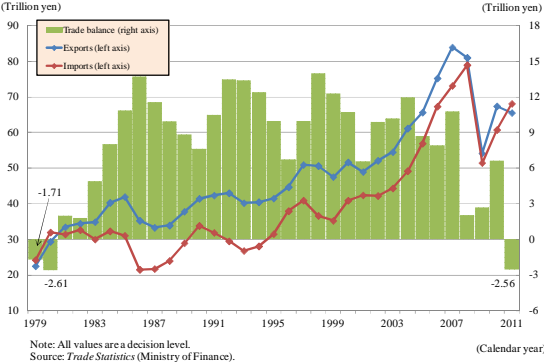
Exports declined 2.7% from the previous year due to a combination of multiple downward factors. Among them were the earthquake, the floods in Thailand, the prolonged appreciation of the yen, and a slowdown in the growth of the world economy caused by the European debt problem. On the other

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[91]   According to trade balance in *Balance of Payments Statistics*, Japan's trade balance in 2011 showed the first trade deficit in 48 years since 1963. All values used for analyses in this section are based on *Trade Statistics*.

hand, imports increased about 12.1% from the previous year due to emergency procurement from overseas in the wake of the earthquake, soaring prices of energy such as crude oil and others, and an increase in demand for such fuels as LNG at thermal power plants after the suspension of operation of nuclear power plants.

On a fiscal year basis, trade deficits in fiscal 2011 stood at about 4.42 trillion yen, which was larger than that on a calendar year basis, marking the largest-ever trade deficits by exceeding that of fiscal 1979 (3.13 trillion yen) (see Figure 2-4-1-2). Exports declined about 3.7%, while imports increased about 11.6%. [92] In the meantime, the trade deficits in fiscal 2011 were the first in three years since a slight trade deficit (about 760 billion yen) was reported in fiscal 2008.

Figure 2-4-1-2

Japan's trade amount (fiscal year basis)

Note: All values before fiscal 2010 are a decision level. As for values in fiscal 2011, exports are a decision level and imports are preliminary figures based on nine columns.
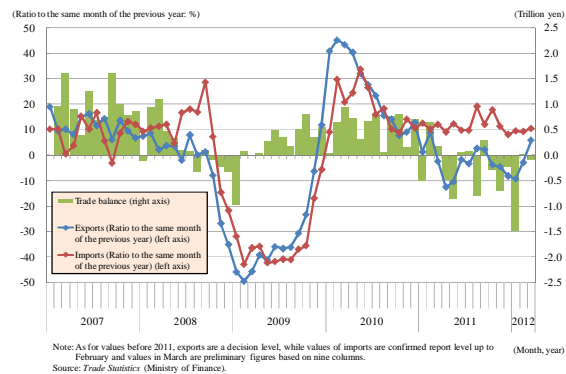Source: *Trade Statistics* (Ministry of Finance).

When analyzing the trend of Japan's foreign trade on a monthly basis (original series), the impact of the aforementioned events in and outside Japan of the time can be observed clearly (see Figure 2-4-1-3). Exports declined in March 2011, the month during which the earthquake hit, from the same month of the previous year, and continued to decrease for five consecutive months until July 2011, while bottoming out in April 2011 (-12.4%). Furthermore, exports remained weak in and after October 2011 since the impact of the floods in Thailand spread among Japanese enterprises there. Thus, exports continued to decline for five consecutive months until February 2012 from the same month of the previous year, reaching a bottom in January 2012 (-9.2%).[93] On the other hand, imports continued to increase from the same month of the previous year throughout 2011 and made a two-digit increase for four consecutive months from August to November in 2011, leading to about a 10% overall annual increase. Therefore, trade deficits on a monthly basis occurred frequently and monthly trade deficits continued for four consecutive months from October 2011 to January 2012, a period during which exports were relatively weak.

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92 Imports in fiscal 2011 are preliminary figures based on nine columns.
93 Since export trends in January and February 2012 in terms of ratio to the same month of the previous year are affected by Lunar New Year in the Asian region as well, a decline in exports in January and an increase in February, which is affected also by a leap year, should be discounted to some extent. (Osanai (2012a), et al.).

Figure 2-4-1-3

Japan's foreign trade (monthly, original series)

(Ratio to the same month of the previous year: %)   (Trillion yen)

Trade balance (right axis)
Exports (Ratio to the same month of the previous year) (left axis)
Imports (Ratio to the same month of the previous year) (left axis)

Note: As for values before 2011, exports are a decision level, while values of imports are confirmed report level up to February and values in March are preliminary figures based on nine columns.
Source: *Trade Statistics* (Ministry of Finance).

(Month, year)

Furthermore, seasonally adjusted values on a monthly basis explain a recent trend more explicitly (see Figure 2-4-1-4). When it comes to seasonally adjusted values for the last decade which can be confirmed, there were no months until 2011 that showed trade deficits, except the period of the global economic crisis (eight consecutive months from August 2008 to March 2009). Yet this time, trade deficits continued for 13 months from March 2011, during which the earthquake occurred, to March 2012.

Meanwhile, exports on a month-on-month basis in and after 2011 also show characteristic movement that reflects the impact of and the recovery from the earthquake and damage caused by the floods in Thailand as observed in the analysis of exports in original series in terms of ratio to the same month of the previous year (see Figure 2-4-1-5).

Figure 2-4-1-4

Japan's foreign trade (monthly, seasonally adjusted value)

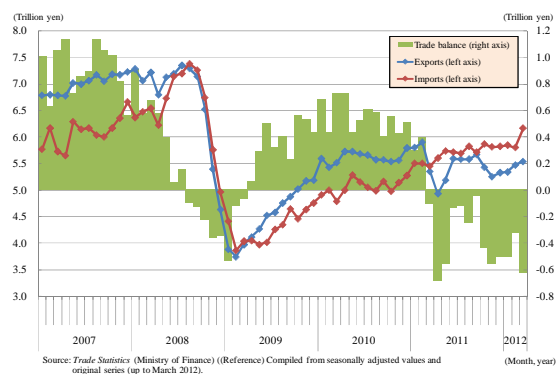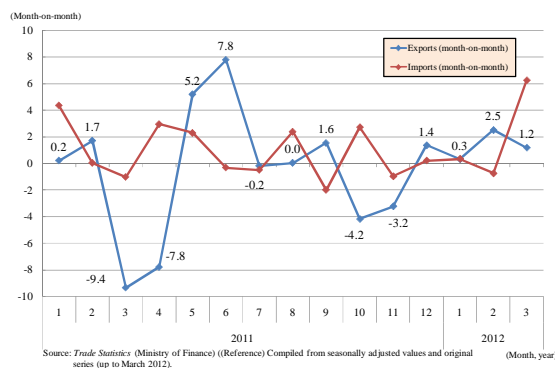(Trillion yen)   (Trillion yen)

Trade balance (right axis)
Exports (left axis)
Imports (left axis)

Source: *Trade Statistics* (Ministry of Finance) ((Reference) Compiled from seasonally adjusted values and original series (up to March 2012).

(Month, year)

Figure 2-4-1-5

Japan's foreign trade (month-on-month seasonally adjusted value)

Source: *Trade Statistics* (Ministry of Finance) ((Reference) Compiled from seasonally adjusted values and original series (up to March 2012).

(2) Trend of trade by trade partners/regions and by item

Next, this section analyzes trade trends between Japan and its major trade partners/regions in 2011 as well as fiscal 2011 (hereafter, see Table 2-4-1-6).

(A) Trend of trade with major trade partners/regions

As to exports in 2011 (calendar year), Asia, which accounts for more than half in Japan's export share, was the largest contributor to Japan's decrease in exports (out of a 2.75% decrease in exports from the previous year, Asia's contribution was -1.69% point). In particular, a decline in exports to NIEs was conspicuous (-1.56% point in contribution) and it is considered that the decline was caused by prolonged sluggish demand for IT-related goods worldwide. Although exports to North America, Central and South America, and Middle East declined as well, contribution by those regions on a fiscal year basis showed improvement compared with that on a calendar year basis and it is likely that exports to those regions are recovering recently. Meantime, exports to India, Western Europe, Central and East Europe, and Russia made a positive contribution on a calendar year basis. On the other hand, contribution to the decline in exports (-3.7% from the previous year) on a fiscal year basis showed slightly different results. Contribution by ASEAN, North America, Central and South America, Middle East, and the Oceania improved, compared with that on a calendar year basis. In contrast, the contribution by other countries/regions rather worsened and, in particular, deterioration of China and the EU was conspicuous.

Table 2-4-1-6

Contribution, etc. by trade partner/region to Japan's recent trade amount

Countries/regions	Exports composition (2011 (calendar year), %)	Contribution (% point)		Ratio to the previous year (%)	
		2011 (Calendar year)	2011 Fiscal year	2011 (Calendar year)	2011 Fiscal year
Total amount	100.0	-2.75	-3.70	-2.7	-3.7
Asia	56.0	-1.69	-3.03	-3.0	-5.4
(Out of Asia, NIEs)	22.8	-1.56	-1.96	-6.6	-8.4
(Out of Asia, China)	19.7	-0.27	-1.36	-1.4	-6.9
(Out of Asia, ASEAN)	14.9	-0.12	0.11	-0.8	0.8
(Out of Asia, India)	1.3	0.13	0.09	11.4	7.2
North America	16.4	-0.69	-0.16	-4.1	-1.0
Central and South America	5.4	-0.51	-0.37	-8.9	-6.6
Middle East	3.0	-0.39	-0.10	-11.8	-3.1
Oceania	2.7	-0.03	0.12	-1.0	4.5
Africa	1.6	-0.01	-0.01	-0.4	-0.4
(EU)	11.6	0.01	-0.41	0.0	-3.6
West Europe	12.4	0.22	-0.31	1.8	-2.6
Central and East Europe/ Russia, etc.	2.5	0.35	0.15	16.4	6.7
<<Breakdown of NIEs>>					
Taiwan	6.2	-0.80	-1.07	-11.7	-15.8
Hong Kong	5.2	-0.42	-0.44	-7.7	-8.2
South Korea	8.0	-0.28	-0.37	-3.5	-4.6
Singapore	3.3	-0.06	-0.08	-1.8	-2.4

Note: Values in 2011 (calendar year) are compiled from figures on a decision level. Values in fiscal 2011 are compiled from figures on confirmed report level.
Singapore is included in both NIEs and ASEAN.
Cells in yellow show countries/regions of which values in fiscal 2011 are lower than those in 2011 (calendar year).
Cells in green show countries/regions of values in fiscal 2011 are higher than those in 2011 (calendar year).
Source: *Trade Statistics* (Ministry of Finance).

Countries/regions	Imports composition (2011 (calendar year), %)	Contribution (% point)		Ratio to the previous year (%)	
		2011 (Calendar year)	2011 Fiscal year	2011 (Calendar year)	2011 Fiscal year
Total amount	100.0	12.09	11.59	12.1	11.6
Asia	44.6	4.74	4.10	10.5	9.0
(Out of Asia, China)	21.5	2.02	1.50	9.2	6.8
(Out of Asia, ASEAN)	14.6	1.82	1.77	12.5	12.1
(Out of Asia, NIEs)	8.6	0.75	0.72	8.5	8.1
(Out of Asia, India)	0.8	0.07	0.08	8.9	9.3
Middle East	18.8	4.02	4.17	23.5	24.3
West Europe	10.3	1.01	0.99	9.5	9.6
(EU)	9.4	0.97	1.02	10.1	10.8
Oceania	7.2	0.93	0.84	13.1	11.7
Africa	2.0	0.55	0.80	32.5	47.5
Central and South America	4.1	0.47	0.30	11.6	7.0
Central and East Europe/ Russia, etc.	2.7	0.21	0.10	7.3	3.4
North America	10.2	0.15	0.30	1.4	2.7
<<Breakdown of NIEs>>					
Taiwan	2.7	-0.28	-0.26	-8.5	-8.2
Hong Kong	0.2	-0.02	-0.01	-7.8	-3.7
South Korea	4.7	1.10	1.00	26.6	23.4
Singapore	1.0	-0.04	-0.01	-3.4	-1.2

Note: Values in 2011 (calendar year) are compiled from figures on a decision level. Values in fiscal 2011 are compiled from figures on confirmed report level.
Singapore is included in both NIEs and ASEAN.
Cells in yellow show countries/regions of which values in fiscal 2011 are lower than those in 2011 (calendar year).
Cells in green show countries/regions of values in fiscal 2011 are higher than those in 2011 (calendar year).
Source: *Trade Statistics* (Ministry of Finance).

When looking at monthly data, exports from Japan to the U.S. continued to increase from the same month of the previous year for five consecutive months from November 2011, supported by the solid U.S. economy. In addition, exports to ASEAN showed a sharp increase in terms of ratio to the same month of the previous year in most recent months. In contrast, exports to the EU and China continued to decline for six consecutive months from October 2011 and exports to NIEs remain negative for 13 consecutive months from March 2011 in terms of ratio to the same month of the previous year. The results suggest that, separately from the domestic recovery from the earthquake, Japan's exports were increasingly affected by economic situations in its trade partners/regions and inventory adjustment in the production process of export items more recently (see Figure, Table 2-4-1-7).
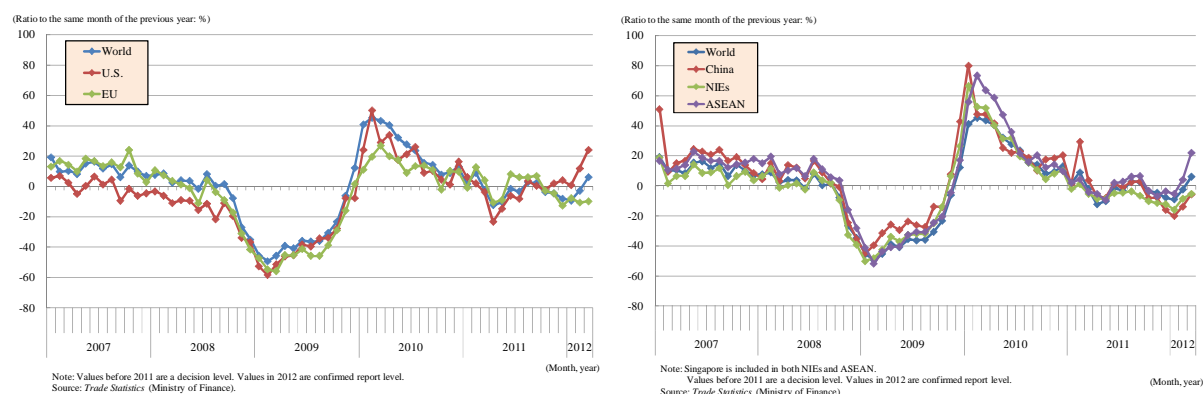
As far as imports in 2011 (calendar year) are concerned, the largest contributors to the increase in imports (a 12.1% increase from the previous year) were Asia (4.74% point in contribution, in terms of ratio to the same month of the previous year) and the Middle East (4.02% point in contribution). This resulted from a temporary increase in substitute procurement in the wake of the earthquake, the soaring energy prices and the increase in fuel demand. In addition, imports in fiscal 2011 (an 11.6% increase from the previous year) show that, though the contribution by major regions in Asia declined in general, the contribution by Middle East and Africa showed an increase. Meantime, it should be noted that, in Asia, the contribution by South Korea improved significantly together with China and ASEAN, clearly indicating that substitute procurement was conducted widely after the earthquake.

(B) Trends of trade by item

When it comes to exports in 2011, the largest contributor to the decline in exports was transportation equipment (out of a 2.7% decline in exports from the previous year, its contribution was

-1.8% points), followed by electrical equipment (-1.6 % point in contribution). [94] These two items made for a sharp contrast in terms of the exports trend on a quarterly basis. Although exports of transportation equipment experienced the largest decline in the first and second quarters of 2011 due to the impact of the earthquake, this later recovered quickly to the extent of making a significant positive contribution to exports in the first quarter of 2012 (out of a 1.6% decline from the same period of the previous year, its contribution was 2.1% point). On the other hand, exports of electrical equipment made a negative contribution throughout the year mainly due to sluggish demand in the global market, though the width of the decline slightly shrank recently (-0.3% point in contribution). Although total exports increased once in the third quarter of 2011 (a 0.5% increase from the same period of the previous year), an increasing number of items made a negative contribution after that and among such items are general machinery, which maintained positive contribution in the wake of the earthquake, products by material, including steel, and chemicals (see Table 2-4-1-8).

Figure, Table 2-4-1-7

Exports by Japan's major trade partner/region

Note: Values before 2011 are a decision level. Values in 2012 are confirmed report level.
Source: *Trade Statistics* (Ministry of Finance).

Note: Singapore is included in both NIEs and ASEAN.
Values before 2011 are a decision level. Values in 2012 are confirmed report level.
Source: *Trade Statistics* (Ministry of Finance).

Ratio to the same month of the previous year (%)		World	U.S.	EU	China	NIEs	ASEAN
Exports composition (2011)		100.0	15.3	11.6	19.7	22.8	14.9
2011	1	1.4	6.0	-0.7	1.0	-2.2	1.9
	2	9.0	2.0	12.7	29.1	1.0	4.2
	3	-2.4	-3.6	4.2	3.7	-5.3	-4.1
	4	-12.4	-23.3	-10.7	-6.8	-8.6	-5.3
	5	-10.3	-14.7	-8.8	-8.1	-8.8	-9.6
	6	-1.6	-6.1	8.0	1.1	-4.9	1.9
	7	-3.3	-8.2	6.0	-1.0	-4.8	2.5
	8	2.8	3.6	6.0	2.4	-3.8	6.1
	9	2.3	0.4	7.1	2.7	-6.9	6.4
	10	-3.8	-2.3	-2.9	-8.2	-10.2	-3.2
	11	-4.5	2.0	-4.6	-7.9	-11.6	-7.0
	12	-8.0	3.9	-12.7	-16.3	-12.2	-3.6
2012	1	-9.2	0.7	-7.6	-20.2	-16.0	-5.7
	2	-2.7	11.9	-10.7	-14.0	-8.6	3.8
	3	5.9	23.9	-9.7	-5.9	-5.5	21.8

Note: Singapore is included in both NIEs and ASEAN.
Values before 2011 are a decision level. Values in 2012 are confirmed report level.
Cells in yellow show months of negative values in ratio to the same month of the previous year.
Source: *Trade Statistics* (Ministry of Finance).

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94 Electrical equipment based on a general condition product base of *Trade Statistics*, which is used for the classification of items in this section, include electronics parts such as semiconductors, including IC, audio/ image equipment (including related parts), heavy electrical equipment, communication equipment and electrical measurement equipment, etc. Meantime, computers (including peripheral equipment) and related parts are categorized into general machinery.

Table 2-4-1-8

Contribution by item to Japan's export amount of last year and after

Ratio to the previous year and ratio to the same month of the previous year <<Contribution, % point>>		Total	Food	Raw materials	Mineral-related fuels	Chemicals	Products by materials	General machinery	Electrical equipment	Transportation equipment	Others
Exports composition (2011)		100.0	0.5	1.5	1.9	10.4	13.4	21.1	17.7	21.4	12.1
2011 (calendar year)		-2.7	-0.1	0.0	0.2	-0.2	0.0	0.7	-1.6	-1.8	-0.1
Fiscal 2011		-3.7	-0.1	0.0	0.0	-0.7	-0.4	0.0	-1.5	-0.9	-0.1
2011	Q1	2.4	0.0	0.0	0.5	0.6	0.9	2.9	-0.7	-1.5	-0.3
	Q2	-8.1	-0.1	-0.1	0.1	0.0	-0.3	1.1	-2.4	-6.0	-0.3
	Q3	0.5	-0.1	0.2	0.3	-0.3	0.1	0.2	-1.1	0.2	0.8
	Q4	-5.5	-0.1	0.0	0.0	-1.0	-0.6	-1.1	-2.0	-0.1	-0.5
2012	Q1	-1.6	-0.1	0.0	-0.6	-1.5	-0.7	-0.3	-0.3	2.1	-0.3

Note: Contribution in 2011 (calendar year) and quarters of 2011 are compiled from figures on a decision level. Contribution in fiscal 2011 and the first quarter of 2012 are compiled from figures on confirmed report level. The classification of the items is a general condition product base of *Trade Statistics*. Cells in yellow show items of negative contribution.

Source: *Trade Statistics* (Ministry of Finance).

As to imports in 2011 (calendar year), the largest contributor to the increase in imports (a 12.1% increase from the previous year) was mineral-related fuels (7.3% point in contribution), particularly crude oil and rough oil (hereafter crude and rough oil) (3.3% point). As to composition of imports, the contribution of LNG, which accounted for about 40% of crude and rough oil, increased steadily every quarter and even surpassed that of crude and rough oil recently (LNG's contribution was 3.8% out of a 9.8% increase in imports in the first quarter of 2012 from the same period of the previous year). Although the contribution of products by materials and chemicals has declined gradually recently, these items had made a significant contribution immediately after the earthquake due to an increase in substitute imports from overseas (see Table 2-4-1-9).

Furthermore, this section examines the trend of trade by major item on a monthly basis as well. When looking at export trends by major machinery items such as general machinery, electrical equipment, and transportation equipment, transportation equipment showed a conspicuous decline right after the earthquake as was expected (in April 2011, its exports declined as much as -43.2% from the same month of the previous year). Yet, despite the fact that exports of transportation equipment made a slight decline in some months in terms of ratio to the same month of the previous year due to the higher yen and the floods in Thailand, the item made a steady recovery in general.[95] Similarly, monthly export trends of general machinery and electrical equipment were consistent with those of quarterly trends as mentioned before (see Figure, Table 2-4-1-10).

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95 It should be noted that values in March 2012 in terms of ratio to the same month of the previous year are driven up in reaction to a sharp decline in export amounts in March 2011 due to the impact of the earthquake (Osanai (2012b), et al).

Table 2-4-1-9

Contribution by item to Japan's import amount of last year and after

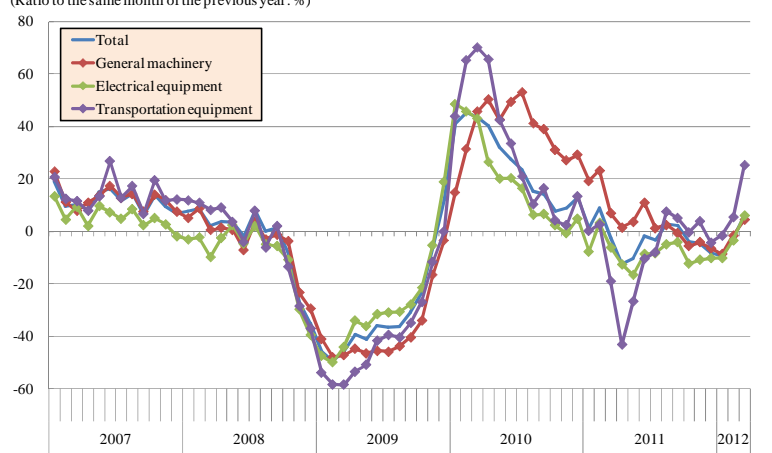| Ratio to the previous year and ratio to the same month of the previous year <<Contribution, % point>>		Total	Food	Raw materials	Mineral-related fuels	Crude oil and rough oil	Petroleum products	Liquid natural gas (LNG)	Liquid petroleum gas	Coal	Chemicals	Products by materials	General machinery	Electrical equipment	Transportation equipment	Others
Imports composition (2011)		100.0	8.6	7.7	32.0	16.8	3.3	7.0	1.3	3.6	9.0	8.9	7.3	11.7	2.6	12.2
2011 (calendar year)		12.1	1.1	0.8	7.3	3.3	1.0	2.2	0.2	0.6	1.2	1.1	0.2	-0.2	0.1	0.4
Fiscal 2011		11.6	1.0	0.2	8.0	3.4	1.0	3.0	0.2	0.4	1.0	0.7	0.2	-0.3	0.3	0.4
2011	Q1	11.7	0.8	2.0	5.2	2.4	0.8	0.5	0.3	1.0	0.6	1.2	0.5	0.7	0.3	0.4
	Q2	10.5	1.3	0.9	6.2	3.3	0.9	1.5	0.1	0.3	1.5	1.4	-0.2	-0.5	-0.2	0.1
	Q3	13.8	0.8	0.9	9.2	4.1	1.5	3.0	0.2	0.4	1.5	1.0	0.4	-0.6	0.0	0.7
	Q4	12.4	1.4	-0.4	8.4	3.4	1.0	3.5	0.1	0.5	1.1	0.8	0.3	-0.3	0.3	0.6
2012	Q1	9.8	0.6	-0.4	8.1	3.0	0.7	3.8	0.2	0.4	0.1	-0.4	0.2	0.3	0.9	0.4

Note: Contribution in 2011 (calendar year) and quarters of 2011 are compiled from figures on a decision level. Contribution in fiscal 2011 and the first quarter of 2012 are compiled from preliminary figures. The classification of the items is a general condition product base of *Trade Statistics*. Cells in yellow show items of more than 1% in contribution.

Source: *Trade Statistics* (Ministry of Finance).

Figure, Table 2-4-1-10

Japan's export by item of major machinery

(Ratio to the same month of the previous year: %)

Note: Values before 2011 are a decision level. Values in 2012 are confirmed report level.
Source: *Trade Statistics* (Ministry of Finance).

Ratio to the same month of the previous year (%)		Total	General machinery	Electrical equipment	Transportation equipment
Exports composition (2011)		100.0	21.1	17.7	21.4
2011	1	1.4	19.2	-7.5	0.2
	2	9.0	23.2	3.3	2.8
	3	-2.4	6.9	-6.1	-19.1
	4	-12.4	1.5	-12.5	-43.2
	5	-10.3	3.7	-16.5	-26.6
	6	-1.6	11.0	-8.7	-10.5
	7	-3.3	1.3	-8.2	-7.9
	8	2.8	2.5	-4.9	7.7
	9	2.3	-0.6	-4.0	5.1
	10	-3.8	-5.6	-12.3	-0.2
	11	-4.5	-4.1	-10.7	3.9
	12	-8.0	-6.4	-10.1	-4.2
2012	1	-9.2	-8.7	-10.0	-1.4
	2	-2.7	-1.5	-3.4	5.4
	3	5.9	4.5	6.1	25.4

Note: The classification of the items is a general condition product base of *Trade Statistics*. Values before 2011 are a decision level. Values in 2012 are confirmed report level.
Cells in yellow show months of negative values in ratio to the same month of the previous year.

Source: *Trade Statistics* (Ministry of Finance).

By breaking down this finding by major export destination (countries/regions), distinctive characteristics can be observed (see Table 2-4-1-11). First of all, exports of transportation equipment declined because exports to the U.S. and EU, which accounted for large shares of exports of complete automobiles, dropped sharply due to the earthquake. After that, exports of the item make a solid recovery compared with other machinery items, supported by a rapid recovery of domestic supply chains, the recent brisk exports to the U.S. market, and an increase in exports to ASEAN in reaction to the decline after the floods in Thailand.[96] On the other hand, exports of electrical equipment were affected significantly by the floods in Thailand together with the earthquake partly because Asia is a major export destination of electrical equipment. In particular, exports of electrical equipment to NIEs show a consistent decline in and after 2011 in terms of ratio to the same month of the previous year and this partly resulted from the deceleration in demand for IT-related goods worldwide, starting last year. However, some bright signs were observed, as exports, mainly to the U.S. and ASEAN gradually

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96 However, it should be noted that there are some negative factors, as seen in that exports of complete automobiles to EU declined significantly in and after November 2011 due to the sluggish economy and that exports to China, including automotive components, slow down.

improved gradually from the beginning of this year partly because inventory adjustment in the production process was completed in many countries and regions. Although exports of general machinery increased from the same period of the previous year in the wake of the earthquake, the item signaled a later slowdown since its exports declined for six consecutive months from September 2011 to February 2012 in terms of ratio to the same month of the previous year. Although exports to the U.S. and ASEAN were favorable in general, China's investments in fixed assets such as railroads and roads slowed down gradually and exports to China continued to decline from last fall. At the same time, exports to the EU were not strong due to the slackening economy in the region.

As to import trends by item, this section examined import trends of major items among mineral-related fuels. It was also examined which of import quantity or import price affected the increase in import amount of these items more significantly (see Figure 2-4-1-12). Although the import amount of crude oil increased 40.0% in August 2011 from the same month of the previous year, showing the largest increase in and after 2011, an increase in individual months mostly resulted from an increase in import price (a 38.4% increase in August) and import quantity even declined in some months, compared with the same month of the previous year. This trend of crude oil is applicable to those of petroleum spirits.[97] On the other hand, LNG showed a different trend from other major items of mineral-related fuels. Although the import amount of LNG increased 76.0% in November 2011 from the same month of the previous year, which was the largest in and after 2011, the import quantity increased significantly (21.3%) in addition to import price (45.2%) and this trend can be observed in individual months.

In order to examine more strictly, factor decomposition was conducted in regard to fluctuations in import amount of mineral-related fuels (difference from the previous year and difference from the same month of the previous year), using unit and quantum indices in *Trade Statistics* (Figure, Table 2-4-1-13). The analysis confirms that an increase in the unit factor mostly accounted for a recent increase in import amount of mineral-related fuels, as it did so in the past cases of the soaring energy prices, including the case in 2008, while an increase in quantum factor played only a minor role. As to 2011 (calendar year), out of about 4.4 trillion yen in an increase in import amount from the previous year (about 60% of the increase in 2008), the unit factor accounted for about 4 trillion yen and the quantum factor occupied about 300 billion yen only. As to crude and rough oil, out of some 2 trillion yen in an increase from the previous year, unit factor accounted for about 2.4 trillion yen and the quantum factor maked negative contribution of about 250 billion yen. On the other hand, LNG showed a different trend from crude and rough oil. Out of about 1.3 trillion yen in an increase in LNG's import amount from the previous year, the unit factor accounted for about 800 billion yen and the quantum factor was about 400 billion yen which is half of the unit factor, indicating that the ratio of the quantum factor was relatively large. It can be said that the current increase in LNG imports is strongly affected by the quantum factor together with the unit factor and that this is similar to the situation at the time of the global economic crisis and the decline in imports of mineral-related fuels due to the

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97　Although import value of petroleum spirits increased 73.2% in August 2011 from the same month of the previous year, the largest increase in and after 2011, import quantity also grew 29.7% in August 2011, an exceptionally large increase observed only in this particular month.

plunge in energy prices in 2009 (in the case of 2009, out of about 13.5 trillion yen in the decline from the previous year, unit factor accounted for about 11.7 trillion yen and the quantum factor was about 3.3 trillion yen). This reflects conditions on Japan's demand side (fuel demand increased at thermal power plants this time, in contrast to 2009 when fuel demand decreased due to a decline in production in the private sector).

Table 2-4-1-11

Japan's export of major machinery item by export counterpart/region

○ Transportation equipment

Ratio to the same month of the previous year (%)		World	U.S.	EU	China	NIEs	ASEAN
Ratio of exports (2011)		100.0	24.4	11.8	9.0	5.1	8.9
2011	1	0.2	-2.1	2.2	4.9	-21.1	-7.2
	2	2.8	2.4	21.2	11.2	-8.4	-4.6
	3	-19.1	-18.4	-2.4	-19.7	-34.1	-31.5
	4	-43.2	-54.5	-48.6	-40.5	-17.0	-27.1
	5	-26.6	-33.0	-23.1	-33.4	-26.2	-18.2
	6	-10.5	-20.0	2.7	-8.1	7.5	9.9
	7	-7.9	-11.5	-9.0	3.8	11.6	19.6
	8	7.7	10.2	3.6	21.0	28.3	22.1
	9	5.1	0.5	20.4	13.2	-15.2	8.5
	10	-0.2	-1.0	21.1	10.7	-33.2	-0.5
	11	3.9	3.4	5.9	-2.5	-19.2	11.3
	12	-4.2	6.8	-14.6	-19.0	-7.1	21.9
2012	1	-1.4	11.1	-9.2	-13.5	-12.8	1.6
	2	5.4	20.0	-12.6	-5.0	-21.8	17.6
	3	25.4	42.5	-23.9	16.9	-14.7	69.2

○ Out of transportation equipment, automobiles (passenger cars, buses/trucks

Ratio to the same month of the previous year (%)		World	U.S.	EU	China	NIEs	ASEAN
Ratio of exports (2011)		100.0	29.9	11.5	6.8	2.6	5.9
2011	1	3.1	-0.5	0.3	22.7	1.9	12.6
	2	10.0	2.7	34.4	10.0	2.8	12.1
	3	-27.8	-27.2	-17.4	-26.2	-36.6	-30.5
	4	-67.1	-73.5	-69.9	-69.2	-74.3	-38.1
	5	-39.0	-43.5	-36.1	-40.1	-42.6	-18.0
	6	-12.5	-23.6	1.5	-7.5	-18.4	1.3
	7	-3.8	-14.4	-5.7	-2.0	23.0	13.8
	8	5.3	15.3	7.4	14.7	21.9	16.4
	9	4.9	-4.6	31.9	7.7	31.2	11.2
	10	6.1	-0.8	25.1	13.9	21.0	22.5
	11	-0.6	-0.4	-13.7	-8.5	1.8	30.2
	12	-4.1	1.9	-20.1	-23.4	-28.9	17.5
2012	1	2.2	14.0	-29.7	-17.0	-27.8	42.0
	2	7.4	26.9	-31.0	-8.2	-10.8	34.9
	3	44.7	46.2	-26.2	22.8	5.2	129.0

○ Out of transportation equipment, automobile parts

Ratio to the same month of the previous year (%)		World	U.S.	EU	China	NIEs	ASEAN
Ratio of exports (2011)		100.0	21.6	14.1	22.1	5.7	16.4
2011	1	-3.2	-3.0	6.9	-9.3	-8.6	-1.3
	2	9.6	2.8	30.9	10.4	-2.9	5.2
	3	-5.0	1.7	11.6	-16.3	-20.9	-2.9
	4	-14.8	-6.3	-8.9	-21.5	-13.5	-20.7
	5	-18.5	-22.5	3.0	-31.4	-5.8	-27.6
	6	-10.3	-20.1	9.7	-11.7	-6.6	-11.8
	7	-4.7	-11.0	3.4	8.8	-1.6	-5.2
	8	5.2	-9.3	2.7	23.6	0.2	7.9
	9	11.5	15.5	9.4	15.6	1.1	14.9
	10	0.4	-7.4	5.4	6.5	-6.0	-5.9
	11	3.6	5.3	4.7	3.2	-21.2	4.7
	12	-5.5	15.2	2.3	-16.2	-26.2	-16.9
2012	1	-4.9	-6.7	2.6	-8.6	-27.5	-5.4
	2	-1.2	0.5	-0.2	-7.8	-26.7	3.5
	3	24.2	48.4	5.7	14.0	-14.2	37.6

○ Electrical equipment

Ratio to the same month of the previous year (%)		World	U.S.	EU	China	NIEs	ASEAN
Ratio of exports (2011)		100.0	13.3	12.6	25.2	27.6	16.8
2011	1	-7.5	-4.3	-3.3	-5.9	-10.4	-10.0
	2	3.3	-2.0	1.2	21.4	-4.2	-3.4
	3	-6.1	0.8	-4.7	-2.9	-12.6	-9.5
	4	-12.5	-17.6	-6.2	-11.0	-16.4	-13.4
	5	-16.5	-14.0	-7.4	-12.2	-22.4	-20.8
	6	-8.7	-7.6	5.3	-2.7	-17.6	-13.4
	7	-8.2	-10.3	12.7	-2.4	-16.9	-13.6
	8	-4.9	1.5	2.6	-0.1	-13.9	-9.4
	9	-4.0	0.8	-1.5	-3.6	-9.7	-2.0
	10	-12.3	-8.2	-15.8	-14.6	-14.2	-10.8
	11	-10.7	-8.8	-14.9	-9.8	-11.1	-13.0
	12	-10.1	1.7	-20.0	-7.8	-15.7	-12.8
2012	1	-10.0	1.1	-13.8	-13.3	-15.5	-7.7
	2	-3.4	7.2	-9.0	-9.3	-6.8	4.5
	3	6.1	25.6	1.7	1.9	-3.5	16.3

○ Out of electrical equipment, electronic parts such as semiconductors

Ratio to the same month of the previous year (%)		World	U.S.	EU	China	NIEs	ASEAN
Ratio of exports (2011)		100.0	6.6	7.1	28.9	38.1	22.3
2011	1	-12.7	-9.8	-20.0	-2.1	-18.5	-13.4
	2	-5.7	-2.1	-25.2	20.5	-16.1	-9.1
	3	-6.9	-3.1	-9.8	9.0	-15.4	-14.0
	4	-19.0	-30.2	-9.5	-6.7	-26.6	-22.2
	5	-18.5	-19.9	-5.0	-1.6	-29.9	-21.9
	6	-17.1	-29.8	-0.2	-0.8	-29.4	-19.0
	7	-15.0	-14.7	-5.8	0.2	-26.3	-21.9
	8	-16.4	-11.7	-21.0	-7.1	-23.0	-22.2
	9	-9.0	9.2	-28.3	-1.3	-15.6	-15.5
	10	-20.8	-14.5	-33.8	-21.8	-19.2	-26.2
	11	-15.1	-11.3	-24.6	-6.6	-12.9	-28.8
	12	-13.0	-4.5	-29.7	8.0	-17.7	-33.6
2012	1	-15.8	-15.1	-30.2	-3.4	-17.9	-27.1
	2	-6.0	-9.2	-22.7	0.4	-2.8	-17.4
	3	-9.2	-4.7	-38.3	-2.0	-7.1	-11.2

○ General machinery

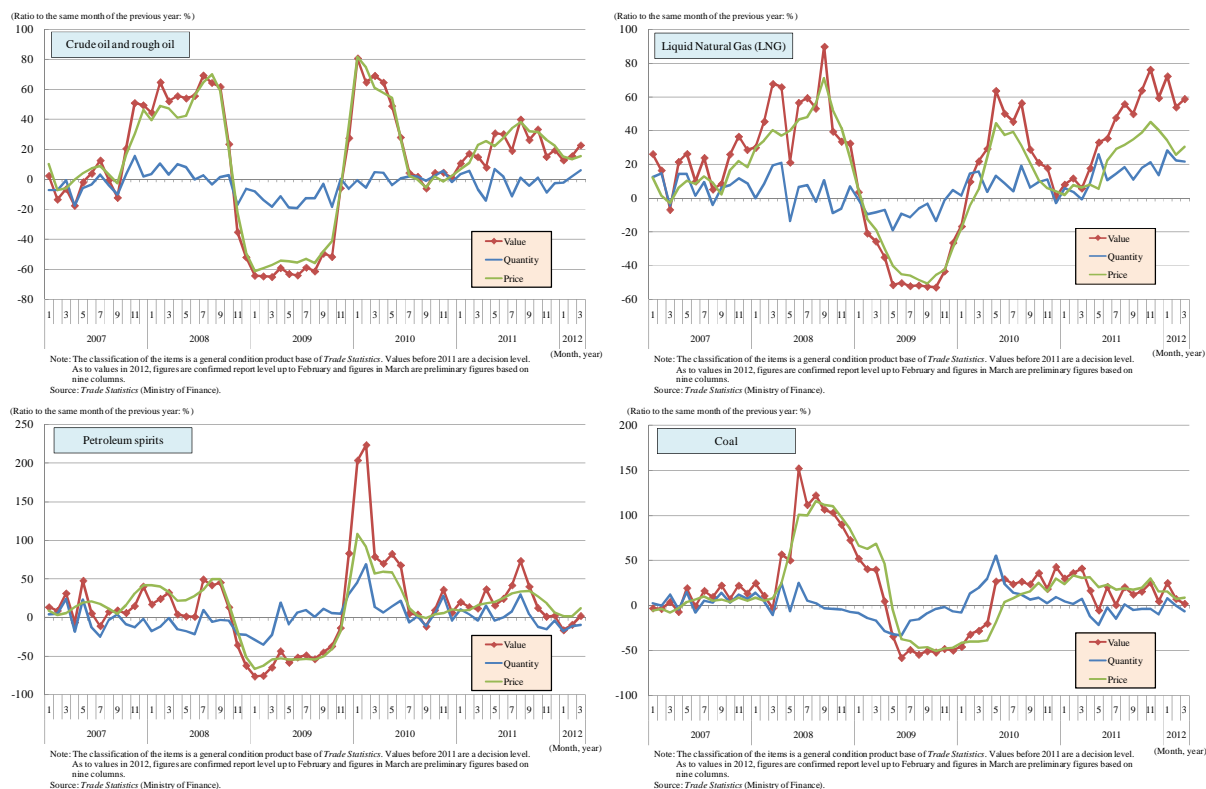| Ratio to the same month of the previous year (%)		World	U.S.	EU	China	NIEs	ASEAN
Ratio of exports (2011)		100.0	17.9	14.4	22.7	18.0	15.1
2011	1	19.2	43.4	7.2	31.2	12.2	5.6
	2	23.2	20.1	15.5	75.9	-7.3	9.3
	3	6.9	12.2	14.6	19.8	-13.1	-3.1
	4	1.5	3.4	2.6	19.7	-17.0	-0.6
	5	3.7	7.1	1.4	7.8	-3.7	-11.8
	6	11.0	17.8	24.4	16.7	-2.8	-1.8
	7	1.3	3.3	15.0	1.8	-3.7	7.8
	8	2.5	8.4	9.3	1.4	-16.1	4.4
	9	-0.6	4.5	11.3	0.9	-25.6	-1.7
	10	-5.6	-1.0	-4.4	-13.4	-22.7	-4.4
	11	-4.1	8.5	-5.8	-14.1	-16.6	-1.4
	12	-6.4	13.2	-9.0	-28.4	-7.2	0.4
2012	1	-8.7	-4.4	-11.2	-31.0	-17.2	16.8
	2	-1.5	12.4	-11.0	-28.0	-1.3	30.4
	3	4.5	20.7	-11.2	-18.1	-1.7	50.6

Note: The classification of the items is a general condition product base of *Trade Statistics*. Singapore is included in both NIEs and ASEAN. Values before 2011 are a decision level. Values in 2012 are confirmed report level.
Cells in yellow show months of negative values in ratio to the same month of the previous year.
Source: *Trade Statistics* (Ministry of Finance).

Figure 2-4-1-12

Japan's import by major item of mineral fuels

(Ratio to the same month of the previous year: %)

Crude oil and rough oil

Note: The classification of the items is a general condition product base of *Trade Statistics*. Values before 2011 are a decision level.
As to values in 2012, figures are confirmed report level up to February and figures in March are preliminary figures based on nine columns.
Source: *Trade Statistics* (Ministry of Finance).

(Ratio to the same month of the previous year: %)

Liquid Natural Gas (LNG)

Note: The classification of the items is a general condition product base of *Trade Statistics*. Values before 2011 are a decision level.
As to values in 2012, figures are confirmed report level up to February and figures in March are preliminary figures based on nine columns.
Source: *Trade Statistics* (Ministry of Finance).

(Ratio to the same month of the previous year: %)

Petroleum spirits

Note: The classification of the items is a general condition product base of *Trade Statistics*. Values before 2011 are a decision level.
As to values in 2012, figures are confirmed report level up to February and figures in March are preliminary figures based on nine columns.
Source: *Trade Statistics* (Ministry of Finance).

(Ratio to the same month of the previous year: %)

Coal

Note: The classification of the items is a general condition product base of *Trade Statistics*. Values before 2011 are a decision level.
As to values in 2012, figures are confirmed report level up to February and figures in March are preliminary figures based on nine columns.
Source: *Trade Statistics* (Ministry of Finance).

LNG prices in Asia, including Japan, are basically linked to prices of crude and rough oil and rose last year in tandem with the soaring prices of crude and rough oil (Figure 2-4-1-14). While LNG prices in the U.S. and Europe were lower than those of Japan in and after the midst of 2008, pricing mechanisms of LNG are different in individual regions, depending on the market environment and supply-demand situation. Among such conditions are arrangements of pipeline networks, distribution costs determined by the distance from a production center, and the volume of shale gas produced. Therefore, a price indicator in individual regions is not determined uniquely. [98] Under these circumstances, the U.S. is expected to export LNG at prices which are not linked to prices of crude and rough oil and it is noteworthy how this move will affect the pricing mechanism of LNG in Asia.

(3) Trend of trade balance for the immediate future from the aspect of unit/quantum factors

Last of all, this section considers trend of trade balance for the immediate future by conducting factor decomposition of imports and exports.

Similar to the aforementioned analysis of mineral-related fuels, factor decomposition of fluctuations in overall trade balance (differences from the previous year) was conducted, using unit and quantum indices in *Trade Statistics* (Figure, Table 2-4-1-15). [99] When decomposing differences in trade balance
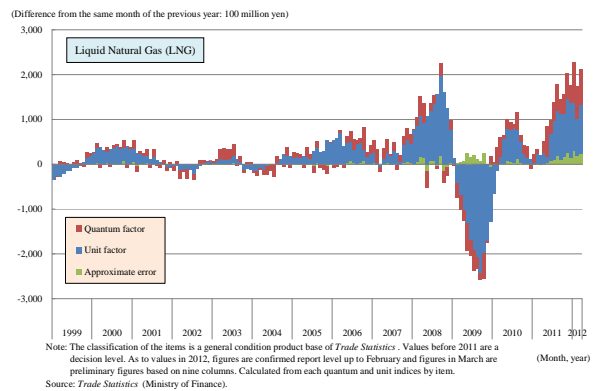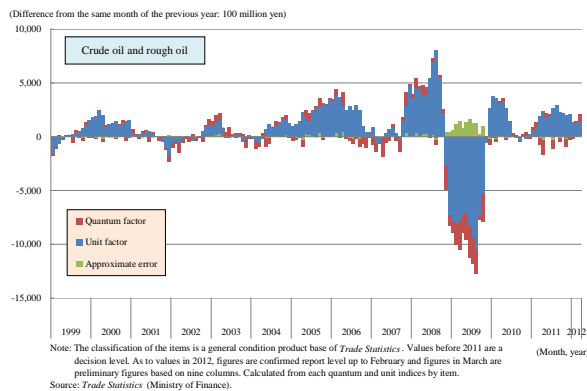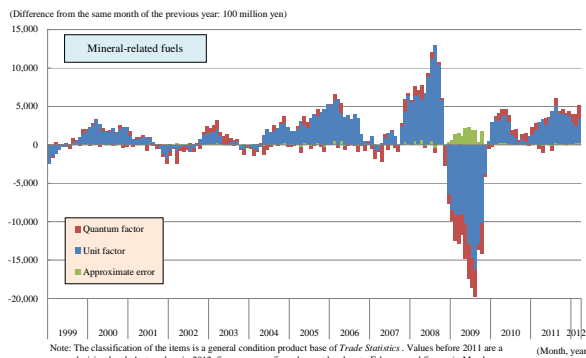
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98 Rim Intelligence Co., (2007), et al. refers to differences in destination to which LNG prices in individual regions are linked.

99 In topics by Kunimine (2012) as well, factor decomposition of fluctuations in trade balance in and after 2000 is conducted and basically the same result is obtained.

from the previous year into four factors, which are the unit factor and the quantum factor for each of imports and exports, there were an increasing number of years during which the unit factor of imports made the largest negative contribution, reflecting the recent soaring energy prices. In recent years, this pattern was observed for four consecutive years from 2005 to 2008. On the other hand, exports, particularly the quantum factor of exports, continued to make the largest positive contribution as if to offset negative contribution by the unit and quantum factors of imports, except the periods of the Asian Financial Crisis (1998), the bursting of the so-called IT bubble (2001) and the global economic crisis (2009). Meanwhile, the unit factor of exports made the largest positive contribution in several years and it is noteworthy that the factor made positive contribution (about 0.1 trillion yen) in 2011 in spite of the higher yen. Yet, it has not reached the extent of making up for negative contribution made by the unit factor of imports.

Figure, Table 2-4-1-13

Factor decomposition of import amount of mineral fuels and amount by major item

(Difference from the same month of the previous year: 100 million yen)

Mineral-related fuels

- Quantum factor
- Unit factor
- Approximate error

Note: The classification of the items is a general condition product base of *Trade Statistics*. Values before 2011 are a decision level. As to values in 2012, figures are confirmed report level up to February and figures in March are preliminary figures based on nine columns. Calculated from each quantum and unit indices by item.
Source: *Trade Statistics* (Ministry of Finance).

(Difference from the same month of the previous year: 100 million yen)

Crude oil and rough oil

- Quantum factor
- Unit factor
- Approximate error

Note: The classification of the items is a general condition product base of *Trade Statistics*. Values before 2011 are a decision level. As to values in 2012, figures are confirmed report level up to February and figures in March are preliminary figures based on nine columns. Calculated from each quantum and unit indices by item.
Source: *Trade Statistics* (Ministry of Finance).

(Difference from the same month of the previous year: 100 million yen)

Liquid Natural Gas (LNG)

- Quantum factor
- Unit factor
- Approximate error

Note: The classification of the items is a general condition product base of *Trade Statistics*. Values before 2011 are a decision level. As to values in 2012, figures are confirmed report level up to February and figures in March are preliminary figures based on nine columns. Calculated from each quantum and unit indices by item.
Source: *Trade Statistics* (Ministry of Finance).

○Mineral-related fuels

Increase/decrease in import amount (unit: 100 million yen)		Differences from the previous year and the same month of the previous year	Unit factor	Quantum factor	Approximate error
2011 (calendar year)		44,182	40,349	3,210	622
Fiscal 2011		49,813	42,688	5,949	1,176
(Reference) 2008		74,521	71,341	830	2,351
(Reference) 2009		-134,566	-116,609	-32,879	14,921
2011	1	2,241	1,234	928	78
	2	2,816	1,861	844	111
	3	2,402	2,896	-415	-78
	4	2,397	3,350	-785	-168
	5	3,521	2,571	802	148
	6	3,538	3,457	64	17
	7	3,570	4,399	-637	-192
	8	6,092	4,855	927	310
	9	4,468	4,146	247	74
	10	4,655	3,865	609	181
	11	4,066	4,029	29	9
	12	4,417	3,685	598	134
2012	1	3,906	2,821	929	156
	2	3,999	2,339	1,459	201
	3	5,184	3,170	1,707	307

○Out of mineral-related fuels, crude oil and rough oil

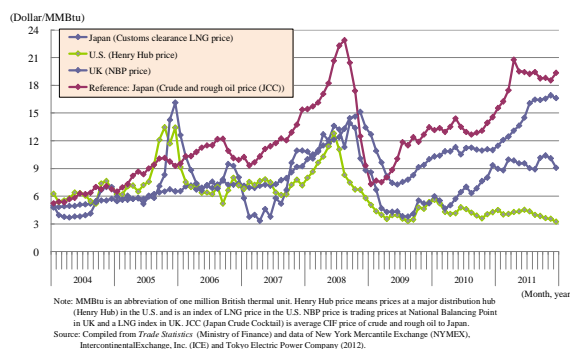| Increase/decrease in import amount (unit: 100 million yen)		Differences from the previous year and the same month of the previous year	Unit factor	Quantum factor	Approximate error
2011 (calendar year)		20,089	23,386	-2,474	-823
Fiscal 2011		21,382	24,095	-2,038	-674
(Reference) 2008		39,832	37,487	118	2,227
(Reference) 2009		-86,983	-77,017	-20,576	10,611
2011	1	891	577	294	20
	2	1,377	923	408	46
	3	1,233	1,904	-546	-126
	4	734	2,374	-1,303	-337
	5	2,218	1,644	468	106
	6	2,080	1,903	139	38
	7	1,474	2,616	-852	-290
	8	2,947	2,872	54	22
	9	1,895	2,298	-306	-98
	10	2,243	2,129	87	27
	11	1,198	2,054	-680	-177
	12	1,800	2,091	-237	-54
2012	1	1,172	1,390	-189	-29
	2	1,460	1,261	175	24
	3	2,161	1,461	607	93

○ Out of mineral-related fuels, Liquid Natural Gas (LNG)

Increase/decrease in import amount (unit: 100 million yen)		Differences from the previous year and the same month of the previous year	Unit factor	Quantum factor	Approximate error
2011 (calendar year)		13,153	7,770	4,236	1,147
Fiscal 2011		18,530	10,288	6,374	1,867
(Reference) 2008		15,122	13,665	1,035	422
(Reference) 2009		-18,252	-16,313	-3,148	1,209
2011	1	235	56	176	3
	2	343	222	113	8
	3	195	215	-19	-1
	4	509	234	254	21
	5	861	144	679	38
	6	989	626	297	66
	7	1,381	846	414	121
	8	1,791	1,020	585	186
	9	1,456	1,023	320	112
	10	1,573	960	442	172
	11	2,040	1,211	571	258
	12	1,780	1,212	405	163
2012	1	2,284	1,086	892	306
	2	1,757	836	734	188
	3	2,109	1,090	781	237

Note: Since values are rounded, adding them up do not always correspond to totals. The classification of the items is a general condition product base of *Trade Statistics*. Values before 2011 are a decision level. As to values in 2012, figures are confirmed report level up to February and figures in March are preliminary figures based on nine columns. Calculated from each quantum and unit indices by item.
Source: *Trade Statistics* (Ministry of Finance).

Figure 2-4-1-14

Comparison of LNG price of the country

Note: MMBtu is an abbreviation of one million British thermal unit. Henry Hub price means prices at a major distribution hub (Henry Hub) in the U.S. and is an index of LNG price in the U.S. NBP price is trading prices at National Balancing Point in UK and a LNG index in UK. JCC (Japan Crude Cocktail) is average CIF price of crude and rough oil to Japan.
Source: Compiled from *Trade Statistics* (Ministry of Finance) and data of New York Mercantile Exchange (NYMEX), IntercontinentalExchange, Inc. (ICE) and Tokyo Electric Power Company (2012).

Last year, restrictions on the supply side occurred due to large-scale natural disasters such as the earthquake and the flooding in Thailand and this created a special environment in which a decline in export quantity (about 2 trillion yen) and an increase in import quantity (about 1.9 trillion yen) tended to take place more easily than usual. Yet, despite the appreciation of the yen to its highest ever level, [100] an increase in import prices (about 5.3 trillion yen) was the largest factor to invite a deterioration of trade deficits, as in the past cases of soaring energy prices. [101] That is, even if the restrictions on the supply side were removed completely in the future, there remain significant restrictions on the improvement of the trade balance as far as the issue of the soaring imports prices is not resolved. In this regard, at the time of prior oil crises, a decline in import prices was eased not only by an increase in export quantity but also by an increase in export prices. In addition, the import quantity made positive contribution through the improvement of energy use efficiency (Figure 2-4-1-16). Therefore, it is essential to consider Japan's future economic and industrial structure from a perspective of further strengthening international competitiveness, especially maintaining and reinforcing its pricing power, in order to mitigate effects from the increase in import prices caused by the current soaring energy prices and secure a certain level of not only an increase in export quantity but also an increase in export prices. [102] This subject is discussed in details in the next section from a different perspective.

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100 Although factor decomposition of exchange rates is not conducted in factor decomposition analysis of trade balance here for simplification, the higher yen from last year functioned naturally to alleviating a negative impact caused by the unit factor of imports. Therefore, the depreciation of the yen should work positively for each factor of exports. Yet, as pointed out by Arai (2012), it should be noted that an excessive level of the depreciation of the yen raises a concern that it might lead a negative impact by the unit factor of imports to become larger.

101 In a column in *Regional Economic Outlook*, IMF (2012) analyses factors of Japan's trade deficits in 2011. It states that the trade deficits of this time result from a combination of temporary and permanent factors and refers to the following four points; (a) a decline in exports associated with a decrease in production of automobiles and electronic equipment due to the earthquake and the Thai floods (an impact of reducing GDP by about 0.25 to 0.5%), (b) a continuous decline in export share in world export value, (c) weak resilience of exports due to the appreciation of the yen, and (d) an increase in import value of energy. Furthermore, as a future outlook, IMF points out that, though Japan will return to modest trade surplus in near future due to recovery of exports from the earthquake, there is a possibility that Japan would fall into trade deficits again, assuming that its share in world exports continues to decline and slow recovery of private demand continues in a medium term.

102 Kanno (2012a, 2012b) also points out that deterioration of Japan's trade balance is a structural change

Figure, Table 2-4-1-15

Factor decomposition of Japan's trade balance (year-on-year difference) (in and after 1995)
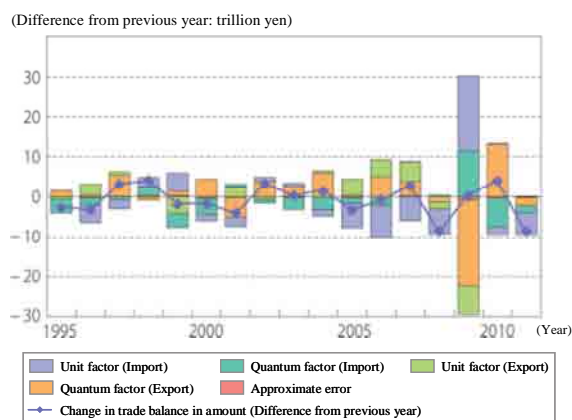
(Difference from previous year: trillion yen)

- Unit factor (Import)
- Quantum factor (Import)
- Unit factor (Export)
- Quantum factor (Export)
- Approximate error
- Change in trade balance in amount (Difference from previous year)

Note: Calculated from quantum and unit indices each of exports and imports.
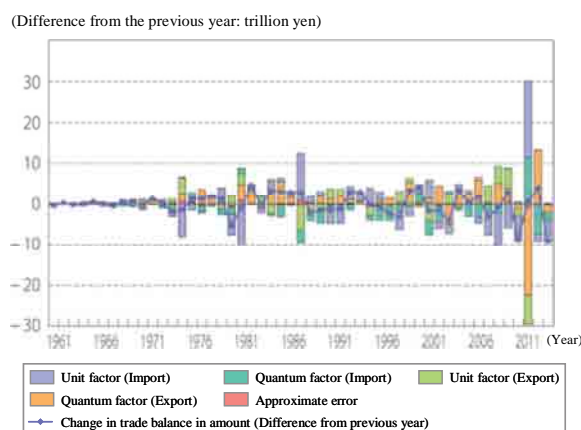Source: *Trade Statistics* (Ministry of Finance) .

Increase/decrease in trade balance (unit: trillion yen)	Difference from the previous year	Unit factor (Import)	Quantum factor (Import)	Unit factor (Export)	Quantum factor (Export)	Approximate error	(Reference) Unit factor (Export /Import)	(Reference) Quantum factor (Export /Import)
1995	-2.4	0.0	-3.5	-0.5	1.6	-0.0	-0.5	-1.9
1996	-3.2	-4.4	-1.7	2.7	0.5	-0.2	-1.7	-1.3
1997	3.2	-2.3	-0.7	0.8	5.3	0.1	-1.4	4.6
1998	4.0	2.2	2.2	0.4	-0.7	-0.1	2.6	1.5
1999	-1.7	4.5	-3.5	-4.1	1.1	0.3	0.4	-2.4
2000	-1.6	-1.6	-3.9	-0.3	4.5	-0.2	-1.9	0.6
2001	-4.2	-2.4	0.8	2.4	-4.8	-0.1	0.0	-4.1
2002	3.3	1.0	-0.8	-0.7	3.8	-0.1	0.4	3.0
2003	0.3	0.8	-3.0	-0.1	2.6	0.1	0.7	-0.4
2004	1.8	-1.6	-3.1	0.7	5.8	-0.1	-0.9	2.7
2005	-3.2	-6.1	-1.4	4.0	0.5	-0.2	-2.2	-0.9
2006	-0.8	-7.9	-2.2	4.2	5.1	0.0	-3.7	2.9
2007	2.9	-5.9	0.1	4.8	3.6	0.3	-1.1	3.7
2008	-8.7	-6.3	0.5	-1.6	-1.3	-0.0	-7.9	-0.8
2009	0.6	18.8	11.3	-7.2	-21.6	-0.8	11.6	-10.2
2010	4.0	-1.9	-7.2	0.1	13.1	-0.2	-1.8	6.0
2011	-9.2	-5.3	-1.9	0.1	-2.0	-0.1	-5.1	-3.9

Note: Calculated from quantum and unit indices each of exports and imports.
Cells in yellow show a factor that makes the largest negative contribution. Cells in green show a factor that makes the largest positive contribution.
Source: *Trade Statistics* (Ministry of Finance).

and that such a change is in the context of continuous deterioration of terms of trade in the past decade. As a countermeasure to prevent current account deficits resulted from trade deficits from getting worse, Kanno proposes to reconsider export strategies (specializing in domestic production of high value added products and thus differentiating a role of domestic production from that of overseas production) as well as take measures to increase exports, including importance of brand strategies.

Figure 2-4-1-16

Factor decomposition of Japan's trade balance (in and after 1961)

(Difference from the previous year: trillion yen)

Note: Calculated from quantum and unit indices each of exports and imports.
Source: *Trade Statistics* (Ministry of Finance) .

2. Recovery of post-earthquake domestic production and trends in overseas procurement

As analyzed in the White Paper of 2011, rapid recovery of Japan's domestic production, especially of the transport machinery industry, after the earthquake also brought about swift restoration of global supply chains. Following up last year's analysis, this section examines the recovery of production levels in individual industries nationwide as well as in the disaster-hit area. Furthermore, it analyzes trends of overseas procurement through the import penetration rate and recent trends of imports, since it is pointed out that "measures responding to the recent appreciation of the yen" coupled with "a move to reconstruct supply chains after the earthquake" help promote overseas procurement of materials and components in Japan.

(1) Recovery of post-earthquake domestic production

First of all, this section examines the recovery of production levels in individual industries on a national level (Figure 2-4-2-1). Last year, not only the earthquake but also other events, including the flooding in Thailand, caused a material impact on Japan's industries through global supply chains. However, it can be said that production has generally recovered nationwide to the extent of making up for the decline caused by the earthquake. In particular, the transport machinery industry demonstrated strong resilience as seen in that its production returned to pre-quake levels as of February 2011 and, since then, has maintained these levels regardless of the sharp decline caused by the earthquake and the flooding in Thailand.
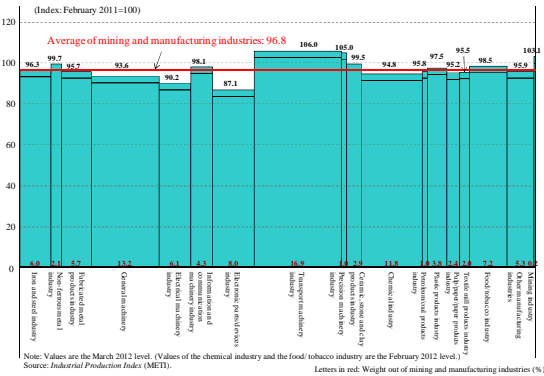
In addition, there are clear bright signs more recently in industrial production level in the disaster-hit area[103] as well (see Figure, Table 2-4-2-2).[104] In March 2012, an industrial production

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103 In this section, the quake-affected area refers to municipalities (excluding municipalities that took measures for people who were deprived of a means to come home due to the earthquake) to which the Disaster Relief Act was applied because of the Great East Japan Earthquake (which include an earthquake with an epicenter in northern Nagano Prefecture on March 12, 2012). As to a trial calculation method of indices, see notes attached to Figure, Table 2-4-2-2.

104 National Institute for Research Advancement (2012) compiled and made public indices for recovery

index in the disaster-hit area increased 8% from a previous month on a seasonally-adjusted basis and reached a pre-quake level (in February 2011) for the first time (assuming that the February 2011 level is 100, the March 2012 level is 102.2). In other words, this means that production in the area increased as much as about 150% from March 2011 when the production declined drastically. When comparing the level of industrial production in the disaster-affected area with that of other regions, it is observed that the production level in the disaster-affected area was not necessarily higher even before the earthquake. Then, the earthquake dealt a severe blow to the production in the area, widening a disparity in the production levels between the two. However, it is significantly meaningful that the disparity has been eliminated recently and that the original order of the two in regard to the production levels is even reversed. It can be said that strenuous restoration efforts made by people concerned, including those who work in the private sector, from right after the earthquake until now led to the result of strong improvement in the industrial production index in the disaster-affected area.[105]

Figure 2-4-2-1

Degree of Japan's industrial production recovery (by industry) in March 2012 (some in February)

(Index: February 2011=100)

Average of mining and manufacturing industries: 96.8

Note: Values are the March 2012 level. (Values of the chemical industry and the food/ tobacco industry are the February 2012 level.)
Source: *Industrial Production Index* (METI).
Letters in red: Weight out of mining and manufacturing industries (%)

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and reconstruction (Indexes for Recovery and Reconstruction Following the Great East Japan Earthquake) in the quake-affected area (which refers to three prefectures of Iwate, Miyagi, and Fukushima) in the wake of the earthquake. In order to grasp conditions and progress of recovery and reconstruction in the area struck by tsunami (37affected municipalities), the indices compiled from various indices consist of two *indices*; (a) the Index of Status of Recovery of Basic Infrastructure which expresses an overall recovery status of basic infrastructure supporting people's daily life in the disaster-affected area and (b) the Index of Status of Activities which expresses production, consumption and distribution of quake-affected people and areas over time. On the basis of the Index of Status of Activities, regarding the trend until December 2011,it is evaluated that consumption activities in the quake-affected area has recovered to a pre-quake level, but the recovery of industrial activities is insufficient.

105 Meantime, as a bright sign, it is planned to turn the disaster-affected area into a new production base. A major automobile manufacturer plans to establish a research and development center for next-generation automobiles and related products, including electronic vehicles, in the quake-affected area (Tagajo City, Miyagi Prefecture) jointly with Tohoku University. (Morning edition of Nihon Keizai Shimbun dated April 15, 2012)

Figure, Table 2-4-2-2

Japan's industrial index (seasonally adjusted) by region in relation to the earthquake

(February 2011 = 100)
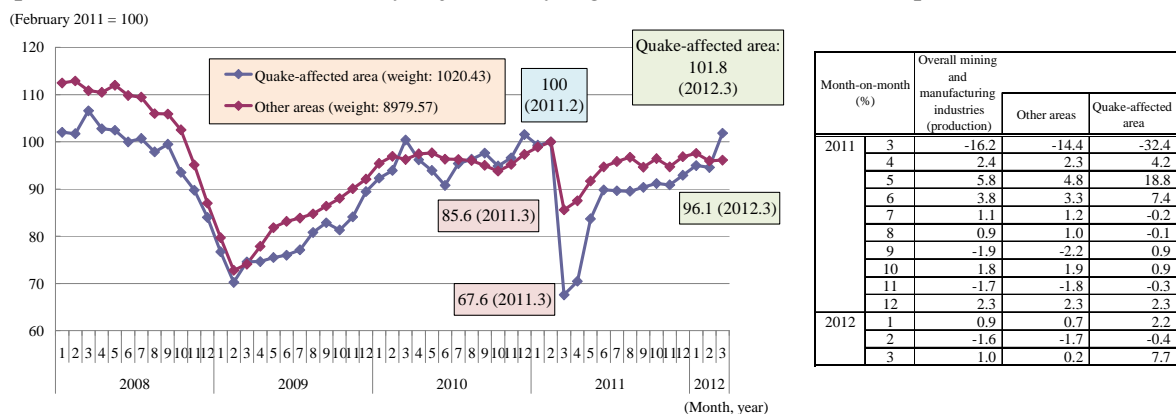
| Month-on-month (%)		Overall mining and manufacturing industries (production)	Other areas	Quake-affected area
2011	3	-16.2	-14.4	-32.4
	4	2.4	2.3	4.2
	5	5.8	4.8	18.8
	6	3.8	3.3	7.4
	7	1.1	1.2	-0.2
	8	0.9	1.0	-0.1
	9	-1.9	-2.2	0.9
	10	1.8	1.9	0.9
	11	-1.7	-1.8	-0.3
	12	2.3	2.3	2.3
2012	1	0.9	0.7	2.2
	2	-1.6	-1.7	-0.4
	3	1.0	0.2	7.7

Note: This trial calculation index is compiled and calculated by adding up and indexing business offices by their locations based on METI Current Production Statistics Survey, which serves as a basis of this index, for each of the quake-affected area and other areas. Quake-affected area refers to municipalities to which the Disaster Relief Act was applied because of the Great East Japan Earthquake (which includes an earthquake on March 12, 2012, with an epicenter in northern Nagano Prefecture, but excludes municipalities that took measures for people who were deprived of a means to come home due to the earthquake), while other areas means municipalities to which the act is not applied. Weight of the industrial production index (nationwide) and baseline quantity are divided, while seasonal index of national level is used for both areas.

Source: *About trial calculation values of Japan's industrial index (seasonally adjusted) by region in relation to the earthquake (preliminary figures for March)* (METI).

According to a questionnaire survey conducted with companies by the Japan Bank for International Cooperation (2011), out of 218 companies that were damaged by the earthquake, about 80% restored their facilities as of July 2011 when the survey was carried out (see Figure 2-4-2-3). The ratio of companies that completed restoration indicates that, subsequently, other disaster-affected companies should make a steady recovery as well.

Figure 2-4-2-3

Forecast for the recovery of quake-hit plants in Japan (survey as of July 2011)
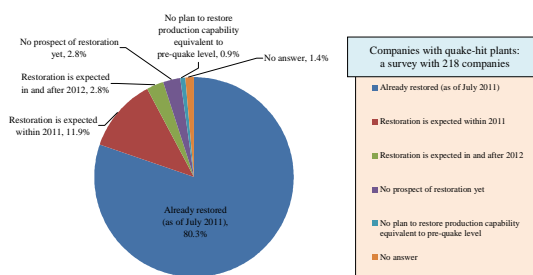
Note: Survey as of July 2011. "Restoration" is defined here to restore production capability at a plant equivalent to pre-quake level.
Source: Report on Overseas Business Operations of Japanese Manufacturers - FY2011(the 23rd) Survey on Foreign Direct Investment (Japan Bank for International Cooperation).

(2) Trend in overseas procurement

On the other hand, it is pointed out that the earthquake and the appreciation of the yen triggered an increase in overseas procurement of materials and components.[106] According to the aforementioned survey conducted by the Japan Bank for International Cooperation (2011), out of the companies

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106 Among analyses of the increase in overseas procurement, mainly changes in Japan's imports after 2010, is a report by Nihon Keizai Shimbun (2012). Yunyu Shin Chouryu, Jo/chu/ge (*Imports New trend I, II and III*) in morning edition dated from March 1 to 3, 2012.

affected by the earthquake in any way, which account for nearly 90% of the total respondents, the largest number (corresponding to about 70% of the total) answered that the earthquake "affected their procurement of materials and components." As a countermeasure, about 23% of these companies answered that they turned to foreign suppliers for substitute procurement, while about 45% cited Japanese substitute suppliers. At the same time, about half of the companies affected by the earthquake in terms of procurement answered that they did not change suppliers.[107] Furthermore, among foreign substitute suppliers, Chinese companies accounted for the largest share, followed by South Korean companies. As far as South Korean suppliers are concerned, they are frequently cited in the automotive industry (see Table 2-4-2-4).

Table 2-4-2-4

Impact of the earthquake on Japanese enterprises (whether there are substitute procurement and substitute suppliers, etc.)

Impact of the earthquake	Companies (number)	Ratio (%)	
Number of respondent companies	603	100.0	
Affected by the earthquake in any way	530	87.9	
Procurement was affected	422	70.0	100.0
Did not change suppliers	212	35.2	50.2
Procured from other Japanese suppliers for substitute procurement	191	31.7	45.3
Procured from foreign suppliers for substitute procurement	95	15.8	22.5

Foreign substitute suppliers (by country/region)	China	South Korea	Europe and the U.S.	Taiwan	Others	Number of respondent companies
Total	31	29	26	21	12	79
Chemicals	10	8	9	2	1	19
Electrical/ electronic	8	3	4	8	3	17
Automotive	4	8	6	2	2	16

Note: Survey as of July 2011. Multiple answers are accepted for questions about countermeasures taken by companies which were affected by the earthquake in terms of procurement of parts and materials as well as questions about county/region of foreign suppliers.
Source: *Report on Overseas Business Operations of Japanese Manufacturers - FY2011(the 23rd) Survey on Foreign Direct Investment* (Japan Bank for International Cooperation).

In the survey, it was also asked whether or not companies would continue substitute procurement hereafter (see Figure 2-4-2-5). Among the companies that turned to foreign suppliers, about 26% answered that they would continue procurement from the substitute suppliers and the figure is larger than that of the companies which turned to Japanese substitute suppliers (17%).

In the meantime, this section analyzes trends of the import penetration rate (which expresses a share of imports among gross domestic supply) by industry before and after the earthquake, using *Indices of Industrial Domestic Shipments and Imports* compiled by METI.[108] It is found that, though the import penetration rate of the mining and manufacturing industries as a whole has increased modestly in recent years, it deviated upward sharply from a trend line immediately after the earthquake (see Figure

107 In a hearing that was conducted along with the survey by the Japan Bank for International Cooperation (2011), companies mentioned, as a reason for not changing suppliers, that it is difficult to change them because an approval of customers is required for such changes, in addition to the fact that original suppliers recovered quickly. While some companies cited new business partners as a substitute supplier, a couple of companies commented that they turned to suppliers with which they had had business transactions in the past. Therefore, the bank analyzes that suppliers were changed out of consideration for quality of substitute products.

108 Miwa and Maruyama (2012) also conducted a comparative analysis of Japan's import penetration rate before and after the earthquake.

2-4-2-6).

Figure 2-4-2-5

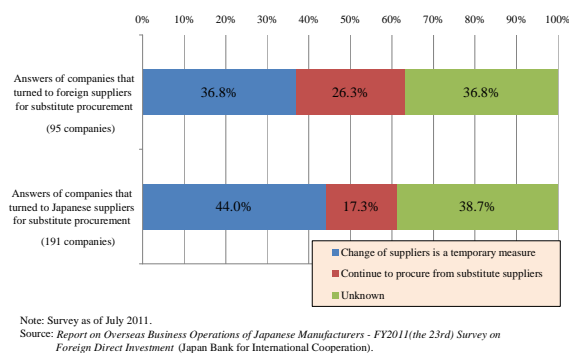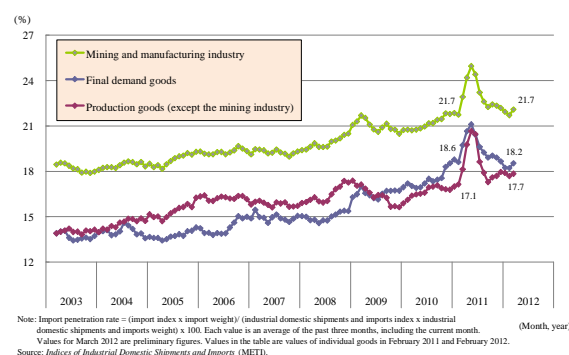Japanese enterprises' response to substitute suppliers

Figure 2-4-2-6

Import penetration rate of Japan's mining and manufacturing industry (by goods)
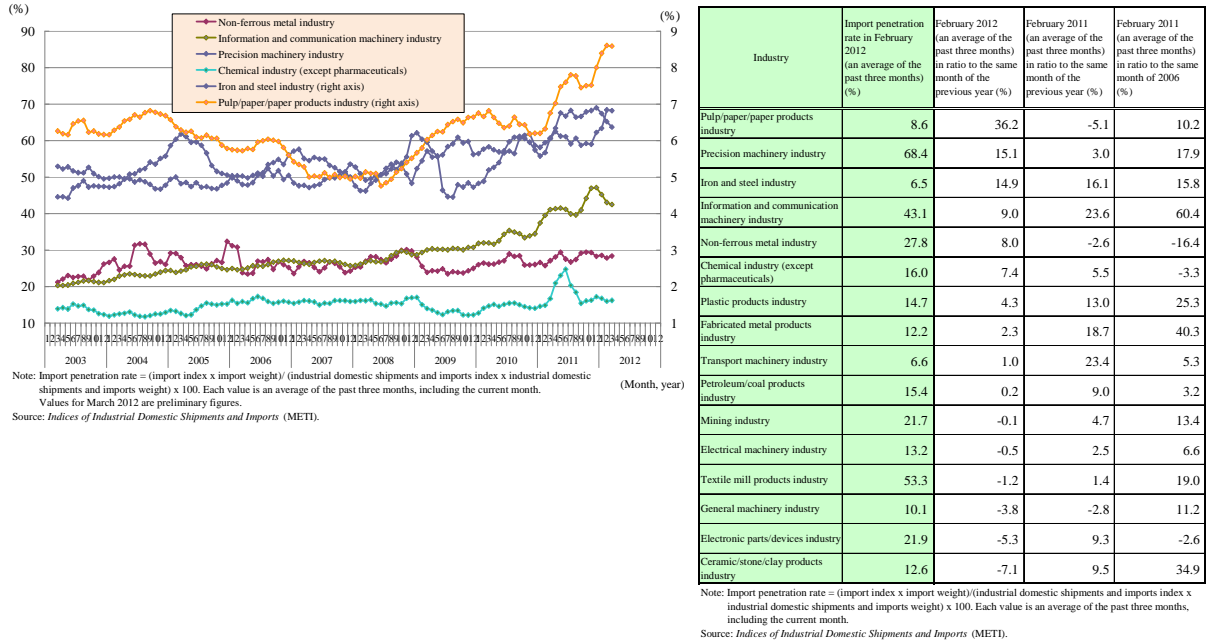
When comparing the import penetration rate (an average of the past three months, including the present month) in February 2012 with that of the same month in 2011, which is right before the earthquake, the mining and manufacturing industry as a whole shows no difference between 2011 and 2012, but import penetration rates by goods shows different movement. Although the import penetration rate of final demand goods had grown before the earthquake, it declined after increasing immediately after the earthquake once and recently fell below the rate of 2011 (in contrast to 18.6% in February 2011, the rate is 18.2% in February 2012). As to production goods (except the mining industry), the import penetration rate increased modestly in and after the latter half of 2009, i.e., before the earthquake, and the rate increased recently and even surpassed a pre-quake level (in contrast to 17.1% in February 2011, it is 17.7% in February 2012). Although it is difficult to evaluate at this point whether or not the import penetration rate of production goods will create a steep trend line compared with that in the past, it can be said that the rate remains high to this date.

Similarly, this section compares trends of the import penetration rate by industry as well (see Figure, Table 2-4-2-7). When calculating the volatility of the import penetration rate (an average of the past three months, including the present month) as of February 2011, which was just before the earthquake, and February 2012, the pulp, paper and paper-processed product industry showed the largest increase,

growing as much as about 36%. Taking into account that the rate of the industry had shown a decline in February 2011 from the same month of 2010, it is clear that imports in this industry surged suddenly after the earthquake. Among other industries that are closely associated with materials and parts, etc. and showed a large increase in the import penetration rate are the steel industry,[109] the non-ferrous metal industry, and the chemical industry (excluding pharmaceuticals).

Figure, Table 2-4-2-7

Import penetration rate of Japan's mining and manufacturing industry (by industry)

Note: Import penetration rate = (import index x import weight)/ (industrial domestic shipments and imports index x industrial domestic shipments and imports weight) x 100. Each value is an average of the past three months, including the current month.
Values for March 2012 are preliminary figures.
Source: *Indices of Industrial Domestic Shipments and Imports* (METI).

Industry	Import penetration rate in February 2012 (an average of the past three months) (%)	February 2012 (an average of the past three months) in ratio to the same month of the previous year (%)	February 2011 (an average of the past three months) in ratio to the same month of the previous year (%)	February 2011 (an average of the past three months) in ratio to the same month of 2006 (%)
Pulp/paper/paper products industry	8.6	36.2	-5.1	10.2
Precision machinery industry	68.4	15.1	3.0	17.9
Iron and steel industry	6.5	14.9	16.1	15.8
Information and communication machinery industry	43.1	9.0	23.6	60.4
Non-ferrous metal industry	27.8	8.0	-2.6	-16.4
Chemical industry (except pharmaceuticals)	16.0	7.4	5.5	-3.3
Plastic products industry	14.7	4.3	13.0	25.3
Fabricated metal products industry	12.2	2.3	18.7	40.3
Transport machinery industry	6.6	1.0	23.4	5.3
Petroleum/coal products industry	15.4	0.2	9.0	3.2
Mining industry	21.7	-0.1	4.7	13.4
Electrical machinery industry	13.2	-0.5	2.5	6.6
Textile mill products industry	53.3	-1.2	1.4	19.0
General machinery industry	10.1	-3.8	-2.8	11.2
Electronic parts/devices industry	21.9	-5.3	9.3	-2.6
Ceramic/stone/clay products industry	12.6	-7.1	9.5	34.9

Note: Import penetration rate = (import index x import weight)/(industrial domestic shipments and imports index x industrial domestic shipments and imports weight) x 100. Each value is an average of the past three months, including the current month.
Source: *Indices of Industrial Domestic Shipments and Imports* (METI).

Meantime, it is reasonable to think that Japanese companies in the steel, chemicals and plastic products industries had already inclined toward switching to overseas procurement even before the earthquake and continue to do so after the quake, rather than to think that they increased overseas procurement suddenly after the earthquake. This is because they had shown a larger increase in the import penetration rate in February 2011 from the same month of the previous year than after the earthquake. In addition to import penetration rate, this section examined import trends of the three items, namely steel, plastics and plastic products, and organic chemical products, from South Korea and China on the basis of trade statistics. Although all of these items showed a larger increase in imports and greater contribution in 2011 in ratio to the previous year, it is found that these figures are not as significant as the corresponding figures in 2010 (see Table 2-4-2-8).

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109 The media often reported the difficult business situation in the steel industry after the earthquake, including a decline in exports. (For example, Shinsai 1nen; Tekko Gyokaini Oshiyoseru Henkanonami, Kadaikokufukuni Motomerareru Speed (*One Year after the Earthquake: Wave of Change Surge to the Steel Industry, Speed Required to Overcome Challenges)* (Reuters) dated on March 13, 2012. But more recently there are some reports on a sign of improvement in exports of the industry. (For example, Tekko Yushutsu, Kaifukuno Kizashi, Endaka Ippuku, Asia Shikyo Kaizen (*Steel Exports, Sign of Recovery, the Higher Yen Coming to Rest and Improved Asian Markets)* (Nihon Keizai Shimbun) morning edition dated on March 19, 2012.

On the other hand, as far as industries that include many final demand goods are concerned, the precision machinery and information and communication equipment industries showed a large increase in import penetration rates. Yet, other than these two, there is no other industry that showed a conspicuous increase. Rather, the import penetration rate began to decline after the earthquake in many industries, including the electronic parts/devices industry.

Last of all, this section examines overseas procurement of parts in the automobile industry since it is pointed out in some media reports that there is a growing tendency among major automobile manufacturers to increase overseas procurement at their production plants in Kyushu.[110] As these automobile manufacturers import parts mainly through Moji Port (Tachinoura) for their plants in northern Kyushu,[111] import trends in automobile components at Moji Port are analyzed. Although imports through the port made a sharp decline temporarily in the wake of the earthquake, they made a swift recovery and, in some recent months, even exceeded the highest level of imports before the global economic crisis. Most of all, imports from South Korea surged after the earthquake and even surpassed import amounts from Thailand (see Figure 2-4-2-9).

Table 2-4-2-8

Import of major primary materials items from South Korea and China

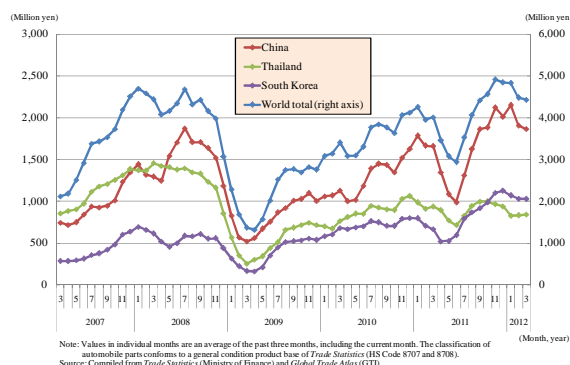| Origin of imports	HS code (2-digit basis)	Item	2011, ratio to the previous year (%)	Contribution (% point)	2010, ratio to the previous year (%)	Contribution (% point)
Imports from South Korea	−	All items	26.6	26.6	22.1	22.1
	72	Steel	29.5	3.0	58.0	4.5
	39	Plastic/plastic products	19.2	0.9	26.7	1.2
	29	Organic chemical products	20.8	0.7	7.8	0.3
Imports from China	−	All items	9.2	9.2	17.3	17.3
	72	Steel	48.6	0.5	109.6	0.6
	39	Plastic/plastic products	10.2	0.3	12.1	0.3
	29	Organic chemical products	17.5	0.3	25.3	0.4

Source: Compiled from *Trade Statistics* (Ministry of Finance) and *Global Trade Atlas* (GTI).

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110 For example, Nihon Keizai Shimbun published an article titled (Ote Jidosha Maker, Kyushu Seisan 5-wari cho, Kogatasha (ryaku) 7gatsu Ikan Chinori Ikashi Chuukannseino Buhin *(the name of major automobile manufacturer), More Than 50% of Production in Kyushu, Small Cars (omitted) Transferred in July, Parts from China and South Korea Taking Advantage of Location* in morning edition dated on April 6, 2012.

111 This is confirmed by Otokosawa (2011) in a hearing to the major manufacturers. The paper analyzes a possibility of distribution of automotive parts and industrial linkage between northern Kyushu and southeastern South Korea. Meantime, imports of automotive parts at Moji Port (a general condition product basis of *Trade Statistics*) totaled about 49 billion yen in 2011, accounting for 10.3% of total imports (about 472 billion yen). The amount is the fourth largest import amount by port in the country, following ports in Nagoya, Tokyo and Yokohama.

Figure 2-4-2-9

Import amount of automotive parts at Moji Port

Note: Values in individual months are an average of the past three months, including the current month. The classification of
automobile parts conforms to a general condition product base of *Trade Statistics* (HS Code 8707 and 8708).
Source: Compiled from *Trade Statistics* (Ministry of Finance) and *Global Trade Atlas* (GTI).

As analyzed in the White Paper of 2011, a ratio of imports/exports to industrial input/output was originally high in Kyushu due to its geographical proximity to Asia. There is a possibility that progress of global procurement would promote industrial agglomeration of the automobile industry in the Kyushu region as a production base. On the other hand, if domestic procurement declines in exchange for an increase in overseas procurement triggered by the impact of the earthquake and the higher yen, special attention should be paid to possible adverse impacts on domestic industries, for example, a possibility that domestic small and medium manufacturers of parts might are pushed out of procurement networks of major manufacturers.

3. Appreciation of the yen since last year and profitability of export enterprises
(1) Different levels of the higher yen depending on how exchange rates are viewed

Last year, the yen maintained its appreciation against other major currencies. On October 27, 2011, the yen appreciated to 75.67 yen against the U.S. dollar on the New York Foreign Exchange Market after renewing a post-war record high for three consecutive days. The yen rose 75.32 yen against the dollar on the Oceania Foreign Exchange Market during the morning session of October 31, 2011.The same morning, the Japanese government and Bank of Japan intervened in the foreign exchange market by selling yen and buying U.S. dollars. Since the post-war record high prior to the current appreciation of the yen is 79.75 yen against the U.S. dollar on April 19, 1995, the dollar-yen rate remained at a record-high level from the latter half of 2011 to earlier this year. As to the euro-yen exchange rate, the yen appreciated below a 100-yen level and rose to 97.04 yen on January 16, 2012, marking the highest level in about 11 years, (a record-high in the euro-yen exchange rate since the introduction of the euro is 88.93 yen marked on October 26, 2000.)

In order to understand the yen rate and evaluate exchange rate levels more comprehensively, two indicators are commonly used; one is an exchange rate changed to an "effective" basis (the nominal effective exchange rate), which is the weighted average of nominal exchange rates of multiple currencies (such as the dollar-yen rate) by trade amount, and the other is an exchange rate changed to a "real" basis (the real effective exchange rate), which is obtained by adjusting the nominal effective

exchange rate, using product prices in the home country and rivaling countries.[112]

While examining exchange rates with the three indicators, namely the dollar-yen exchange rate, the nominal effective exchange rate and the real effective exchange rate, this section compares the appreciation of the yen as of January 2012[113] with the past cases (see Figure 2-4-3-1). As far as the dollar-yen rate is concerned, the yen rate in January 2012 is about 8.6% higher than that in April 1995, which had been a record-high before the current appreciation of the yen began last year (the latest record-high marked in October 2011 is about 8.9% higher than the rate in April 1995). However, it is found that the nominal effective exchange rate of the yen appreciates more drastically, rising as much as 15.3%. This means that the value of the yen increases not only against the U.S. dollar but also against other currencies such as the euro which are widely used by Japan's trade partners. Therefore, the current appreciation of the yen has been creating a severer exchange rate environment to Japanese export enterprises.

Figure 2-4-3-1

Dollar-yen rate after the Plaza Accord and effective exchange rate of the yen (nominal/real)

(Index: September 1985=100)

Note: Value as of September 1985 is set as 100. The latest value is of March 2012.
Source: *Foreign Exchange Rates (Tokyo market interbank rates: monthly)* and *Effective Exchange Rates(nominal/real)* (BOJ).
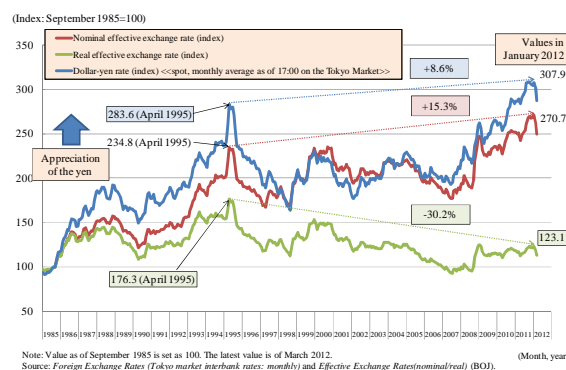
When using the real effective exchange rate for comparison, however, it reveals a totally different picture. In the first place, the real effective exchange rate of the yen as of April 1995 is not at a high level compared with the nominal exchange rate. Furthermore, while the real effective exchange rate of the yen as of January 2012 is at a higher level, it is still about 30.2% lower than that as of April 1995. In addition, it is found that the yen rate during the recent depreciation of the yen from 2007 to 2008 is even lower than that in September 1985 when the Plaza Accord was signed. This demonstrates that Japan's relative prices, which are expressed in comparison of domestic prices with overseas prices, are relatively cheap in recent years compared with those in other countries. The following section examines how to evaluate these different exchange rate levels of the yen which are revealed by the three indicators of exchange rates.

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112 As to the definition of "change to effective basis" and "change to real basis," Ito, Inaba, Ozaki and Sekine (2011) are mainly quoted.

113 While it is January 2012 that the effective exchange rate of the yen (both nominal and real) rose most sharply by month during the current appreciation of the yen, it is October 2011 that the yen rose most rapidly in terms of a monthly average of the dollar-yen exchange rates.

Although there are many points to be noted in measuring Japan's international competitiveness,[114] it is desirable to consider not only a movement of the nominal exchange rate but also a movement of the "real" exchange rate, which takes into account fluctuations of product prices in individual countries. Furthermore, in order to clarify competitive relationship in the whole global market, it is essential to examine the "effective" exchange rate as well, which reflects movements of multiple currencies instead of a single currency. In this regard, the real effective exchange rate has both of the features and thus properly represents Japan's international competitiveness rather than the nominal exchange rate of a single currency such as the dollar-yen rate (Ito, Inaba, Ozaki, Sekine, et al. (2011)).

There are opinions from various quarters to suggest that, based on the aforementioned argument; the current appreciation of the yen may not exacerbate business performance of Japan's manufacturing industries so badly as far as the real effective exchange rate of the yen remains at the present level.[115] As discussed later, however, it appears that a sense of crisis over the current appreciation of the yen among Japan's manufacturing enterprises results from a completely different perception of the present conditions from the evaluation based on the real effective exchange rate.[116]

(2) Reason for sense of crisis among Japan's export enterprises
(A) Appreciation of the yen beyond companies' assumed rate and investment judgment under little expectation for depreciation of the yen

With regard to a divergence between the exchange rate levels on the real effective exchange rate basis and a sense of crisis over the current appreciation of the yen felt by companies, this section refers to and analyzes results obtained from three questionnaire surveys with companies on the higher yen.

First, it analyzes a recently growing "divergence" between profitability/estimated exchange rate of export enterprises and the actual dollar-yen rate (see Figure 2-4-3-2).
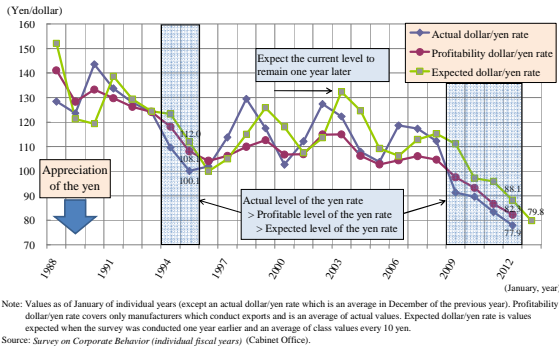
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114 According to Ito, Inaba, Ozaki and Sekine (2011), in case of using the real effective exchange rate, such factors as sharp fluctuations, differences in economic circumstances, changes in economic structure in home country and its rivaling countries and errors in estimates should be considered in addition to merely comparing the present level of the rate with the past one.

115 For example, an article titled "Out of the ruins" published in The Economist (issue of August 27, 2011) reports that, judging from the level of the real effective exchange rate, Japan's manufacturing industries will continue to make appropriate profits and will move their business overseas not because of the higher yen but because of being closer to growing markets. "That is one reason why Japanese manufacturers have continued to make decent profits. Companies gripe that the strong yen may push them to move operations overseas. Yet they are heading there anyway, to be closer to consumers in faster-growing markets."

116 For example, CEO of a major automotive manufacturer said "the present level (of the yen) is extraordinary. It is an extraordinary situation." The president also expressed his concern, saying that "we cannot implement a new domestic project at the present level of the higher yen. It is more efficient to do so abroad and, if this situation continues, domestic (industries) would hollow out completely." The president called for the government to take further actions against the higher yen, saying that "the higher yen began to shadow employment and investment activities. I want the exchange rates to be back to a usual level." (Nikkei QUICK News, Inc., October 24, 2011)

Figure 2-4-3-2

Comparison of profitability/estimated exchange rate of Japanese exporting enterprises and actual dollar-yen rate

Note: Values as of January of individual years (except an actual dollar/yen rate which is an average in December of the previous year). Profitability dollar/yen rate covers only manufacturers which conduct exports and is an average of actual values. Expected dollar/yen rate is values expected when the survey was conducted one year earlier and an average of class values every 10 yen.

Source: *Survey on Corporate Behavior (individual fiscal years)* (Cabinet Office).

If the actual dollar-yen exchange rate is much higher than that of profitability/estimated exchange rates of companies, it would cause a seriously negative impact on corporate management. According to an annual questionnaire survey conducted by Cabinet Office, Japanese export enterprises continuously reflect the appreciation of the yen in their profitability exchange rate in recent years. In other words, this demonstrates that Japanese enterprises make constant efforts to improve their resilience to the appreciation of the yen. Yet, in realities, the yen continues to appreciate in and after 2009 beyond their profitability/estimated exchange rates, which is similar to the situation around 1995. While profitability/estimated exchange rates of export companies usually tend to lag slightly behind actual exchange rates, it is assumed that a serious divergence between the two gives a reason for the strong sense of crisis on the side of corporate management in the backdrop of the current higher yen. In addition, there is a tendency for companies to expect that their estimated exchange rates remain unchanged for one year, according to the survey results. Therefore, the companies are particularly vulnerable to a sharp rise of the yen which they cannot reflect in their business plan.

Second, it should be noted that companies make a very severe forecast of exchange rates in a medium- and long-term (see Figure, Table 2-4-3-3).

According to the "survey on Corporate Attitudes towards Yen Appreciation" published by Teikoku Databank, Ltd. in September 2011,[117] 35.5% of the total respondents reply that the appreciation of the yen causes a negative impact on their sales (the percentage goes up to 46.8% in the manufacturing sector only and, the figure exceeds 60% in machinery industries such as transport machinery/equipment, which are a key segment of the manufacturing sector). These figures are almost the same level as the results of a previous survey which was conducted in August 2010, reflecting companies' continuous efforts to grapple with the appreciation of the yen. When it comes to expectation for the current yen rate to change its direction towards depreciation, however, 25.8% of the total respondents (26.1% in the manufacturing sector) answered that they "cannot expect the depreciation of the yen in a long term" and 31.0% (30.6% in the manufacturing sector) chose "unknown," jointly accounting for more than half of the total. These respondents anticipate that the

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117 This survey was conducted from August 19 to 31, 2011, and 11,070 companies responded to the survey.

trend of the higher yen will continue for the time being and the survey result demonstrates the strong sense of crisis that the respondents already have little expectation for the change in the trend of the exchange rates.[118] Meantime, as to countermeasures against the appreciation of the yen, 23.4% of the total respondents reply "to increase overseas procurement," accounting for the largest share of the total. This result indicates a possibility that Japanese companies would expand overseas production further and that hollowing out of domestic industries would be facilitated.[119] As mentioned earlier, if the appreciation of the yen and the earthquake trigger a decline in domestic production in an exchange for increase in overseas procurement, it would raise a concern that Japan's small and medium enterprises might be excluded from major manufacturers' procurement networks for materials/components and/or face a decrease in business with such manufacturers.

Figure, Table 2-4-3-3

Results of questionnaire survey with Japanese enterprises in the "Survey on Corporate Attitudes towards Yen Appreciation"

	Implemented/considered measures against the higher yen (multiple answers, %)	Total enterprises with overseas business (n=3,426)	Export enterprises (n=1,946)
1	Increase overseas procurement	23.4	23.4
2	Increase imports	19.3	14.9
3	Maintain yen-denominated prices (raise export prices denominated in foreign currency)	16.7	25.4
4	Hedge exchange rate risks (derivatives such as futures and forward)	13.9	12.9
5	Implement cost-cutting measures, including restructuring of domestic production divisions	13.7	17.9
6	Expand/establish production center overseas	10.3	12.6
7	Raise a ratio of overseas production	9.8	12.0
8	Reduce yen-denominated prices (maintaining export prices denominated in foreign currency)	8.4	12.6
9	Review foreign suppliers	6.8	5.5
10	Review foreign supplier countries	6.0	4.8
11	Lower a ratio of exports	5.1	8.8
12	Decrease domestic production	3.5	4.7
13	Increase domestic procurement	2.8	2.4
	Others	13.0	10.3

Source: *Survey on Corporate Attitudes towards Yen Appreciation* conducted in August 2011 (Teikoku Databank, Ltd).
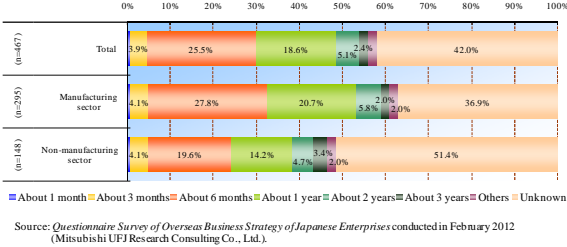
Third, when companies make investment judgments and, as part of such judgments, consider a

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118 According to results of a hearing (*Hearing Results with Business Partners about the Higher Yen and Thai Floods, etc.* conducted on 186 companies in November 2011) conducted by the Development Bank of Japan (2011), more than 70% of the companies answer "unknown." Among the rest, the number of companies which reply that "the higher yen trend will continue at least for three to five years" exceeded that of companies which answer that "the higher yen trend will end within three years and then the yen will depreciate." In particular, a large number of companies in processing industries of the manufacturing sector answer that "the higher yen trend will continue at least for three to five years." As a result of the hearing, the bank suggests that "companies with greater degree of overseas dependence tend to forecast exchange rates in a stricter way."

119 In a questionnaire survey titled *Questionnaire on Overseas Business Strategy of Firms* which was commissioned by METI and conducted by MURC in February 2012, as actual countermeasures against the appreciation of the yen (multiple answers), 63.1% of the total (279 companies) in the manufacturing sector cited "review of procurement of raw materials/components, etc." accounting for the largest share.

period until they actually make new investments, the fact that the current level of the higher yen already continues for a substantial period of time becomes important information (see Figure 2-4-3-4).

Figure 2-4-3-4

Period until actual new investments, etc. are made by Japanese enterprises on the basis of exchange rate

Source: *Questionnaire Survey of Overseas Business Strategy of Japanese Enterprises* conducted in February 2012
(Mitsubishi UFJ Research Consulting Co., Ltd.).

According to results of a survey with Japanese enterprises (Questionnaire Survey of Overseas Business Strategy of Japanese Enterprises) conducted by Mitsubishi UFJ Research Consulting Co., Ltd. (hereafter MURC) in February 2012, about half (48.5%) of 295 manufacturing companies cited six months to one year as a period until they actually make new investments after considering levels and fluctuations of exchange rates. Since it is found in the aforementioned survey by the Cabinet Office that the current appreciation of the yen remains at a higher level than companies' profitability/estimated exchange rate for four years, there is no doubt that the current exchange rate level makes a negative impact on their investment judgments of whether they would make investments in Japan one year later.

Judging from the aforementioned results of the three surveys, when enterprises need to make investment decisions swiftly in the face of the yen rate exceeding their profitability/estimated exchange rates for a long time and little expectation for the depreciation of the yen, their sense of crisis about the exchange rates likely leads to realization and actions that they cannot help but hesitating to make domestic investments. Therefore, it can be said that the sense of crisis held by companies is considerably serious.

(B) Severe environment not only exchange rate levels but also its fluctuations

When it comes to the exchange rate environment, it is likely that, needless to say the exchange rate levels, a degree of fluctuations in exchange rates make a substantial impact on overseas procurement, exports, and foreign direct investment by Japanese enterprises. In the aforementioned survey conducted by MURC, a question is asked which of an exchange rate level or fluctuation in exchange rates are more problematic. About three fourths of the total respondents (300 companies) in the manufacturing sector answer that the exchange rate level is more problematic, while the remaining one fourth cite fluctuations in exchange rates as more problematic. Furthermore, a ratio of respondents choosing fluctuations in exchange rate as more problematic is larger in the non-manufacturing sectors, accounting for about 35% of the sectors (151 companies) (see Figure 2-4-3-5).

Figure 2-4-3-5

Concepts of Japanese enterprises regarding exchange rate levels and fluctuations in exchange rate (which is more problematic?)
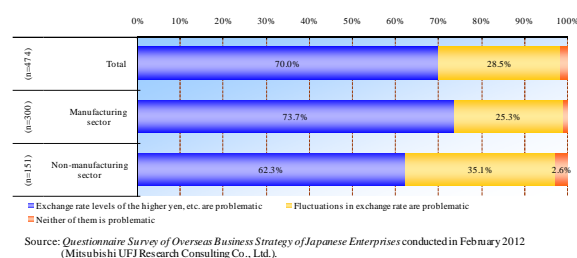
In addition to comparing the current level of the higher yen with the past cases, this section examines whether there is drastic changes in the real effective exchange rate of the yen against other major currencies. On top of comparing the real effective exchange rate of the yen in January 2012 with that in the past appreciation of the yen, this section compares the volatility of the real effective exchange rate of the yen with those of the dollar, the euro and the won for the same period (see Figure 2-4-3-6). Although the real effective exchange rate of the yen appreciates 4.0% from one year ago and 8.4% from two years ago, it rises as much as 32.5% over a period of four and half years from 2007 when the yen depreciated most recently. On the other hand, the real effective exchange rate of other major currencies decline in general over the corresponding periods. The euro drops 11.0% from two years ago and the dollar declines 7.6% from 2007 when the yen was weaker. In particular, the won declines conspicuously over the same period, dropping 25.0% from 2007. The increase in the yen and the decline in the won add up to about 60% and this suggests that the relatively large fluctuations in the exchange rates cause a serious impact on the recent export environments of both Japan and South Korea.

Furthermore, standard deviation of the yen and these major currencies is calculated in order to confirm trends in the real effective exchange rate of these currencies and the dispersion of exchange rates from January 1994, which is just before the yen began to appreciate in 1995, to the present (as of March 2012) (see Figure 2-4-3-7).[120]

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120 Please note that standard deviation of the real effective exchange rate index at an absolute level is calculated here, not standard deviation of volatility of the index (the so-called historical volatility).

Figure 2-4-3-6

Recent volatility of the yen and major related currencies (real, effective rate basis)
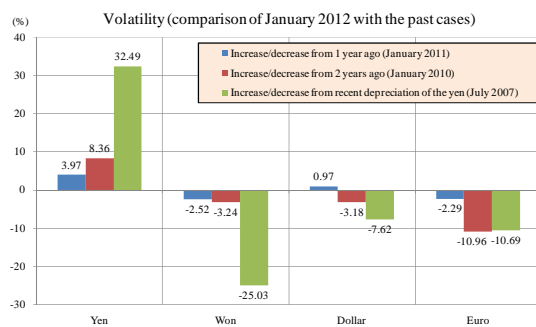
Volatility (comparison of January 2012 with the past cases)

Note: For the effective basis, a broad base (weighted average of trade amounts in major 61 countries/regions) is adopted.
Source: *Effective Exchange Rates (Real)* (BIS).

Figure 2-4-3-7

Standard deviation of the yen and major related currencies (real, effective rate basis)

Real effective exchange rates of the dollar and the euro

Note: For the effective basis, a broad base is adopted. Standard deviation is calculated for a period from January 1994 to March 2012.
Source: *Effective Exchange Rates (Real)* (BIS).

Real effective exchange rates of the yen and the won

Note: For the effective basis, a broad base is adopted. Standard deviation is calculated for a period from January 1994 to March 2012.
Source: *Effective Exchange Rates (Real)* (BIS).

The standard deviation of the yen rate is 14.7, which is larger than those of the euro (7.2) and the dollar (9.4). It is even larger than that of the won (13.2), despite the fact that the won fluctuated considerably during the examined period due to the Asian financial crisis and the global financial crisis. It is confirmed that the dispersion of the yen rate was relatively large in the long term as well compared with that of other major currencies. This suggests that the exchange rate environment is severe to Japanese companies in a relative sense to other major countries in term of not only the exchange rate levels but also the degree of fluctuations of the exchange rates.

(3) Appreciation of the yen without improvement of terms of trade

In order to understand the reason for the sense of crisis expressed by Japanese enterprises in the context of Japan's economic structure, this section analyzes the terms of trade by countries/regions as well as by industry.

While the movement of exchange rates, which was examined earlier in this section, is a matter of grave concern to export enterprises, the issue of how such a movement changes the "terms of trade" becomes similarly important. Broadly speaking, the terms of trade are an indicator to express to what extent an increase in payment resulted from an increase in prices of imported natural

resources/materials can be passed on to export prices. Specifically, the terms of trade can be calculated by "dividing export price by import price."[121] That is, if a rise in the value of the yen against foreign currencies can lessen the prices of imported goods, including natural resources/materials (on the assumption that export prices are fixed), it means that the higher yen should improve the terms of trade.

However, judging from the recent movement of Japan's terms of trade, the country fails to utilize benefits of the higher yen fully and its terms of trade deteriorate when the real effective exchange rate of the yen increases in and after the global economic crisis (see Figure 2-4-3-8). In contrast to the period when the yen appreciated around 1995, during which benefits from the exchange rate helped improve Japan's terms of trade, albeit slightly, both the exchange rates and the terms of trade worsened during the current appreciation of the yen, inflicting very difficult conditions on export enterprises.

Figure 2-4-3-8
Japan's terms of trade and real, effective exchange rate in recent years

Note: Values are indexed (September 1985 = 100). The latest value is March 2012.
Source: Compiled from *Effective Exchange Rates (nominal/real)* and *Corporate Goods Price Index (the 2005 standards)* (BOJ).
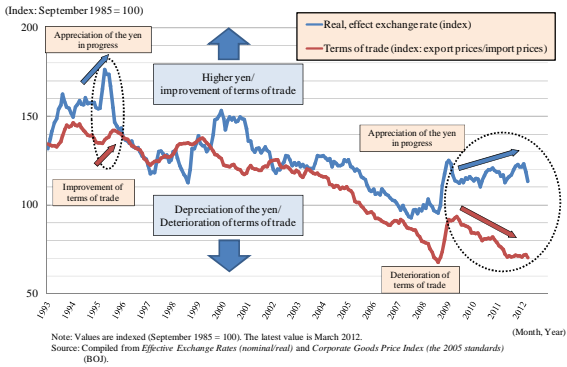
Furthermore, it is found that Japan's terms of trade continued to deteriorate not only during the current appreciation of the yen but also during the depreciation of the yen in the early 2000s. Even when the yen depreciated sharply from 2004 to around 2007, Japan's terms of trade worsened rapidly and the benefits of the weaker yen could not be enjoyed because increases in export prices remained modest due to intensified international competition over export goods and overall import prices increased due to repeated price hikes of natural resources/materials (see Figure 2-4-3-9).

Chronic deterioration of Japan's terms of trade, which take place independently from fluctuations in exchange rates as seen earlier, is an evidence to demonstrate that it is manufacturing sector that has been continuing to maintain/restore international competitiveness mainly by making cost-cutting

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[121] As to trade price index which is used to calculate terms of trade, there are two methods; one is the method of using "unit value" which is obtained by dividing export/import amount by export/import quantities and, in Japan, this is "export/import price index" in Trade Statistics made public by the Ministry of Finance. The other is the method of using "survey price" which surveys trends of typical trade goods and, in Japan, this is Export/Import Price Index in Domestic Corporate Goods Price Index announced by BOJ, according to Silver (2007), IMF et al. (2009), and Kinoshita and Kuroko et al. (2011). In this section, in order to exclude price fluctuations accompanied by improvement of quality, terms of trade in Japan and other countries are calculated based on "survey price," which is recommended as trade price index by Silver (2007) and IMF et al. (2009).

efforts and thus suppressing prices of export products in many years. In other words, this supports the conclusion that Japan's domestic business environment tends to deteriorate rapidly when the yen appreciates sharply.

Figure 2-4-3-9

Japan's terms of trade and export/import price in recent years

Note: Values are indexed (September 1985 =100). The latest value is of March 2012.
Source: *Corporate Goods Price Index (2005 base)* (BOJ).
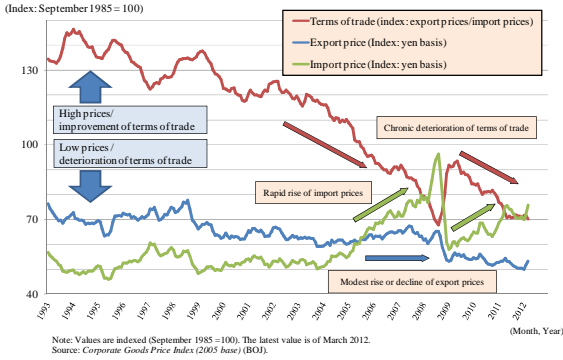
(A) Comparison of terms of trade by countries/regions (worsening terms of trade in Asian countries/regions)

In order to analyze the chronic deterioration of Japan's terms of trade in recent years, this section compares recent terms of trade by countries/regions (see Table 2-4-3-10).

Table 2-4-3-10

Comparison of recent terms of trade of countries/regions

(Recent values against the past higher yen in April 1995 (= 100))

Terms of trade	Japan	U.S.	UK	Germany	South Korea	Taiwan	Hong Kong	Singapore	Thailand	Australia	New Zealand	Brazil
Index	51.5	90.2	101.1	87.8	41.5	64.1	98.4	77.7	78.5	190.2	130.4	121.1
(Recent month, year)	2012.3	2012.3	2012.2	2012.3	2012.3	2012.4	2012.2	2012.1	2012.2	2012.3	2011.12	2012.3

Note: Terms of trade in individual countries are calculated by dividing export price/import price, except Hong Kong and Thailand. Because of limited data, terms of trade in Hong Kong and Thailand are calculated by dividing export unit value/import unit value. All values are home currency basis.
Source: Compiled from *Export/Import Price Index ″ (U.S., U.K. Germany and Singapore)* (IMF), *Export/Import Unit Value Index (Thailand)* (IMF), *Export/Import Price Index (Japan)* (BOJ), *Export/Import Price Index (South Korea)* (The Bank of Korea), *Export/Import Price Index (Taiwan)* (Directorate-General of Budget, Accounting and Statistics), *Export/Import Unit Value Index (Hong Kong)* (Census & Statistic Department), *Export/Import Price Index (Australia)* (Australian Bureau of Statistics), *Export/Import Price Index (New Zealand)* (Statistics New Zealand), *Export/Import Price Index (Brazil)* (Center for Foreign Trade Studies Foundation) and *CEIC Database* .

In order to compare how Japan's competitive conditions with other countries/regions has changed from the past period of the higher yen, the terms of trade for individual countries/regions in April 1995 are set as a baseline (=100). It is found that, in fact, the recent terms of trade of Japan deteriorated about 50% from the 1995 baseline. It is only South Korea (about 60% in deterioration) that outpaced Japan in terms of deterioration of the terms of trade. Therefore, the more recent international competitive environment became more difficult for Japan than that of 1995.

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With the exception of Japan, major developed countries, particularly U.S., UK, and Germany, maintained their terms of trade at a certain level for about two decades in and after 1990 and this suggests that these countries coped with the soaring prices of natural resources and raw materials by passing the price increases on to prices of their export products (see Figure 2-4-3-11).

Figure 2-4-3-11

Terms of trade of major advanced countries

Note: Terms of trade in individual countries are calculated by dividing export price/import price. All values are home currency basis.
For comparison with the past appreciation of the yen, the value in April 1995 is set as100.
Source: Compiled from *Export/Import Price Index (U.S., U.K. and Germany)* (IMF), *Export/Import Price Index (Japan)* (BOJ) and *CEIC Database*.
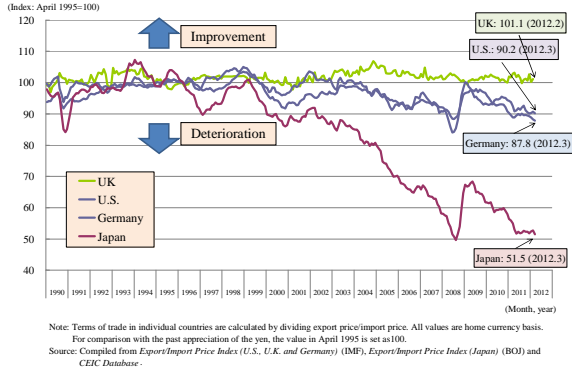
When it comes to major countries/regions in Asia and the Oceania region, Australia, New Zealand and Brazil, which are rich in natural resources and food exporters, have improved their terms of trade drastically in recent years due to price increases in those commodities. In contrast, the terms of trade in countries/regions other than these three countries deteriorated. In particular, the terms of trade in Japan, South Korea and Taiwan deteriorated in almost the same manner in and after the 2000s, though levels of the deterioration were different. Similarly, the terms of trade in Thailand and Singapore continue to deteriorate in and after the 2000s (see Figure 2-4-3-12).

It is assumed that the synchronized deterioration of the terms of trade in those countries/regions in Asia results from their similarity of foreign trade structure that they import most of their natural resources/raw materials and export a massive volume of industrial products, though there is some difference in the degree of processing. There is a clear difference between the countries/regions in Asia and major countries in Europe and the U.S., which have a similar foreign trade structure to those of the Asian countries but continue to maintain their terms of trade.

Figure 2-4-3-12

Terms of trade of major countries/regions in Asia and Oceania, etc.
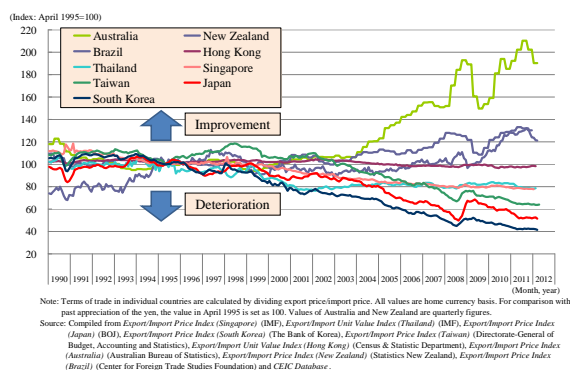
(B) Comparison of terms of trade by industry (worsening terms of trade in specific industry)

In spite of having the same economic structure centering on the manufacturing sector, some countries/regions can maintain the terms of trade and others continue to worsen them. According to Nezu (2011), the difference between the two results from whether enterprises are able to adopt export strategies of avoiding commoditization of their products and price competition with products manufactured in emerging economies. Then, this section compares the terms of trade by industry in Japan's manufacturing sector (see Figure 2-4-3-13).

For the purpose of comparing how the current terms of trade change from those in the past appreciation of the yen by industry, the terms of trade in individual industries as of April 1995 are set as a baseline (= 100) (a formula used to calculate terms of trade here is dividing output price by input price in individual industries of the manufacturing sector and this formula is different from the calculation method for terms of trade by countries/region). It is found that the terms of trade in the overall manufacturing sector deteriorated about 15% from the 1995 baseline. There are only limited numbers of industries that show improvement of the terms of trade compared with the 1995 level and one example of such industries is the precision machinery industry. On the other hand, among industries of which terms of trade deteriorated from the 1995 baseline, deterioration was conspicuous in the primary materials industries such as the steel and chemical products and processing industries such as in electrical/electronic equipment. The deterioration of the terms of trade in these industries was larger than that of the overall manufacturing sector.

In addition, there is a clear difference between the primary materials industries and the processing industries with regard to changes in the terms of trade. It is found that, in the primary materials industries, changes in prices of raw materials and others on the input side was a main factor behind fluctuations of the terms of trade and that a range of fluctuations tends to be larger. In addition, an increase in prices of raw materials and others is offset somewhat by the recent appreciation of the yen and this led to slight improvements in the terms of trade in some industries (see Figure 2-4-3-14).

Figure 2-4-3-13

Comparison of latest terms of trade of Japanese manufacturers (by industry)
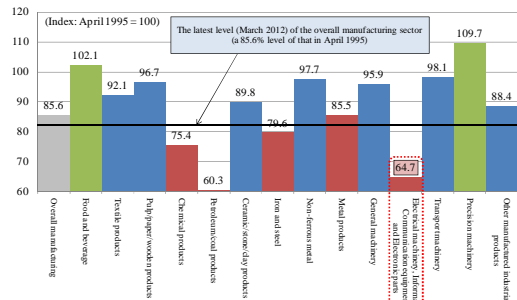
Note: Terms of trade by industry is calculated by dividing output price/input price. The latest values are of March 2012. Bar graph in green shows industries that improve from April 1995. Bar graph in blue shows industries that worsen from April 1995 but are better than the recent value of the overall manufacturing. Bar graph in red shows industries that worsen from April 1995 and the recent value of the overall manufacturing.
Source: *Input-Output Price Index of the Manufacturing Industry by Sector (2005 base)* (BOJ).

Figure 2-4-3-14

Terms of trade of major Japanese primary materials industries
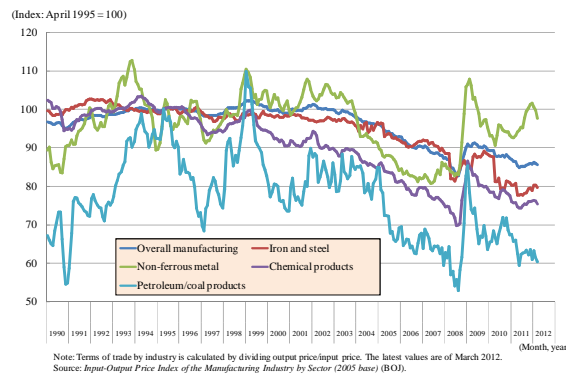
Note: Terms of trade by industry is calculated by dividing output price/input price. The latest values are of March 2012.
Source: *Input-Output Price Index of the Manufacturing Industry by Sector (2005 base)* (BOJ).

On the other hand, though the terms of trade in the processing industries fluctuated moderately compared with those of the primary materials industries, they continued to deteriorate in and after the latter half of the 1990s even during the depreciation of the yen, except certain periods. While they were affected by changes in prices on the input side, it is assumed that a main factor influencing the terms of trade in recent years was the price structure on the output side, i.e., the processing industries had to keep prices of export products low constantly in the face of severe price-cutting competition with countries/regions in Asia. More recently, the terms of trade have just begun to deteriorate even in other industries of the manufacturing sector such as general machinery, transport machinery, and precision machinery. Although these industries maintained a certain level of the terms of trade without deteriorating them until now, they needed to keep product prices lower amid the current appreciation of the yen, affecting their terms of trade negatively (see Figure 2-4-3-15).

Figure 2-4-3-15

Terms of trade of major Japanese processing industries

(Index: April 1995 = 100)

Note: Terms of trade by industry is calculated by dividing output price/input price. The latest values are of March 2012.
Source: *Input-Output Price Index of the Manufacturing Industry by Sector (2005 base)* (BOJ).
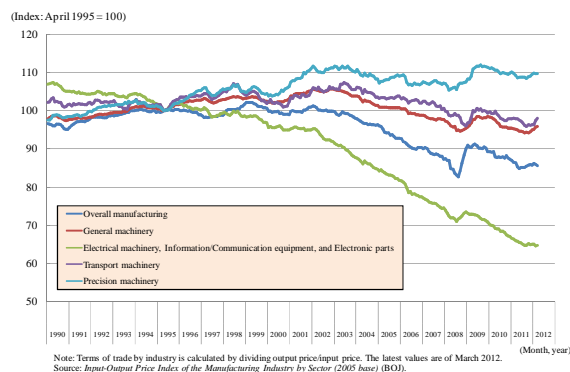
In addition, a questionnaire survey with enterprises reveals a particularly severe business environment faced by the processing industries amid the recent appreciation of the yen (see Figure 2-4-3-16).

Figure 2-4-3-16

Impact of the appreciation of the yen on earnings of Japanese enterprises (by industry)

Note: "Negative impact" is a total of "considerably negative impact" and "somewhat negative impact." "Favorable impact" is a total of "considerably favorable impact" and "somewhat favorable impact." "Almost no impact, etc." is a total of "almost no impact" and "no answer."
Source: *Nissay Survey on Business Conditions* (survey in the latter half of fiscal 2010, conducted in January 2011, the number of respondents is 5,384 companies) (Nippon Life Insurance Company and Nissay Leasing Co., Ltd.).

According to the questionnaire survey with enterprises titled Nissay Survey on Business Conditions (the latter half of fiscal 2010) conducted jointly by Nippon Life Insurance Company and Nissay Leasing Co., Ltd. in January 2011, as much as 78.4% of enterprises in the general machinery/precision machinery industry answer that the appreciation of the yen caused a negative impact on their profitability, in contrast to 53.5% in overall manufacturers. The ratio of respondents citing the exchange rates as a negative impact was also higher in the transport equipment industry (64.6%) and the electrical machinery industry (62.9%) than that in the overall manufacturers. This indicates that the recent appreciation of the yen caused a seriously negative impact on profitability, particularly in the machinery industries, and that this negative impact emerged in the form of the deterioration of the terms of trade.

(C) Relationship between real effective exchange rate and terms of trade

As discussed earlier, it is evident from the recent terms of trade in the machinery industries that the increase in the real effective exchange rate of the yen does not always bring about the improvement of the terms of trade. According to Okada and Hamada (2009) and Kataoka (2011), changes in the terms of trade can explain only a part of movement of the real effective exchange rate over the long term and it is possible that the real effective exchange rate moves in the opposite direction to the terms of trade, depending on international structure of demands for traded goods.[122] While there are various factors to explain fluctuations of the real effective exchange rate, the very severe environment remains unchanged to Japan's export enterprises after all as far as the increase in the real effective exchange rate of the yen exists concurrently with the deterioration of the terms of trade.

According to Okada and Hamada (2009) and Arima (2010), it is appropriate to measure profitability of export industries by the ratio of the terms of trade to the real effective exchange rate (=the terms of trade/the real effective exchange rate). This means purchasing power parity measured by a ratio of export/import prices to domestic production cost (≈ consumer price) and can be interpreted as profitability of export industries. In accordance with this argument, even if the real effective exchange rate increases, profitability in export industries would not be affected much as far as the terms of trade improve and offset the appreciation of the currency. However, if the appreciation of the real effective exchange rate is so considerable that the terms of trade cannot explain it, profitability of the export industries would be damaged.[123]

(4) Comparison of profitability of export industries in Japan, Germany and South Korea

Using the aforementioned ratio of the terms of trade to the real effective exchange rate (=the terms of trade/the real effective exchange rate) as an indicator, this section compares profitability of the export industry in Japan, South Korea and Germany.

Profitability in Japan's export industry appeared to deteriorate rapidly during the appreciation of the real effective exchange rate of the yen (an increase in denominator of profitability) accompanied by

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122 According to Okada and Hamada (2009), the terms of trade (= export price/import price) are relative price of traded goods (export goods and import goods). On the other hand, though the real effective exchange rate (see the formula below) is also related with the terms of trade, it means mainly "fluctuations in relative price of non-traded goods and traded goods" and it is possible that it moves in the opposite direction of terms of trade, depending on weights given to the terms of trade (a symbol of difference between export goods weight and import goods weight in the formula below. For example, if demand for industrial goods exported by Japan is stronger abroad than in Japan and demand for natural resources and raw materials imported by Japan is stronger in Japan than abroad, it is possible that the terms of trade move in the opposite direction of the real effective exchange rate, contrary to the case in which home bias exists.

<< Logarithmic expression >>
　(real effective exchange rate)
　　= (nominal effective exchange rate) – (purchasing power parity)
　　= (export goods weight - import goods weight) x (terms of trade)
　　　+ (weight) x (domestic price of non-traded goods – domestic price of traded goods)
　　　- (weight) x (overseas price of non-traded goods – overseas price of traded goods).

123 Meantime, it is said that an increase in the real effective exchange rate that cannot be explained by the terms of trade results largely from low productivity in the domestic sector of non-traded goods. This is explained in details by Cabinet Office (2011).

the deterioration of the terms of trade (a decrease in numerator of profitability) in and after the period of 2007 to 2008. Meanwhile, it is found that Japan's profitability did not improve even when the real effective exchange rate of the yen began to depreciate in the early 2000s and this is because its terms of trade continued to deteriorate gradually. As analyzed previously, as import prices increased sharply due to the soaring energy prices and other reasons, export prices increased moderately or rather declined after the global economic crisis (see Figure 2-4-3-17).

Similar to Japan, it is assumed that profitability in South Korea's export industry declined drastically because the real effective exchange rate of the won appreciated (an increase in denominator of profitability) and its terms of trade deteriorated (a decrease in numerator of profitability) in and after the first half of the 2000s. It is certain that South Korea experienced a drastic but temporary improvement of profitability due to the rapid depreciation of the won in the wake of the Asian Financial Crisis in 1997 and the global economic crisis in 2008. However, South Korea's terms of trade deteriorated more significantly than those of Japan over the medium term due to the drastic rise in import prices driven by the depreciation of the won and thus it is found that the country is in a fiercely competitive environment just like Japan (see Figure 2-4-3-18).

Figure 2-4-3-17
Japan's terms of trade/export/import price, real, effective exchange rate, and the profitability of export industry

Figure 2-4-3-18

South Korea's terms of trade/export/import price, real, effective exchange rate, and the profitability of export industry

(Index: April 1995=100)   (April 1995 = 1.0)

— Terms of trade (Index: export prices/import prices) : left axis
— Real effective exchange rate (Index) : left axis
— Profitability of exporting enterprises (= Terms of trade/real effective exchange rate): Right axis

South Korea

Improvement

Deterioration

0.495 (2012.3)

Profitability of exporting enterprises declines due to continuous deterioration of terms of trade and increase in real effective exchange rates, except the times of crisis.

1994 1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012
(Month, year)

Note: Values are indexed (April 1995 = 100). Recent values are of March 2012. For the real effective exchange rate, a broad base is adopted.
Source: Compiled from *Export/Import Price Index* (The Bank of Korea), *Effective Exchange Rates (Real)* (BIS) and *CEIC Database*.

(Index: April 1995=100)

High prices/Improvement of terms of trade
Low prices/ Deterioration of terms of trade

Sharp increase in import prices   253.0

Moderate increase or decline in export prices   104.9

— Terms of trade (index: export prices/import prices)
— Export prices (index)
— Import prices (index)

Chronic deterioration of terms of trade   41.5

1994 1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012
(Month, year)

Note: For comparison with the past appreciation of the yen, April 1995 is set as 100. The most recent value is March 2012.
Source: Compiled from *Export/Import Price Index* (The Bank of Korea) and *CEIC Database*.

In contrast, profitability in Germany's export industry apparently shows a very stable movement. Both the real effective exchange rates and the terms of trade are stable in Germany and, as a consequence, this stability contributes to maintaining sustainable profitability in its export industry. Looking at the trend of export prices and import prices, export prices increased in accordance with an increase in import prices, which is a characteristic of Germany and is in sharp contrast to Japan and South Korea. As mentioned earlier, the reason behind this difference is that many German companies gave the highest priority to maintaining their pricing power which was supported by technologies and brand value. Furthermore, they did not pursue economies of scale excessively or enter intensive price competition. At the same time, German enterprises tapped into rapidly growing overseas markets,[124] while implementing management strategies that allowed them to change their export prices in accordance with fluctuations of local currencies and import prices (see Figure 2-4-3-19).[125]

It is often pointed out that Germany in particular benefitted from the introduction of the euro in terms of not only the terms of trade but also actual exchange rate levels. Therefore, this section

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124 According to Hermann Simon (2009), it is one of characteristics common to successful small and medium enterprises, including German companies, to adopt business strategies not to get involved in price competition. *Hidden Champions of the Twenty-First Century: Success Strategies of Unknown World Market Leaders* Hermann Simon (2009)

125 Furthermore, as other factors, Arima (2010) points out stable trade environment such as trade within the euro zone. As another evidence to demonstrate that prices of luxury import automobiles, including German automobiles, do not decline even amid the appreciation of the yen, please refer to J-CAST News dated October 30, 2011.

compares the volatility of the real effective exchange rate of EU countries that introduced the common currency in the initial stage, covering a period from the launch of the real effective exchange rate to the present (January 2012) (see Figure 2-4-3-20). While the real effective exchange rate of the overall euro zone declined about 8.3% from the launch of the real effective exchange rate, Germany showed the largest decline (-12.6%) among the examined countries. Besides Germany, only Finland and France that showed a larger decline than the average of the euro zone. This result shows that the introduction of the euro has worked favorably to the profitability of Germany's export enterprises in terms of exchange rates. According to Tanaka et al. (2007), in the euro zone countries of which inflation rate is stabilized at a lower level like Germany, the real rate of policy interest rates were relatively high even during the sluggish economy and the stability of prices tended to continue. This is likely to create a favorable cycle in which the real effective exchange rate depreciates and export competitiveness within the euro zone is strengthened since exchange rates are fixed within the zone (see Figure 2-4-3-21). It can be said that this favorable business environment in terms of both the terms of trade and exchange rates is a source of profitability of Germany's export industries.

Figure 2-4-3-19

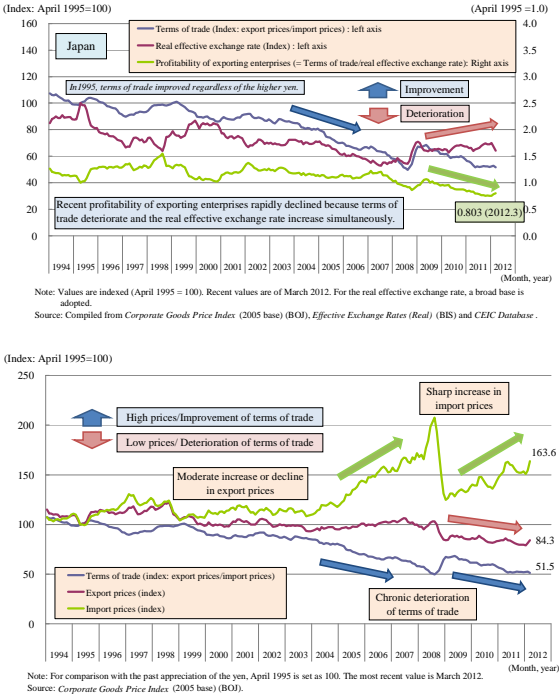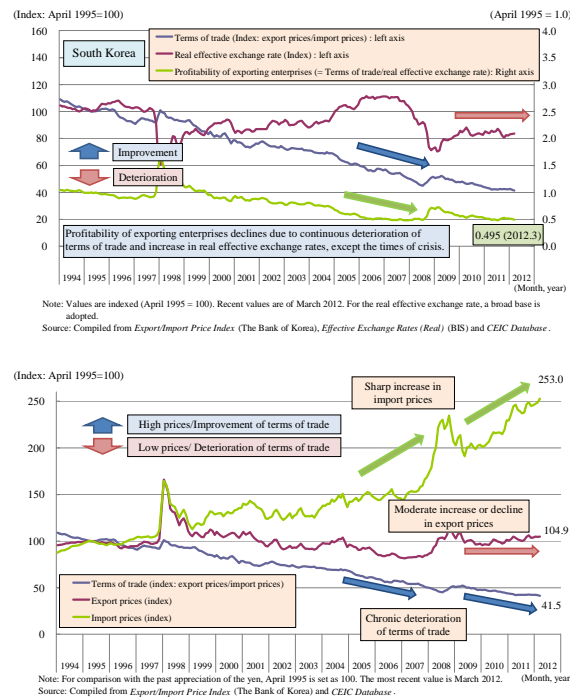Germany's terms of trade/export/import price, real, effective exchange rate, and the profitability of export industry
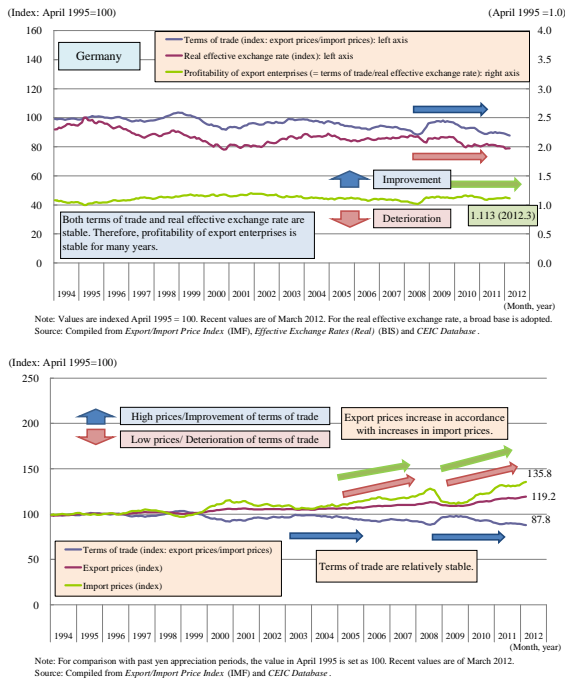
Figure 2-4-3-20

Volatility of real, effective exchange rate of countries that introduced the euro in the initial phase (January 2012/January 1999)

Note: Countries that launched the euro before 2001 are covered. For the effective basis, a broad base (weighted average of trade amounts in major 61 countries/regions) is adopted.
Source: *Effective Exchange Rates (Real)* (BIS).
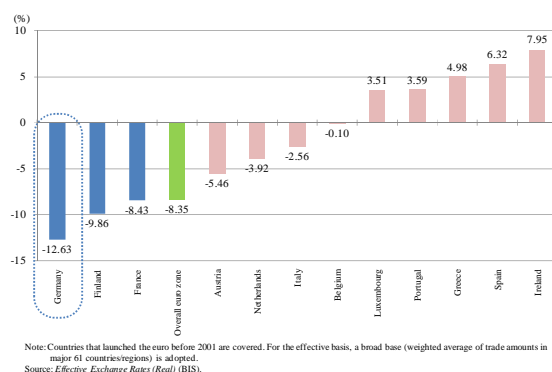
Figure 2-4-3-21

Structure to strengthen Germany's competitive edge in the eurozone (concept)
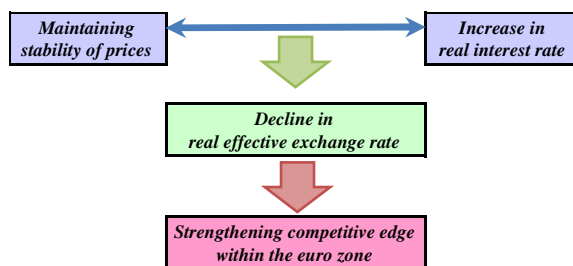
Source: Kakudai Suru Euro Keizai-ken *Expanding the Euro Economic Zone* (Sokou Tanaka).

As mentioned earlier, the markets closely watched the situation in which export industries in Japan and South Korea engaged in fierce competition by cutting back on their profitability. As pointed out by Kumagai (2011) and Sasaki (2011), Japan's stock market (TOPIX, in particular) shows almost the same movement as that of the yen-won exchange rate in recent years and the correlation between the stock market and the yen-won rate is far stronger than that between the stock market and the dollar-yen rate. The markets paid keen attention to recent competitive environment of Japan and South Korea and the movement in the yen-won exchange rate has been gaining importance to the business performance of Japanese enterprises more than ever (see Table 2-4-3-22 and Figure 2-4-3-23).

Table 2-4-3-22

Correlation coefficient of recent Japanese stocks and exchange rate

(Period: from January 1, 2004 to April 30, 2012)

(Correlation coefficient)	TOPIX	Nikkei Stock Average
Dollar-yen rate	0.90	0.84
Yen-won rate	0.97	0.95
(TOPIX)		0.99

Source: Compiled from *TOPIX* (Tokyo Stock Exchange), *Nikkei Stock Average* (Nikkei, Inc.), *Dollar-yen Rate (spot rate as of 17:00)* (BOJ), *Yen-won Rate* (The Bank of Korea) and *CEIC Database* .

When it comes to the source of profitability of export industries in Japan, South Korea and Germany,

this paper compares the movement of export prices by item in the machinery industry in these countries in the context of a relationship with domestic corporate goods (producer) prices. While this subject is analyzed in detail later, the result of the analysis is explained briefly here. In both Japan and South Korea, export prices (home currency basis) of overall machinery items fluctuated considerably relative to domestic prices, affected by fluctuations of exchange rates. At the same time, the pricing power of the two countries was rather weak on the offering of many items, mainly electrical/electronic equipment items, in export markets (this can be confirmed by export prices on the contract currency basis). On the contrary, Germany's export prices (home currency basis) of main items such as general machinery and transport machinery were very stable relative to domestic prices. At the same time, export prices of electrical/electronic equipment increased relative to domestic prices (despite the fact that absolute price levels of these products plunged just as with Japan and South Korea). This confirms that Germany's export strategies center on maintaining and improvement of pricing power and that its stable exchange rate environment brings about an increase in export prices relative to domestic prices.

Figure 2-4-3-23

Relation between recent TOPIX, yen-won rate, and dollar-yen rate

Source: Compiled from *TOPIX* (Tokyo Stock Exchange), *Yen-won Rate* (The Bank of Korea) and *CEIC Database*.

Source: Compiled from *TOPIX* (Tokyo Stock Exchange), *Dollar-yen Rate* (spot rate as of 17:00) (BOJ) and *CEIC Database*.
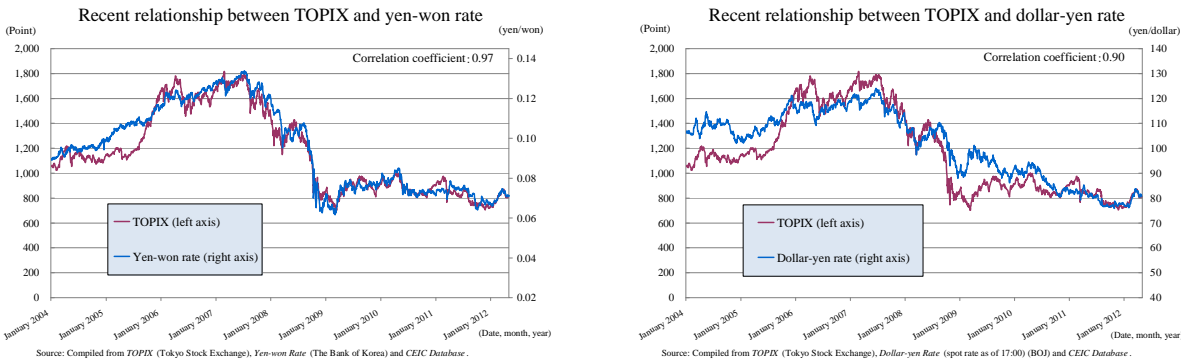
(5) Necessity to break from the appreciation of the yen and deterioration of terms of trade

As discussed earlier, the current appreciation of the yen has not brought about the improvement of the terms of trade and instead has created the extremely difficult business environment to Japanese enterprises in the comparison with other countries/regions as well as the comparison by industry. As countermeasures to grapple with the appreciation of the yen, Japan's export enterprises have been taking various restructuring measures for many years such as reducing wages and cutting back on procurement cost of raw materials. These corporate efforts are stretched almost to the limits.[126] When it comes to other major advanced countries, there was a time when Germany, similarly to Japan, reduced its unit labor costs (hereafter, ULC) by reforming its labor market and strengthened its

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126 According to Kanda and Suzuki (2010), Japan's real effective exchange rate currently remains at about 30% lower than its highest level because ULC in Japan's manufacturing sector has declined relative to ULC in other countries. In particular, the electric machinery industry consistently exercises downward pressure to ULC in the overall manufacturing sector, while general machinery and transport machinery have been playing an increasing role of lowering ULC in and after 1995.

competitive edge, which is discussed in details in the following section. However, it is only Japan among the major advanced countries, that has been reducing not only ULC but also overall labor costs. This means that Japan has been raising corporate profitability mainly through cost-cutting efforts, while inventing high-value added products one after another (see Figure 2-4-3-24).[127] Japan has been facing an increasingly intensifying competition with other Asian countries/region of which terms of trade have been deteriorating just like Japan and the sharp appreciation of the yen could waste cost-cutting efforts made by Japanese enterprises until now. Although it is possible to employ risk management methods for currency risk hedging in and outside companies, they have their own limits in the face of the higher-than-expected appreciation of the yen.

If the current appreciation of the yen continues concurrently with the deterioration of the terms of trade, it is no easy to break from the vicious circle in Japan's current economic structure, that is, sluggish domestic demand and continued deflation fuel the appreciation of the yen (see Figure 2-4-3-25).[128]

In order to break the impasse of the appreciation of the yen coupled with the deterioration of the terms of trade and put an end to the vicious circle, comprehensive and sustainable countermeasures are indispensable. For example, in order to improve the terms of trade, Japan should implement trade/industrial policies of promoting changes in corporate behaviors and industrial structures over the medium- and long-term. Japan should shift away from engaging in price competition towards differentiating its products from those of rivaling countries and strengthening competitive edge.[129]

When it comes to policy measures such as promoting economic partnerships, assisting infrastructure exports and supporting overseas business development by small and medium enterprises, those measures should focus on not only assisting cost-cutting efforts by enterprises but also raising brand value and increasing exports of packaged-type products coupled with services and products satisfying customer demand in local markets. It is desirable that these measures would strengthen Japan's

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127 On the other hand, Hori (2009) re-classifies export goods in trade data by item in accordance with levels of value added and analyzes changes of trade structure in East Asia and Japan from 1980 to 2004. The result demonstrates that, during the prolonged appreciation of the yen in recent years, Japan's share in the world has declined not only in low value-added goods but also in high-value added goods and it is losing international competitiveness. In the paper, Hori summarizes that Japan's scenario of participating in networks as supply sources of high-value added intermediary goods and investment goods has been disrupted.

128 It is often pointed out that the relationship between interest differentials and exchange rates has become strong in recent years, though it is not discussed in this section. Fukao (2010) points out the relationship between long-term real interest differentials and real exchange rates, while Sasaki (2011) indicates the relationship between 2-year swap interest rate differentials or 10-year bonds yield spreads and nominal dollar-yen exchange rates.

129 With regard to measures to invigorate Japan's industries and enterprises, various measures other than strengthening price competitiveness have been proposed. Among them, Kazuhiko Tamaki suggests that branding strategies, which are a mainstay of aggressive marketing strategies by European companies, would open new opportunities for Japanese companies as well. Source: *Column: Nihon Kigyo Kasseika, Kirifuda-wa Brand Senryaku to Gijutsu Kakushin ni Column: Vitalization of Japanese enterprises, Branding Strategy and Technological Innovations are Last Resort* (Reuters), an article dated January 20, 2012. Tamaki also proposes to continue technological innovations as a way to increase a ratio of yen-denominated exports and create new industries (2012). *Shin Sangyo Soshutsu de Nihon Fukkatsu wo Resurrect Japan by Creating New Industries,* an article published in Nihon Keizai Shimbun dated March 19, 2012, morning edition (Michael Cusumano)

competitive edge against companies in emerging countries in other aspects than prices, leading to the improvement of Japan's terms of trade.

Figure 2-4-3-24

Factor decomposition of ULC in major advanced counties

(Cumulative growth rate with 2002 as a baseline: %)

Japan
■ Total labor cost
■ Real output
◆ ULC

Note: All industries basis.
Source: *OECD Stat*.

(Cumulative growth rate with 2002 as a baseline: %)

Germany
■ Total labor cost
■ Real output
◆ ULC

Note: All industries basis.
Source: *OECD Stat*.

(Cumulative growth rate with 2002 as a baseline: %)

South Korea
■ Total labor cost
■ Real output
◆ ULC

Note: All industries basis.
Source: *OECD Stat*.

(Cumulative growth rate with 2002 as a baseline: %)

U.S.
■ Total labor cost
■ Real output
◆ ULC

Note: All industries basis.
Source: *OECD Stat*.

Figure 2-4-3-25

Recent Japan's economic conditions in a vicious cycle (concept)

Import side: Soaring prices of resources/raw materials

Export side: Downward pressure on product prices

Despite the higher yen, terms of trade do not improve due to structural factors (a part of a vicious circle)

Nominal rate The higher yen

Continuing deflation

Japan's current economic status

"Deterioration" of terms of trade

Sluggish domestic demand

Cost-cutting by enterprises

Source: Compiled by METI.

4. Item-by-item export profitability of Japanese, South Korean, and German machinery industries

As a way to examine factors behind the aforementioned differences in profitability among Japan, South Korea and Germany, this section compares trend of export prices on a home currency basis. For Japan and South Korea, a contract currency basis is also used by item in the machinery industry

(general equipment, electrical equipment, electronic equipment, transport equipment, and precision equipment, etc.[130]) with particular focus on a relationship between export prices and domestic corporate goods prices (domestic producer price, hereafter domestic prices) in these countries.

(1) Comparison of absolute levels of export prices and domestic prices

First of all, this section examines absolute levels of export prices and domestic prices (for comparison with the past appreciation of the yen, values in April 1995 are set as a baseline).

With regard to the trend of Japan's export prices on the yen basis, export prices of manufacturing products (total average) currently declined to about 80% of what it was during the appreciation of the yen in 1995. Although export prices of both transport equipment and general equipment remained at a higher level than the 1995 baseline, they have fallen below the baseline amid the recent appreciation of the yen. On the other hand, export prices of electrical equipment/electronic equipment have been declining consistently since the 2000s and have not shown any sign of reaching bottom yet (currently about 40% of the 1995 baseline) (see Figure 2-4-4-1).[131]

Figure 2-4-4-1
Japan's export price (yen basis)

Index: (April 1995 = 100)

Note: Ratio of indices is calculated on the basis of the past higher yen in April 1995 (=100).
Since export price indices are not available for electrical equipment, information and communication equipment, and electronic parts/devices until 2004, an index for electrical/electronic equipment is used as substitute for the corresponding period.
Source: *Corporate Goods Price Index (2005 base)* (BOJ).

When looking at the trend of Japan's export prices on the contract currency basis, export prices of all items have been declining consistently since 1995 and export prices of total average of manufacturing products remained at about 80% of the 1995 baseline during the past decade. As mentioned by IMF et al. (2009), export prices on the contract currency basis represent product prices on the demand side in export markets[132] and a decline in the price means that purchase prices of

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130 Since this section (4) analyzes product prices by item, names of items are used throughout the section, instead of names of industries. The names of items for Japan follow those used in *Corporate Goods Price Index (the 2005 base)* by BOJ, while names of items for South Korea and Germany are translated in accordance with *Export/Import Price Index* by the Bank of Korea and *Export Price Index* by the Federal Statistical Office, respectively.

131 As mentioned in the first footnote in 3. (3) of this section, export prices here do not contain price fluctuations resulted from improvement of product quality. In other words, absolute levels of export prices of IT products decrease quickly over time since prices of these products tend to decline rapidly if product quality is same.

132 In contrast, export prices on the home currency basis mean product prices on the domestic supply side,

Japanese products became relatively inexpensive in overseas markets. With regard to general equipment and transport equipment, which had shown only a minor decline, began to increase during the appreciation of the yen in 2009 and have recovered to a level slightly above the 1995 baseline, which appears to be a bright sign. On the other hand, export prices of electrical/electronic equipment have been declining consistently since 1995 in the same way as the export prices on the yen basis. This means that prices of these items are relatively inexpensive at the time of not only domestic shipment but also overseas purchases (see Figure 2-4-4-2).

Figure 2-4-4-2

Japan's export price (contract basis)

Index: (April 1995 = 100)

Export price (contract currency basis)

Industrial products (overall average)   General equipment
Electrical/electronic equipment   Transport equipment
Precision equipment   Electrical equipment
Information and communication equipment Electronic parts/devices

Note: Individual indices are calculated on the basis of the past case of the higher yen in April 1995 (=100).
Since export price indices are not available for electrical equipment/ information and communication equipment, and electronic parts/devices until 2004, an index for electrical/electronic equipment is used as substitute for the corresponding period.
Source: *Corporate Goods Price Index (2005 base)* (BOJ).

(Month, year)

Last of all, as to the trend of Japan's domestic prices, the prices of all machinery items have been decreasing almost consistently in and after the appreciation of the yen in 1995 without surpassing the baseline. Among electrical/electronic equipment, domestic prices of information and communication equipment in particular have declined drastically, dwindling to about 20% of what they were in 1995. Since a decline in domestic prices of manufacturing products (total average) is smaller than that of the machinery items, it can be said that domestic prices of the machinery items have not increased to the same extent as those of other manufacturing products (see Figure 2-4-4-3).

which is an origin of exports. Indices for export prices are usually compiled only on home currency basis as in the case of Germany. (IMF et al. 2009)

Figure 2-4-4-3

Japan's domestic corporate goods price

Index: (April 1995 = 100)

Domestic corporate goods price

Industrial products
Electrical/electronic equipment
Precision equipment
Information and communication equipment

General equipment
Transport equipment
Electrical equipment
Electronic parts/devices

(Month, year)

Note: Individual indices are calculated on the basis of the past case of the higher yen in April 1995 (=100).
Source: *Corporate Goods Price Index (2005 base)* (BOJ).

It is found that the absolute levels of Japan's export prices and domestic prices show different movements. As a next step, this section compares price movements in South Korea and Germany with those of Japan (see Figure 2-4-4-4, Figure 2-4-4-5).

When it comes to the overall trend of export prices in South Korea, export prices on a won basis remained at a higher level than those of Japan due to the depreciation of the won, with the exception of electronic equipment. South Korea's export prices of manufacturing products (total average) currently stand at almost the same level as the 1995 baseline. Most of all, the current export prices of transport equipment are about 80% higher than the 1995 baseline, while even export prices of electrical equipment and general equipment are about 40% higher than the baseline. As far as the trend of export prices on the contract currency basis is concerned, many of the examined items have been repeating ups and downs in and after 1995. During the process, there was a time when export prices of manufacturing products (total average) dwindled to about 60% of the 1995 baseline during the global downturn in the past. Yet, an upward trend is notable in export prices of transport equipment, general equipment, and electrical equipment. In particular, export prices of transport equipment have been exceeding the 1995 level since the latter half of the 2000s, showing a remarkable increase in overseas purchase prices. Meantime, export prices of electronic equipment fell more drastically than those of Japan and currently stand at about 10% of the 1995 baseline. Last of all, South Korea's domestic prices make a sharp contrast to those of Japan and exceed the baseline, with the exception of electronic equipment. Furthermore, domestic prices of manufacturing products (total average) have risen further than those of the machinery items, growing as much as about 80% from the 1995 baseline. This indicates that South Korea's domestic prices of machinery items have been kept lower compared with those of other manufacturing products, which is similar to Japan.

Figure 2-4-4-4

South Korea's export price (won basis, contract currency basis) and domestic producer price

Index: (April 1995 = 100)

Export price (won basis)

Industrial products — Transport equipment
Electrical equipment — Electronic equipment
General equipment — Precision equipment

Note: Individual indices are calculated on the basis of the past case of the higher yen in April 1995 (=100).
Source: *Export Price Index (2005 base)* (The Bank of Korea).

(Month, year)

Index: (April 1995 = 100)

Export price (contract currency basis)

Industrial products — Transport equipment
Electrical equipment — Electronic equipment
General equipment — Precision equipment

Note: Individual indices are calculated on the basis of the past case of the higher yen in April 1995 (=100).
Source: *Export Price Index (2005 base)* (The Bank of Korea).

(Month, year)

Index: (April 1995 = 100)

Domestic producer price

Industrial products — Transport equipment
Electrical equipment — Electronic equipment
General equipment — Precision equipment

Note: Individual indices are calculated on the basis of the past case of the higher yen in April 1995 (=100).
Source: *Producer Price Index (2005 base)* (The Bank of Korea).

(Month, year)

As far as Germany is concerned, export prices (home currency basis) have been increasing moderately in and after 1995, except items categorized into electronic equipment. Similar to the movement of total average of manufacturing products, the current export prices of many items are about 20% above the 1995 baseline. Yet, export prices of computers/peripheral equipment and electronic parts/boards have been declining sharply, just like in Japan and South Korea, and currently stand at about 20% of the 1995 baseline. On the other hand, domestic prices in Germany have been increasing moderately since 1995 similar to the movement of export prices, with the exception of items categorized into electronic equipment. In the meantime, if comparing Germany's corporate goods prices with its export prices, the increase in corporate goods prices is rather small (or a decline is large) for many of machinery items, which is discussed in detail later.

Figure 2-4-4-5

Germany's export price (home currency basis) and domestic producer price

Index: (April 1995 = 100)

Export price (for the world, home currency basis)

Industrial products
Transport equipment
Electrical equipment
Electronic equipment/precision equipment
General equipment
Computers/peripheral equipment
Household electronics
Information and communication equipment
Electronic parts/boards
Precision equipment

1990 1991 1992 1993 1994 1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012
(Month, year)

Note: Individual indices are calculated on the basis of the past case of the higher yen in April 1995 (=100).
All values, except industrial products and computers/peripheral equipment, are in and after 1995.
Source: Compiled from *Preisin-dizes für die Ausfuhr (2005 base)* (Statistisches Bundesamt) and *Eurostat*.

Index: (April 1995 = 100)

Domestic producer price

Industrial products
Transport equipment
Electrical equipment
Electronic equipment/precision equipment
General equipment
Computers/peripheral equipment
Household electronics
Information and communication equipment
Electronic parts/boards
Precision equipment

1990 1991 1992 1993 1994 1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012
(Month, year)

Note: Individual indices are calculated on the basis of the past higher yen in April 1995 (=100).
Source: Compiled from *Erzeugerpreise (2005 base)* (Statistisches Bundesamt) and *Eurostat*.

(2) Verifiable export profitability by comparing ratio of export price to domestic price, etc.

This section examines differences in the trends of export prices and domestic prices in the three countries by comparing a ratio of the two over a period time (for comparison with the past appreciation of the yen, values in April 1995 are set as a baseline as in the previous part of this section).

First of all, an analytical framework is explained, using movements of total average of manufacturing products in Japan (see Figure 2-4-4-6).

Figure 2-4-4-6

Japan's export price (yen basis, contract currency basis) and ratio, etc. of domestic corporate goods price

Ratio: (April 1995 = 1)

Industrial products

Export price (yen basis)/export price (contract currency basis)
Export price (contract currency basis)/domestic producer price
Export price (yen basis)/domestic producer price

1990 1991 1992 1993 1994 1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012
(Month, year)

Note: Ratio of indices is calculated on the basis of the past higher yen in April 1995 (=1).
Source: *Corporate Goods Price Index (2005 base)* (BOJ).

In this analysis, three indices are developed. The first index is a ratio of export price on the yen basis to export price on the contract currency basis (= yen basis/contract currency basis). If the yen rate depreciates compared with the 1995 baseline, the export price index on the yen basis increases and becomes larger than 1 because the export price index on the contract currency basis remains unchanged (on the assumption that overseas purchase prices are fixed). Although this index for the total average of manufacturing products continued to exceed 1 in and after 1995 in the same way as the trend of exchange rates, it has declined and fallen below 1 during the recent appreciation of the yen. It is considered that this index represents an exchange rate level by item (hereafter, the index of exchange rate), and individual items are analyzed on the basis of this index later.

The second index is a ratio of export price on the contract currency basis to domestic price (= export price (contract currency basis)/domestic corporate goods price). If this index is larger than 1, it means that overseas purchase price increases from the 1995 baseline relative to domestic price. It is considered that this index represents how Japanese enterprises set prices of export products in overseas markets (hereafter, the index of overseas pricing). This index for total average of manufacturing products has been falling below the baseline since 1995. This means that, in overseas markets, Japanese enterprises set more inexpensive prices than those in 1995 relative to domestic prices. Although the index declined to about 80% of the 1995 baseline at the time of the global economic crisis, it increased slightly during the recent appreciation of the yen and currently stays at nearly 90% of the baseline.

The third index is a ratio of export price on the yen basis to domestic price (= export price (yen basis)/domestic corporate goods price). If the index is larger than 1, it means that overseas shipment price on a yen basis increases from the 1995 baseline relative to domestic price. In other words, this index expresses how profitable export products of Japanese enterprises are (hereafter, the index of export profitability). Although this index for total average of manufacturing products had exceeded the baseline from 1995 to around 2007, it began to decline rapidly in and after 2008 and has fallen to about 80% level of the baseline amid the recent appreciation of the yen.

Last of all, in regard to relationship among the three indices, the index of export profitability is a value (product) obtained by multiplying the index of exchange rate by the index of overseas pricing. In other words, export profitability can be decomposed into the exchange rate component and the price overseas component.[133]

As the next step, this section compares trends of those indices in South Korea and Germany with those of Japan (see Figure 2-4-4-7, Figure 2-4-4-8). Similar to Japan, the trend of South Korea's exchange rate index reflects the sharp depreciation of the won at the time of the Asian Financial Crisis and the global economic crisis. The index of exchange rate remains about 20% above the baseline in and after 1995 even when it is relatively low. On the other hand, the index of overseas pricing declined

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133 As a similar analytical method, Maruyama (2002) conducts factor decomposition of fluctuations in overall export prices on the yen basis by breaking them down into three components of domestic, price adjustment, and exchange rate fluctuation. Meantime, a method to calculate the value of elasticity of export prices by industry is often adopted. Cabinet Office (2011), Yoneyama et al. (2012)

in a step-like manner three times in the past, that is, at the time of the Asian Financial Crisis, the bursting of the IT bubble and the global economic crisis. Recently, the index has dwindled to about 40% of the level of 1995. As a consequence, the index of export profitability continued to decline and fell below the baseline in and after the latter half of 1998 and has been hovering around about 60% of the level of the baseline in the latter half of the 2000s.

When it comes to Germany, export prices on a contract currency basis are unavailable, while export prices on a home currency basis are officially announced. Therefore, an index of exchange rates cannot be calculated for Germany. However, since Germany's real effective exchange rates show very moderate movement, which was discussed earlier, this section focuses on the index of export profitability, ignoring its exchange rate component.

Although Germany's export profitability index has been declining gradually since the early 2000s, the breadth of decline is rather small and stays within 10% below the 1995 baseline even at its lowest level during the global economic crisis. Therefore, it can be said that Germany's export profitability index is remarkably stable. Meantime, since Germany began to announce export prices for EU member countries and non-EU countries as a breakdown of export prices (for the world) at the time of the launch of the euro in 2000, this section compares the two indices and calculates the profitability of exports to the world and the profitability of exports to non-EU countries (hereafter, the former is called simply the index of export profitability and the latter is described as the index of export profitability for non-EU countries). There is almost no divergence between the two, indicating that Germany makes profits stably both within and outside EU.[134]

Figure 2-4-4-7

South Korea's export price (won basis, contract currency basis) and ratio, etc. of domestic producer price

Note: Ratio of indices is calculated on the basis of the past higher yen in April 1995 (=1).
Source: Compiled from *Producer Price Index (2005 base)* and *Export Price Index (2005 base)* (The Bank of Korea).

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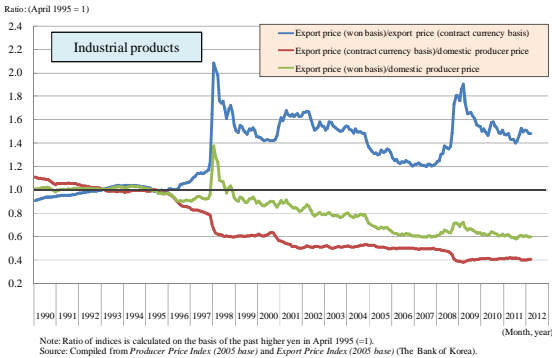
134 Although a ratio of the terms of trade to the real effective exchange rate (= terms of trade/real effective exchange rate) in Japan, South Korea and Germany is regarded as the profitability index in export industries for each countries earlier in this paper, this part conducts almost the same analysis for individual items with a different method.

Figure 2-4-4-8

Germany's export price (home currency basis) and ratio, etc. of domestic producer price

Ratio: (April 1995 = 1)

Industrial products

— Export price (for the world)/export price (for non-EU basis)
— Export price (for non-EU countries)/domestic producer price
— Export price (for the world)/domestic producer price

Note: Ratio of indices is calculated on the basis of the past higher yen in April 1995 (=1).
Export price (for non-EU countries) are in and after 2000. All export prices are on home currency basis.
Source: Compiled from *Erzeugerpreise (2005 base)*, *Preisin-dizes für die Ausfuhr (2005 base)* (Statistisches Bundesamt) and *Eurostat*.

(3) Comparison of export profitability, etc. by item in Japan, South Korea and Germany

Next, this section examines these indices for individual machinery items in Japan, South Korea and Germany in line with the aforementioned analytical framework.

First of all, machinery items of Japan are examined, using the indices (see Figure, Table 2-4-4-9).

When comparing the index of exchange rates by item, it is found that the index for precision equipment and general equipment always tends to move towards the appreciation of the yen in and after 1995. In contrast, the index for transport equipment and electrical/electronic equipment tends to move towards the depreciation of the yen in a relative sense. As for component ratio of contract currency, the yen-based ratio is relatively high for precision equipment and general equipment, while the ratio of the foreign currency basis is comparatively high for transport equipment and electrical/electronic equipment (see Table 2-4-4-10).[135]

Figure, Table 2-4-4-9

Japan's export price (yen basis, contract currency basis) by item and ratios, etc. of domestic producer price

Ratio: (April 1995 = 1)

General equipment

— Export price (yen basis)/export price (contract currency basis)
— Export price (contract currency basis)/domestic producer price
— Export price (yen basis)/domestic producer price

Note: Ratio of indices is calculated on the basis of the past higher yen in April 1995 (=1).
Source: *Corporate Goods Price Index (2005 base)* (BOJ).

Ratio: (April 1995 = 1)

Electrical/electronic equipment

— Export price (yen basis)/export price (contract currency basis)
— Export price (contract currency basis)/domestic producer price
— Export price (yen basis)/domestic producer price

Note: Ratio of indices is calculated on the basis of the past higher yen in April 1995 (=1).
Source: *Corporate Goods Price Index (2005 base)* (BOJ).

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135 Although various interpretations of the relationship between fluctuations in the exchange rate index and composition by contract currency are possible, it is reasonable to think that items with a higher ratio of foreign currency would benefit more from the depreciation of the yen since they are affected greatly by fluctuations in exchange rates. In fact, the index of exchange rate for them fluctuates greatly.

Chart 1 (top left)

Ratio: (April 1995 = 1)

Of electrical/electronic equipment, electrical equipment

- Export price (yen basis)/export price (contract currency basis)
- Export price (contract currency basis)/domestic producer price
- Export price (yen basis)/domestic producer price

1.7 1.6 1.5 1.4 1.3 1.2 1.1 1.0 0.9 0.8 0.7 0.6 0.5

1990 1991 1992 1993 1994 1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 (Month, year)

Note: Ratio of indices is calculated on the basis of the past higher yen in April 1995 (=1). Since no export price is available before 2004 (neither yen basis nor contract currency basis), export prices of electrical/electronic equipment are used instead.
Source: *Corporate Goods Price Index (2005 base)* (BOJ).

Chart 2 (top right)

Ratio: (April 1995 = 1)

Of electrical/electronic equipment, information and communication equipment

- Export price (yen basis)/export price (contract currency basis)
- Export price (contract currency basis)/domestic producer price
- Export price (yen basis)/domestic producer price

1.9 1.8 1.7 1.6 1.5 1.4 1.3 1.2 1.1 1.0 0.9 0.8 0.7 0.6

1990 1991 1992 1993 1994 1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 (Month, year)

Note: Ratio of indices is calculated on the basis of the past higher yen in April 1995 (=1). Since no export price is available before 2004 (neither yen basis nor contract currency basis), export prices of electrical/electronic equipment are used instead.
Source: *Corporate Goods Price Index (2005 base)* (BOJ).

Chart 3 (second row left)

Ratio: (April 1995 = 1)

Of electrical/electronic equipment, electronic parts/devices

- Export price (yen basis)/export price (contract currency basis)
- Export price (contract currency basis)/domestic producer price
- Export price (yen basis)/domestic producer price

1.7 1.6 1.5 1.4 1.3 1.2 1.1 1.0 0.9 0.8 0.7

1990 1991 1992 1993 1994 1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 (Month, year)

Note: Ratio of indices is calculated on the basis of the past higher yen in April 1995 (=1). Since no export price is available before 2004 (neither yen basis nor contract currency basis), export prices of electrical/electronic equipment are used instead.
Source: *Corporate Goods Price Index (2005 base)* (BOJ).

Chart 4 (second row right)

Ratio: (April 1995 = 1)

Transport equipment

- Export price (yen basis)/export price (contract currency basis)
- Export price (contract currency basis)/domestic producer price
- Export price (yen basis)/domestic producer price

1.7 1.6 1.5 1.4 1.3 1.2 1.1 1.0 0.9 0.8 0.7

1990 1991 1992 1993 1994 1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 (Month, year)

Note: Ratio of indices is calculated on the basis of the past higher yen in April 1995 (=1).
Source: *Corporate Goods Price Index (2005 base)* (BOJ).

Chart 5 (third row left)

Ratio: (April 1995 = 1)

Precision equipment

- Export price (yen basis)/export price (contract currency basis)
- Export price (contract currency basis)/domestic producer price
- Export price (yen basis)/domestic producer price

1.7 1.6 1.5 1.4 1.3 1.2 1.1 1.0 0.9 0.8 0.7

1990 1991 1992 1993 1994 1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 (Month, year)

Note: Ratio of indices is calculated on the basis of the past higher yen in April 1995 (=1).
Source: *Corporate Goods Price Index (2005 base)* (BOJ).

Chart 6 (third row right)

Ratio: (April 1995 = 1)

Export price (yen basis)/export price (contract currency basis)

- Industrial products
- Electrical/electronic equipment
- Precision equipment
- Transport equipment
- General equipment
- (Reference) Nominal effective exchange rate (reciprocal)

Appreciation of the yen

Depreciation of the yen

2.0 1.9 1.8 1.7 1.6 1.5 1.4 1.3 1.2 1.1 1.0 0.9 0.8

1990 1991 1992 1993 1994 1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 (Month, year)

Note: Ratio of indices is calculated on the basis of the past higher yen in April 1995 (=1). For nominal effective exchange rate, April 1995 is set as a baseline(=1), and a reciprocal is used.
Source: *Corporate Goods Price Index (2005 base)* (BOJ) and *Effective Exchange Rate (nominal, real)*.

Chart 7 (bottom left)

Ratio: (April 1995 = 1)

Export price (contract currency basis)/domestic producer price

- Industrial products
- Transport equipment
- Electrical/electronic equipment
- General equipment
- Precision equipment
- Electronic parts/devices
- Electrical equipment (right axis)
- Information and communication equipment (right axis)

(left axis) 1.2 1.1 1.0 0.9 0.8 0.7
(right axis) 1.8 1.5 1.2 0.9 0.6 0.3

1990 1991 1992 1993 1994 1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 (Month, year)

Note: Ratio of indices is calculated on the basis of the past higher yen in April 1995 (=1). For nominal effective exchange rate, April 1995 is set as a baseline(=1), and a reciprocal is used.
Source: *Corporate Goods Price Index (2005 base)* (BOJ) and *Effective Exchange Rate (nominal, real)*.

Chart 8 (bottom right)

Ratio: (April 1995 = 1)

Export price (yen basis)/domestic producer price

- Industrial products
- Transport equipment
- Electrical/electronic equipment
- General equipment
- Precision equipment
- Electronic parts/devices
- Electrical equipment (right axis)
- Information and communication equipment (right axis)

(left axis) 1.8 1.6 1.4 1.2 1.0 0.8 0.6
(right axis) 2.2 1.9 1.6 1.3 1.0 0.7 0.4

1990 1991 1992 1993 1994 1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 (Month, year)

Note: Ratio of indices is calculated on the basis of the past higher yen in April 1995 (=1). For nominal effective exchange rate, April 1995 is set as a baseline(=1), and a reciprocal is used.
Source: *Corporate Goods Price Index (2005 base)* (BOJ) and *Effective Exchange Rate (nominal, real)*.

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Item	Industrial products	General equipment	Electrical/electronic equipment	Electrical equipment	Information and communication equipment	Electronic parts/devices	Transport equipment	Precision equipment	(Reference) Nominal effective exchange rate (reciprocal)
Comparison of export price (yen basis)/export price (contract currency basis)									
Recent depreciation of the yen (June 2007)	1.31	1.22	1.31	1.33	1.33	1.29	1.38	1.19	1.32
Recent appreciation of the yen (January 2012)	0.94	0.93	0.99	0.97	1.00	1.00	0.97	0.89	0.87
Volatility (%)	-27.9	-23.3	-24.6	-27.4	-24.9	-22.1	-29.7	-25.4	-34.5
Comparison of export price (contract currency basis)/domestic producer price									
Recent depreciation of the yen (June 2007)	0.83	1.02	0.92	0.65	1.42	0.99	1.07	0.92	
Recent appreciation of the yen (January 2012)	0.86	1.13	0.90	0.60	1.56	0.94	1.10	0.98	
Volatility (%)	2.9	10.5	-2.4	-7.2	9.8	-5.0	2.9	6.7	
Comparison of export price (yen basis)/domestic producer price									
Recent depreciation of the yen (June 2007)	1.09	1.25	1.20	0.86	1.88	1.28	1.48	1.09	
Recent appreciation of the yen (January 2012)	0.81	1.06	0.89	0.58	1.55	0.95	1.07	0.87	
Volatility (%)	-25.8	-15.3	-26.4	-32.6	-17.6	-26.0	-27.7	-20.4	
(Reference) Comparison of export price (contract currency basis)/domestic producer price									
Lowest value between June 2007 and January 2012	0.79	1.01	0.88	0.59	1.36	0.94	1.04	0.92	
Month and year recorded	2008.10	2007.9	2009.2	2009.2	2008.9	2012.1	2008.10	2007.7	
Volatility (%)in January 2012/ lowest value	8.0	11.6	2.7	2.2	14.2	0.0	6.2	6.7	

Note: Ratio of indices is calculated on the basis of the past higher yen in April 1995 (=1). Since export price indies are not available for electrical equipment, information and communication equipment and electronic parts/devices before 2004 (neither yen basis nor contract currency basis), export prices of electrical/electronic equipment are used instead.

Source: *Corporate Goods Price Index (2005 base)* (BOJ).

Table 2-4-4-10

Composition by contract currency of Japan's export price index

Item	Yen basis	Foreign currency basis	U.S. Dollar	Euro	Others
Industrial products	31.7	68.3	55.3	9.7	3.3
General equipment	49.3	50.7	35.6	14.5	0.6
Electrical/electronic equipment	37.3	62.7	52.6	9.5	0.6
Transport equipment	19.8	80.2	54.8	13.4	12.0
Precision equipment	44.6	55.4	42.7	10.2	2.5

Note: As of December 2012.
Source: *Corporate Goods Price Index (2005 base)* (BOJ).

When comparing the index of overseas pricing by item, the index for transport equipment and general equipment remains at a high level. In particular, the index for the two items has been increasing in and after the appreciation of the yen in 2009, and has exceeded the 1995 baseline by about 10% recently.[136] Although the index for electronic parts/devices had remained at a high level

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136 Yamamoto's analysis (2012) focuses on pricing mechanism of enterprises called Pricing-To-Market (PTM), that is, enterprises set different prices for the same products, depending on markets. The analysis examines Japan's trend of export prices of automobiles (contract currency basis). According to the analysis, pricing appears to be in harmony with local market prices (consumer price index) in general though prices increase temporarily for adjustment when the value of the yen rises extremely as in the cases of the higher yen in 1995, 2000 and 2009. Therefore, the analysis suggests that Japanese enterprises were unable to pass fluctuations in exchange rates onto prices of export products

until around 2005, it has been showing a rapid downward trend after that.[137] When looking at electrical/electronic equipment as a whole, the index began to decline around 2000 and its increase from 2009 remains modest.

In the comparison on the basis of the export profitability index which reflects the aforementioned results comprehensively, the index for transport equipment and general equipment has been exceeding the 1995 baseline to the present. On the contrary, the index for electronic parts/devices fell below the baseline last year in accordance with a decline in the index of overseas pricing. Meantime, the export profitability of overall electrical/electronic equipment and precision equipment declined further in and after 2008.

For the purpose of confirming the trend of individual indices during the recent appreciation of the yen and examining the change of trade environment by item, this section calculates the volatility of individual indices from the recent depreciation of the yen in June 2007 to the recent appreciation of the yen in January 2012. It is transport equipment (-27.7%) that shows the largest decline in the export profitability index during the examined period, followed by electrical/electronic equipment (-26.4%). Electrical/electronic equipment includes items showing a large decline such as electrical equipment (-32.6%) and electronic parts/devices (-26.0%). However, there is considerable difference in factors behind the deterioration of profitability between transport equipment and electrical/electronic equipment. As the index of exchange rate for transport equipment has deteriorated considerably, the transport industry has coped with the situation by raising the index of overseas pricing, taking a similar method by general equipment and precision equipment industries. In contrast, as far as electrical/electronic equipment is concerned, both the exchange rate index and the overseas pricing index have declined simultaneously.[138] This result shows that a gap in terms of product competitiveness and pricing power arises between the two items during the recent appreciation of the yen.

The next part examines these indices by machinery item in South Korea (see Figure, Table 2-4-4-11).

When comparing the index of exchange rate by item, the index for precision equipment tends to move towards the appreciation of the won constantly through fluctuations in exchange rates in and after 1995, just like Japan. On the other hand, the index for transport equipment tends to move towards

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denominated by local currency fully and, instead, absorb the fluctuations by adjusting mark-up rates of their profits. Meantime, Cabinet Office (2009), which analyzes pass-through exchange rates, indicates that pass-through rates tend to be lower during the appreciation of the yen and higher during the depreciation of the yen.

137 On the other hand, as to other items among electrical/electronic equipment, the index of overseas pricing for information and communication equipment shows a sharp increase and the index for electrical equipment shows a rapid decline. This is related to the fact that the index seemingly fluctuate considerably because products composing the items and their weights are slightly different between domestic price and export price when weights of these items among all items are not so large. Therefore, an attention should be paid to interpretation of the data.

138 Thorbecke (2012) analyzes the trend of export price of Japan's electronic equipment between 2007 and 2011. In the analysis, a width of a decline in export prices of electronic equipment on the yen basis is larger than the breadth of the decline in cost on a yen basis. The analysis shows that earnings of Japan's export enterprises shrank during the examined period and the result is in line with the result obtained in the analysis of this paper.

the depreciation of the won in a relative sense and even reached more than twice as high as the 1995 baseline during the appreciation of the won twice in the past. The exchange rate index for general equipment and electrical/electronic equipment is in the middle between them and has shown almost the same movement as that of total average of manufacturing products in recent years. Although South Korea's width of fluctuations in the index of exchange rate is larger than that of Japan, there are no items that fall below the 1995 baseline throughout the examined period. This result suggests that exchange rate levels have served as a favorable environment for South Korea's exports of all machinery items over many years.

In contrast with the index of exchange rate, however, South Korea's overseas pricing index has remained below the 1995 baseline for all items and the only exception to this is transport equipment, which slightly exceeded the baseline briefly at the time of the global economic crisis. Similar to the aforementioned trend in total average of manufacturing products, the overseas pricing index of individual items declined in a step-like manner three times at the time of the Asian Financial Crisis, the bursting of the IT bubble and the global economic crisis. The index for electronic equipment remains at the lowest level, followed by precision equipment, general equipment and electrical equipment. These results suggest that, against the backdrop of the depreciation of the won, South Korean enterprises adopted export strategies centering on price competitiveness. In the meantime, the only exception to this is transport equipment. Although the index for the item slightly declined in the wake of the Asian Financial Crisis, it increased steadily through the 2000s to the global economic crisis. After the index showed a slight downward trend in the wake of the global economic crisis, it remains at the highest level among the machinery items.
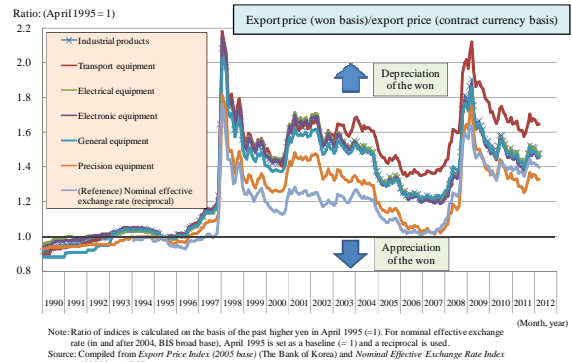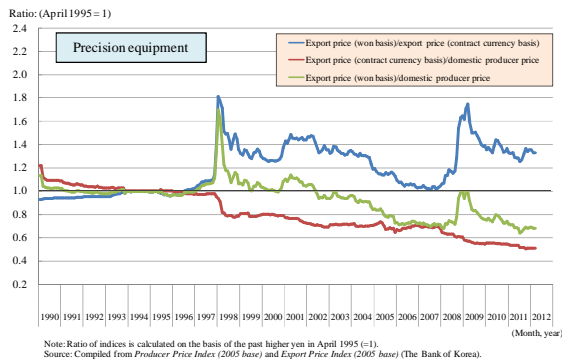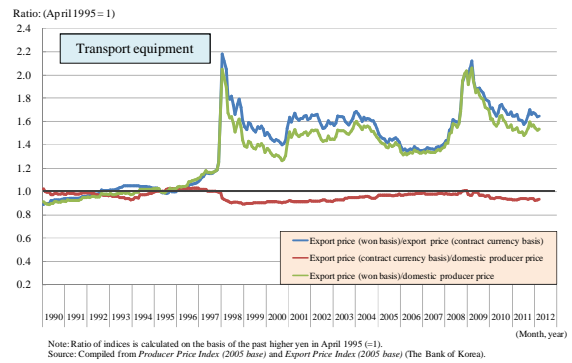
In the item-by-item comparison on the basis of the export profitability index, the index for transport equipment is prominently high because both the exchange rate and the overseas pricing indices remain at a high level. The export profitability index for the item is currently about 60% above the 1995 baseline. Meantime, the index for general equipment and electrical equipment currently stands at almost the same level as the 1995 baseline, while the index for precision equipment and electronic equipment declines to about 70% of what it was in 1995.

In order to compare South Korea's competitive conditions with those of Japan, this section examines movements of the individual indices during the recent appreciation of the yen. When looking at volatility of these indices from the recent depreciation of the yen in June 2007 to the recent appreciation of the yen in January 2012, the item showing the largest increase in the export profitability index during the examined period is transport equipment (15.7%), followed by electrical equipment (12.3%) and general equipment (11.0%). The reasons for the improvement of profitability are slightly different among these items. The profitability of transport equipment has improved drastically because a width of a decline in the overseas pricing index is small. Concerning general equipment and electrical equipment, the breadth of decline in the overseas pricing index is not as small as that of transport equipment. More important, the index of export profitability has not improved for general equipment and electrical equipment because their index of overseas pricing has declined considerably. As the dynamism of South Korean enterprises and their products have been attracting attention in the global market in recent years, the comparison of the export profitability index by

machinery item suggests that South Korean enterprises do not necessarily go through a uniform process of expanding business or develop a uniform corporate strategy across the machinery industry.

Figure, Table 2-4-4-11

South Korea's export prices (won basis, contract currency basis) by item and ratio, etc. of domestic producer prices
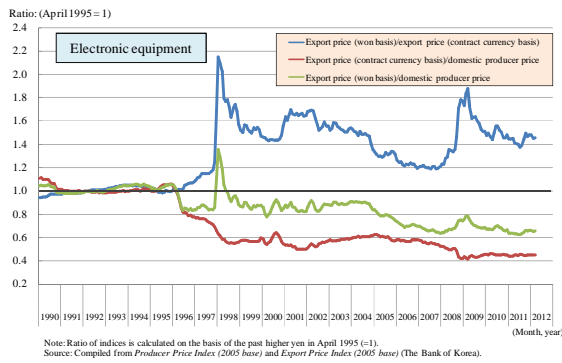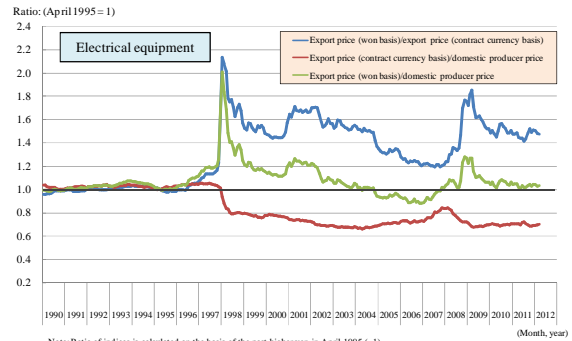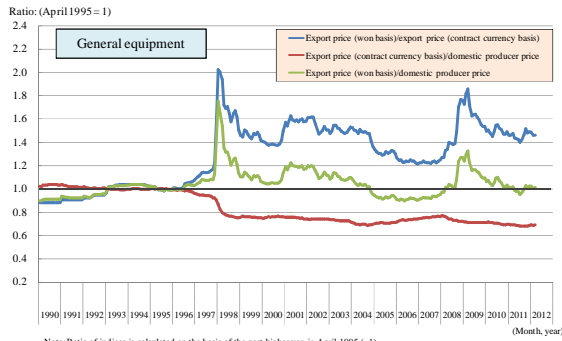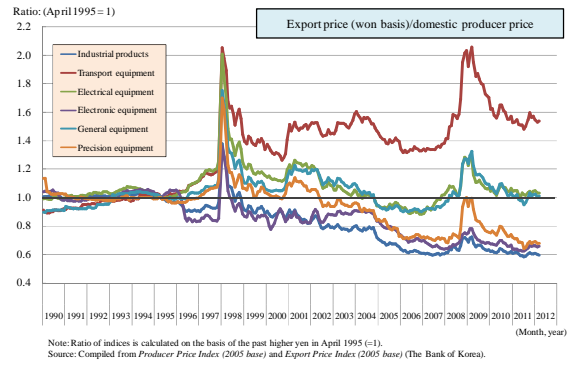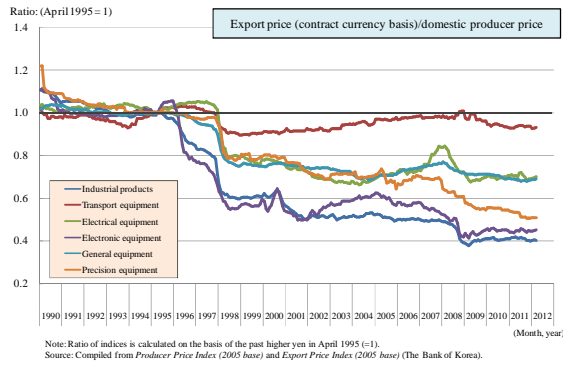
Note: Ratio of indices is calculated on the basis of the past higher yen in April 1995 (=1).
Source: Compiled from *Producer Price Index (2005 base)* and *Export Price Index (2005 base)* (The Bank of Korea).

Item	Industrial products	General equipment	Electrical equipment	Electronic equipment	Transport equipment	Precision equipment	(Reference) Nominal effective exchange rate (reciprocal)
Comparison of export price (won basis)/export price (contract currency basis)							
Recent depreciation of the yen (June 2007)	1.21	1.22	1.20	1.20	1.36	1.02	1.02
Recent appreciation of the yen (January 2012)	1.51	1.48	1.51	1.48	1.67	1.35	1.42
Volatility (%)	24.6	21.5	25.2	23.2	22.3	32.6	39.1
Comparison of export price (contract currency basis)/domestic producer price							
Recent depreciation of the yen (June 2007)	0.49	0.75	0.77	0.55	0.98	0.69	
Recent appreciation of the yen (January 2012)	0.40	0.69	0.69	0.45	0.93	0.51	
Volatility (%)	-18.5	-8.6	-10.3	-18.0	-5.4	-25.9	
Comparison of export price (won basis)/domestic producer price							
Recent depreciation of the yen (June 2007)	0.60	0.92	0.93	0.66	1.34	0.70	
Recent appreciation of the yen (January 2012)	0.61	1.02	1.05	0.66	1.54	0.69	
Volatility (%)	1.5	11.0	12.3	1.1	15.7	-1.8	
(Reference) Comparison of export price (contract currency basis)/domestic producer price							
Lowest value between June 2007 and January 2012	0.38	0.68	0.68	0.41	0.93	0.51	
Month and year recorded	2009.3	2011.7	2009.4	2009.3	2012.1	2011.10	
Volatility (%) in January 2012/ lowest value	6.1	1.2	2.6	8.0	0.0	0.8	

Note: Ratio of indices is calculated on the basis of the past higher yen in April 1995 (=1).
Source: Compiled from *Producer Price Index (2005 base)* and *Export Price Index (2005 base)* (The Bank of Korea).

Last of all, Germany's index of export profitability, etc. is examined (see Figure, Table 2-4-4-12).

Germany is characterized by the fact that its export profitability index for many of the items has been remarkably stable, similar to the index for the total average of manufacturing products. In particular, the index for transport equipment which accounts for a substantial percentage in export prices (20.7% in export prices and 13.7% in domestic prices, both of which are the largest among the machinery items (see Table 2-4-4-13)), general equipment (16.3% in export prices and 10.7% in domestic prices, both of which are the second largest after transport equipment), and even electrical equipment has been stable in terms of movement, which is within a ±5% range of the 1995 baseline, consistently to the present.

Figure, Table 2-4-4-12

Germany's export price (home currency basis) by item and ratio, etc. of domestic producer price

Ratio: (April 1995 = 1)

General equipment

- Export price (for the world)/export price (for non-EU countries)
- Export price (for non-EU countries)/domestic producer price
- Export price (for the world)/domestic producer price

Note: Ratio of indices is calculated on the basis of the past higher yen in April 1995 (=1). Export prices (for non-EU countries) are in and after 2000. All export prices are on home currency basis.
Source: Compiled from *Erzeugerpreise (2005 base)*, *Preisin-dizes für die Ausfuhr (2005 base)* (Statistisches Bundesamt) and *Eurostat*.

Ratio: (April 1995 = 1)

Electrical equipment

- Export price (for the world)/export price (for non-EU countries)
- Export price (for non-EU countries)/domestic producer price
- Export price (for the world)/domestic producer price

Note: Ratio of indices is calculated on the basis of the past higher yen in April 1995 (=1). Export prices (for non-EU countries) are in and after 2000. All export prices are on home currency basis.
Source: Compiled from *Erzeugerpreise (2005 base)*, *Preisin-dizes für die Ausfuhr (2005 base)* (Statistisches Bundesamt) and *Eurostat*.

Ratio: (April 1995 = 1)

Electronic equipment/precision equipment

- Export price (for the world)/export price (for non-EU countries)
- Export price (for non-EU countries)/domestic producer price
- Export price (for the world)/domestic producer price

Note: Ratio of indices is calculated on the basis of the past higher yen in April 1995 (=1). Export prices (for non-EU countries) are in and after 2000. All export prices are on home currency basis.
Source: Compiled from *Erzeugerpreise (2005 base)*, *Preisin-dizes für die Ausfuhr (2005 base)* (Statistisches Bundesamt) and *Eurostat*.

Ratio: (April 1995 = 1)

Of Electronic equipment/precision equipment, computers/peripheral equipment

- Export price (for the world)/export price (for non-EU countries)
- Export price (for non-EU countries)/domestic producer price
- Export price (for the world)/domestic producer price

Note: Ratio of indices is calculated on the basis of the past higher yen in April 1995 (=1). Export prices (for non-EU countries) are in and after 2000. All export prices are on home currency basis.
Source: Compiled from *Erzeugerpreise (2005 base)*, *Preisin-dizes für die Ausfuhr (2005 base)* (Statistisches Bundesamt) and *Eurostat*.

Ratio: (April 1995 = 1)

Of electronic equipment/precision equipment, household electronics

- Export price (for the world)/export price (for non-EU countries)
- Export price (for non-EU countries)/domestic producer price
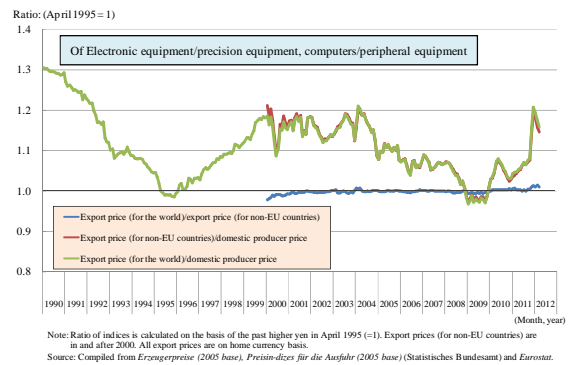- Export price (for the world)/domestic producer price

Note: Ratio of indices is calculated on the basis of the past higher yen in April 1995 (=1). Export prices (for non-EU countries) are in and after 2000. All export prices are on home currency basis.
Source: Compiled from *Erzeugerpreise (2005 base)*, *Preisin-dizes für die Ausfuhr (2005 base)* (Statistisches Bundesamt) and *Eurostat*.

Ratio: (April 1995 = 1)

Of electronic equipment/precision equipment, communication equipment

- Export price (for the world)/export price (for non-EU countries)
- Export price (for non-EU countries)/domestic producer price
- Export price (for the world)/domestic producer price

Note: Ratio of indices is calculated on the basis of the past higher yen in April 1995 (=1). Export prices (for non-EU countries) are in and after 2000. All export prices are on home currency basis.
Source: Compiled from *Erzeugerpreise (2005 base)*, *Preisin-dizes für die Ausfuhr (2005 base)* (Statistisches Bundesamt) and *Eurostat*.

Ratio: (April 1995 = 1)

Of electronic equipment/precision equipment, electronic parts/board

- Export price (for the world)/export price (for non-EU countries)
- Export price (for non-EU countries)/domestic producer price
- Export price (for the world)/domestic producer price

Note: Ratio of indices is calculated on the basis of the past higher yen in April 1995 (=1). Export price (for non-EU countries) are in and after 2000. All export prices are on home currency basis.
Source: Compiled from *Erzeugerpreise (2005 base)*, *Preisin-dizes für die Ausfuhr (2005 base)* (Statistisches Bundesamt) and *Eurostat*.

Ratio: (April 1995 = 1)

Of Electronic equipment/precision equipment, precision equipment

- Export price (for the world)/export price (for non-EU countries)
- Export price (for non-EU countries)/domestic producer price
- Export price (for the world)/domestic producer price

Note: Ratio of indices is calculated on the basis of the past higher yen in April 1995 (=1). Export prices (for non-EU countries) are in and after 2005. All export prices are on home currency basis.
Source: Compiled from *Erzeugerpreise (2005 base)*, *Preisin-dizes für die Ausfuhr (2005 base)* (Statistisches Bundesamt) and *Eurostat*.

Ratio: (April 1995 = 1)

Transport equipment

Export price (for the world)/export price (for non-EU countries)
Export price (for non-EU countries)/domestic producer price
Export price (for the world)/domestic producer price

Note: Ratio of indices is calculated on the basis of the past higher yen in April 1995 (=1). Export price (for non-EU countries) are in and after 2000. All export prices are on home currency basis.
Source: Compiled from *Erzeugerpreise (2005 base), Preisin-dizes für die Ausfuhr (2005 base)* (Statistisches Bundesamt) and *Eurostat*.

Ratio: (April 1995 = 1)　　Ratio: (April 1995 = 1)

Export price (for the world, home currency basis)/domestic producer price

Industrial products
Electrical equipment
General equipment
Household electronics
Precision equipment
Transport equipment
Electronic equipment/precision equipment
Computers/peripheral equipment
Electronic parts/boards
Communication equipment (right axis)

Note: Ratio of indices is calculated on the basis of the past higher yen in April 1995 (=1).
Source: Compiled from *Erzeugerpreise (2005 base), Preisin-dizes für die Ausfuhr (2005 base)* (Statistisches Bundesamt) and *Eurostat*.

Item	Industrial products	General equipment	Electrical equipment	Electronic equipment/ precision equipment	Computers/ peripheral equipment	Household electronics	Communication equipment	Electronic parts/boards	Precision equipment	Transport equipment
Comparison of export price (for the world, home currency basis)/domestic producer price										
Recent depreciation of the yen (June 2007)	0.95	0.99	1.04	1.16	1.06	1.14	1.65	0.98	0.97	1.01
Recent appreciation of the yen (January 2012)	0.95	0.99	1.05	1.20	1.19	1.19	1.91	1.06	0.98	1.04
Volatility (%)	0.0	-0.5	1.5	4.3	13.1	4.9	15.6	8.7	0.2	3.7

Note: Ratio of indices is calculated on the basis of the past higher yen in April 1995 (=1).
Source: Compiled from *Erzeugerpreise (2005 base), Preisin-dizes für die Ausfuhr (2005 base)* (Statistisches Bundesamt) and *Eurostat* .

Another distinctive character of Germany in comparison with Japan and South Korea is that there are no electrical equipment items of which the export profitability index declined substantially from the 1995 baseline relative to domestic prices, despite the fact that the absolute levels of both export prices and domestic prices of the item declined considerably in all of the three countries. On the contrary, the export profitability index for many of the items such as communication equipment and household electronics has been raising a level of the index.[139] As mentioned earlier, this appears to result largely from the export strategies adopted by many German enterprises that aimed to secure profitability by focusing on innovations in their specialty areas and increase their brand value without pursuing economies of scale unnecessarily. These strategies are implemented even in the field of electronic equipment which tends to fall into price competition through large-scale production.

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[139] Meanwhile, a possible reason for Japan's sharp increase in the export profitability index for information and communication equipment is a technical problem in statistics that composition and weights of the item are slightly different in individual price indices when weights of the item is not so large among all items in domestic price and export price. It should be noted that there is a possibility that the same problem occuring in Germany's composition of electronic equipment items and that it is important to interpret data with some flexibility. However, it is important to mention that the index has increased for all items categorized into electronic equipment.

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Table 2-4-4-13

Comparison of weights of domestic enterprise (producer) goods price and export price in Japan, Germany, and South Korea

Weights of domestic corporate (producer) goods price in Japan, Germany, and South Korea

Industrial products	Japan	Germany	South Korea
Industrial products	100.0	100.0	100.0
General equipment	11.8	10.7	7.9
Electrical equipment	5.8	5.7	5.4
Electronic equipment	8.2	3.5	14.5
Transport equipment	13.6	13.7	9.5
Precision equipment	1.2	1.6	1.0

Weights of export price in Japan, Germany, and South Korea

Industrial products	Japan	Germany	South Korea
Industrial products	100.0	100.0	100.0
General equipment	19.5	16.3	6.7
Electrical equipment	11.0	7.0	5.4
Electronic equipment	18.5	8.2	36.3
Transport equipment	22.4	20.7	14.5
Precision equipment	1.9	4.0	0.7

Note: All values are 2005 base. Electronic equipment includes information and communication equipment and electronic parts/devices.

Source: Compiled from *Corporate Goods Price Index* (2005 base) (BOJ), *Erzeugerpreise* (2005 base), *Preisindizes für die Ausfuhr (2005 base)* (Statistisches Bundesamt), *Producer Price Index (2005 base)* and *Export Price Index (2005 base)* (The Bank of Korea).

In addition, there is little divergence between the export profitability index and the export profitability index for non-EU countries for any of the items. This indicates that Germany earns stable profits from every item both within and outside EU.

Furthermore, the export profitability index for total average of manufacturing products has leveled off during the recent appreciation of the yen. It is found that major items show neither a substantial decline nor a substantial increase.

As mentioned earlier, this section analyzed export profitability in Japan, South Korea and Germany by comparing their trends of export prices and domestic corporate goods prices in detail. Furthermore, it examined the export profitability of Japan and South Korea by decomposing then into an exchange rate component and an overseas pricing component. In conclusion, it can be said that, as to both Japan and South Korea, the exchange rate component in export profitability fluctuates considerably. At the same time, both countries are fighting an uphill battle in the field of pricing of many items in export markets, particularly for electrical/electronic equipment which have a certain importance in the export strategies of both countries. In sharp contrast to the export structure of Japan and South Korea, Germany's export prices of its major items such as transport equipment and general equipment on a home currency basis is remarkably stable relative to domestic prices. At the same time, Germany continues to secure a certain level of export profitability even for electrical/electronic equipment, which shows a sharp decline in the absolute level of export prices in all of the three countries. Under a stable exchange rate environment, German enterprises focus on increasing their brand value and attaching importance to innovations in their niche but specialty areas, while maintaining and increasing their pricing power. On the contrary, Japanese and South Korean enterprises cannot but help waging export price competition to some extent. In conclusion, this analysis demonstrates these differences in export strategies between German enterprises and their counterparts of Japan and South Korea.