Chapter 2 Structure and change of Japan's trade and investment

Section 1 Transition and structural change of Japanese trade and economy

1. Transition of Japanese trade and economy after "White Paper on International Economy and Trade"

The year of 2011 was a memorable year of drastic change for Japan. This was due to the Great East Japan Earthquake on March 11, coupled with the resulting accident at the nuclear power plant in Fukushima and the continued appreciation of the yen. In these circumstances, Japan's "trade balance" turned into deficit in the *Trade Statistics* for the first time since 1980 (in 31 years), and in the *Balance of Payments Statistics* for the first time since 1963 (in 48 years).

First, in this section, we outline the long-term transition of Japanese trade and economy. Next we analyze and discuss the recent structural change in trade and economy during the so-called "lost two decades."

(1) Transition of Japanese economy after 1955

First, in order to show the outline of trade and economy, we follow the transition for about 60 years after 1955 by linking various macro statistics related to them[1].

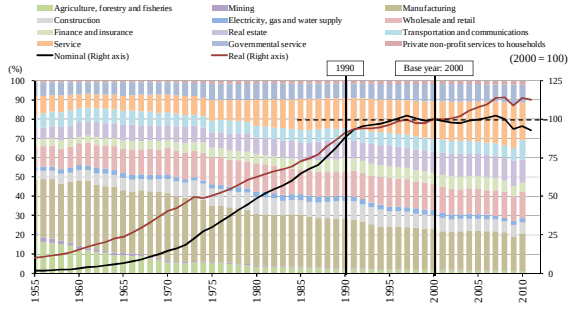
Figure 2-1-1-1 shows the trend in Gross Domestic Product (GDP).

In Figure 2-1-1-1, we use nominal and real GDP indexed with 100 representing the level in 2000, a fixed base year of real GDP, to see the trend. In nominal terms, the trend of economic growth has drastically changed from positive growth until around 1990 to zero growth since then. Comparing nominal and real values, there is an inflation trend before 1990, little price fluctuations from 1990 to 2000, and a deflation trend (higher real values and lower nominal values) after 2000. GDP is produced by various domestic production activities, and its composition ratio by industry shows an increase in the ratio of tertiary industries before 2000.

1 It is normally desirable to show data from 1945 after the war or from 1949, when the first "White Paper on International Economy and Trade" was published. However, we show data from 1955, when GDP data are available, because we frequently use ratios to GDP in this section. We use *Japan's long-term statistical series* (Ministry of International Affairs and Communications) as the past statistics, and statistics of ministries or *Japan statistical yearbook* (Ministry of International Affairs and Communications) for recent values. We made minimum adjustments of differences in definitions or values resulting from this to see the long-term transition.

Figure 2-1-1-1

Trend in Japan's GDP and industrial compositions (real, 2000 base, 2000 =100) Source: *System of National Accounts (SNA)* (Cabinet Office)



Notes 1: We added data before and after the period from 1980 to 2009 to that of the period and indexed the data with 100, representing the level in 2000 to show the long-term trend.
Notes 2: We added real GDP data before and after 2000 (a fixed base year) to that in 2000. Real GDP in 2011 is on a preliminary basis, and its breakdown is not provided.
Source: *System of National Accounts (SNA)* (Cabinet Office).

(2) Trend in "trade," "current account balance" and "investment balance"

Next we look at the trend in trade in terms of the ratio to GDP. Figure 2-1-1-2 shows the "trade" (total of "goods trade" and "service trade") in the *System of National Accounts (SNA)* to GDP. The balance of "service trade" in Japan has been in deficit though its deficit to GDP is recently decreasing. Accordingly, net exports of "trade" in the *System of National Accounts (SNA)* are lower than only "goods trade."

Figure 2-1-1-2

Japan's trade (total of goods trade and service trade) to GDP

Source: *System of National Accounts (SNA)* (Cabinet Office)

Note: Trade in System of National Accounts (SNA) is the total amount of goods trade and service trade.
Source: *System of National Accounts (SNA)* (Cabinet Office).

This shows both exports and imports to GDP have been around 10%, including the high-growth period before 1990, except they have been 10-15% for 10 years from 1975 to 1985. They both have sharply increased since 2000 and have been around 15% since 2005. Net exports have been stable at around 2% after reaching 3.9% in 1986. Recently, however, they decreased to near zero in 2008 after the failure of Lehman Brothers and fell into deficit in 2011.

Then we look at "current account balance" and "investment balance" in the *Balance of Payments*

Statistics to see the trend in overall commerce including trade[2].

Figure 2-1-1-3 shows the change in "current account balance." We present exports and imports in "trade" (only "goods trade"), "Invisible" receipts and payments, and their balances according to the categories of past long-term data prepared in the old *Balance of Payments Statistics*. "Invisible" balance generally consists of "service balance," "income balance" and "current-account transfer."

Figure 2-1-1-3 shows that the trade balance after 1964 dropped to near zero in the 1970s, when the two oil crises occurred, and that it has remained in surplus with around 2% of GDP. The surplus, however, decreased in the late 2000s. "Invisible" balance, which has long been in deficit, achieved a surplus around 2000 and has sharply increased since. Of this "Invisible" balance, balance other than "income balance" is still in deficit, and the surplus was due to an increase in the credit of "income balance." Most of the "income balance" credit is income (dividends and interests) obtained by the purchase of overseas assets, such as "direct investment" and "securities investment."

Figure 2-1-1-3
Trend in current account balance to GDP ratio
Source: *Balance of Payments Statistics* (Bank of Japan)

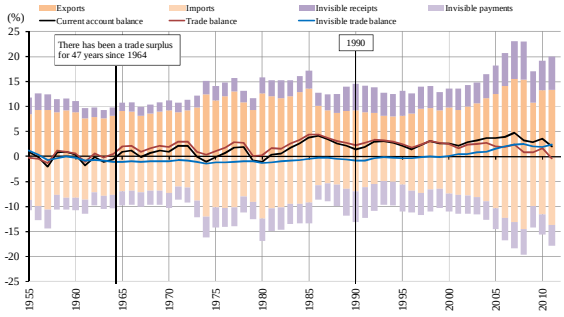


Figure 2-1-1-4 shows "investment balance" ("long-term capital balance" before 1994) and its breakdown[3].

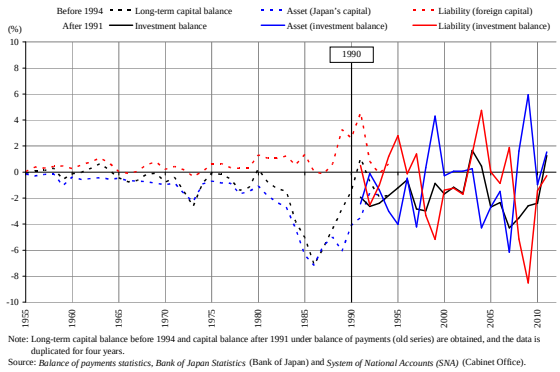
Figure 2-1-1-4 shows there was little purchase of both overseas "long-term capital" by Japan and domestic "long-term capital" by foreign counties before 1980. It shows, however, purchase of both domestic and overseas assets has increased since purchase of overseas "long-term capital" increased in the late 1980s. We can see Japan continues to purchase overseas assets from the fact investment balance has recorded net outflows (shown by a blue solid line representing minus values on the graph) since 1990, except during the Asian currency crisis in 1997 and the failure of Lehman Brothers in

2 It is difficult to obtain consecutive values due to the revision of balance items in the *Balance of Payments Statistics* in 1996. In this section, we use recent values processed according to the *Japan's long-term statistical series* (Ministry of International Affairs and Communications) whose data are obtained for the longest period. However, since "long-term capital balance" does not appear in the recent *Balance of Payments Statistics*, we also present "investment balance", a part of "capital balance."

3 In the *Balance of Payments Statistics*, the transfer of money abroad is represented with a minus sign. Accordingly, imports, purchase of overseas assets and overseas investment are represented with minus signs.

2008.

Figure 2-1-1-4
Trend in the ratio of Japan's investment balance and long-term capital balance to GDP
Source: *Balance of Payments Statistics* (Bank of Japan)



(3) Trend in the *Trade Statistics* and breakdown by purpose

Next we compare the trade amount in the *Trade Statistics*. This total trade amount is almost the same as the "trade balance" in the *Balance of Payments Statistics* and the "goods trade" in the *System of National Accounts (SNA)*[4]. We look at the trend in values under the special classification by amount/purpose since finer classifications can be obtained than other statistics.

Figure 2-1-1-5 (left) shows exports and their breakdown, and Figure 2-1-1-5 (right) shows imports and their breakdown.

As for exports, an increase has been seen mainly in exports of "capital goods" since 2004, and exports of consumption goods ("durable goods" and "non-durable goods") have not increased so much. We can also see "mining raw materials", especially "other industrial raw materials", have increased since 2000. "Other industrial raw materials" consist of "chemical industry products," "metals," "textiles" and other goods. This shows exports of intermediary goods are increasing. The cause can be attributed to the fact Japan cannot survive in price competition in final goods due to the economic development and industrialization of other countries and is shifting its exports to some intermediary goods requiring advanced technologies, or the fact exports of parts and components for overseas production are increasing.

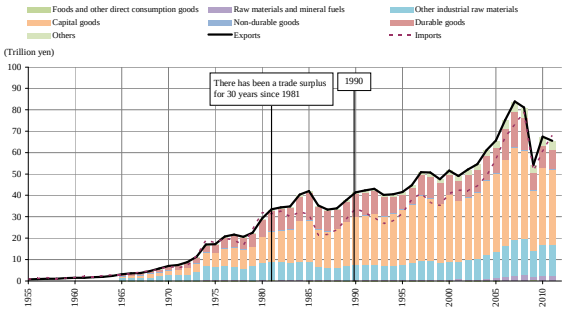
Meanwhile, imports of final goods such as capital goods and consumption goods are growing. While partially processed goods such as "raw materials and mineral fuels" have significantly increased, "other industrial raw materials", which include highly processed intermediary goods, have also increased since 2000.

We can see from the fact exports and imports of intermediary goods, and imports of final goods have thus increased that Japan's trade has already changed greatly from the so-called "processing

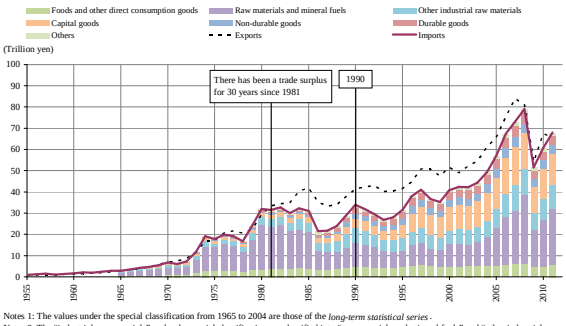
4 While exports are recorded on FOB (Free on Board) basis and imports on CIF (Cost, Insurance and Freight) basis in the trade statistics, as for the trade balance in the Balance of Payments Statistics, they both are recorded on FOB basis (insurance and freight are recorded in the service balance).

trade," in which a country imports resources and exports final goods.

Figure 2-1-1-5
Trend in Japan's goods trade by purpose (special classification) (left: export, right: import)
Source: *Trade statistics* (Ministry of Finance)



Notes 1: The values under the special classification from 1965 to 2004 are those of the *long-term statistical series* .
Notes 2: The "industrial raw materials" under the special classification are classified into "raw materials and mineral fuels" and "other industrial raw materials."
"Other industrial raw materials" consist of "chemical industry products," "metals," "textiles" and other goods.
Source: *Trade Statistics* (Ministry of Finance).



Notes 1: The values under the special classification from 1965 to 2004 are those of the *long-term statistical series* .
Notes 2: The "industrial raw materials" under the special classification are classified into "raw materials and mineral fuels" and "other industrial raw materials."
"Other industrial raw materials" consist of "chemical industry products," "metals," "textiles" and other goods.
Source: *Trade Statistics* (Ministry of Finance).

2. Analysis of economic structure as assumption

(1) Need to analyze the economic structure

As described in the preceding paragraph, Japan's economic growth changed greatly before and after 1990. Trade to GDP remained stable at around 10% before 2000, but both exports and imports have increased since 2000. Based on these situations, we move on to the change in Japan's trade and economic structure before the earthquake during the "lost two decades" after 1990.

For this purpose, in this section, we compare Japan with Germany, one of EU27 member countries, and the U.S. having a persistent trade deficit. In particular, the comparison with Germany would be important in consideration of Japan's economic structure since Germany is sometimes compared with Japan as an industrial country and is a member of EU27, which has established an economic zone beyond the system of a nation.

In this section, we value the domestic economic structure by looking down at its change. We call this a "macro-perspective." In contrast, a "micro-perspective" refers to a look at the economic structure in terms of interests of an economic entity such as a producer (a company) and a consumer, and "executive's selfish interest" for a company.

(2) "Economic zone" and change in its independence

In this section, we evaluate the strength of an "economic zone" of each country or region. The strength of an "economic zone" means the degree to which it is regarded as a "completed economic structure" in the inter-industry analysis. A "completed economic structure" (hereinafter referred to as a "completed form") refers to an economic structure in which an "economic zone" produces almost all goods demanded in the zone, and the self-sufficiency rate of each industry is at a high level.

Since achieving self-sufficiency in all goods is difficult, however, an economic zone is deemed to be self-sufficient if charges for imports of some goods are covered by exports. The situation is evaluated

as close to a “completed form” and highly independent as an “economic zone[5].”

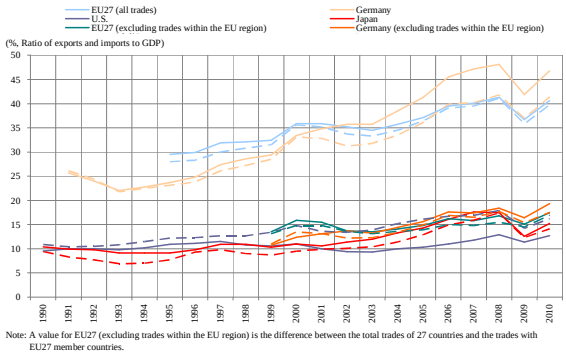
Based on this evaluation method, Japan is explained as having maintained an economic structure close to a “completed form” since around 1990. It is because Japan has long been less dependent on trade and has maintained a trade surplus under a situation where supplying resources and agricultural products are difficult.

However, this economic structure has been maintained partly because there are no highly industrialized countries like Europe around Japan, and Japan is independent in terms of an industrial structure. Conversely, Japan has lost the necessity to maintain a “completed form” due to the economic growth in neighboring countries. In other words, it is enough for Japan to import cheap goods from foreign countries without making efforts to be self-sufficient, and companies are prepared to shift production abroad.

(3) Change in dependency on trade

Based on these situations, we compare the dependency on trade for Japan, the U.S., Germany and EU27. For this purpose, we compare “trade” (goods and services) to GDP using values in the *System of National Accounts (SNA)*. Since EU27 members establish an “economic zone”, however, as for Germany and EU27, values excluding trade within the EU27 region are also presented (Figure 2-1-2-1). By doing so, we can see Germany not only as an economy but as an area within the EU27 region.

Figure 2-1-2-1
Change in the ratio of a country/region (goods + services) to GDP nominal, home currency) (solid lines: export, dotted lines: import)



Comparing Japan with the U.S. and EU27 (excluding trade within the EU region), the U.S. imports and exports and imports from EU27 (excluding trade within the EU region) were around 15% in early 2000, the U.S. exports were about 10%, and they have increased since around 2004. In contrast, Japan’s exports and imports remained at about 10% like the U.S. exports, and have rapidly increased since 2004. Since 2006, they have increased as significantly as the U.S. imports and the exports and

5 Leontief (1963) defines “self-sufficiency as a status of development where the settlement for imports that are not fungible is made up for by exports,” pointing out achieving complete self-sufficiency is impossible. Japanese translation, Niida (1969), p.50.

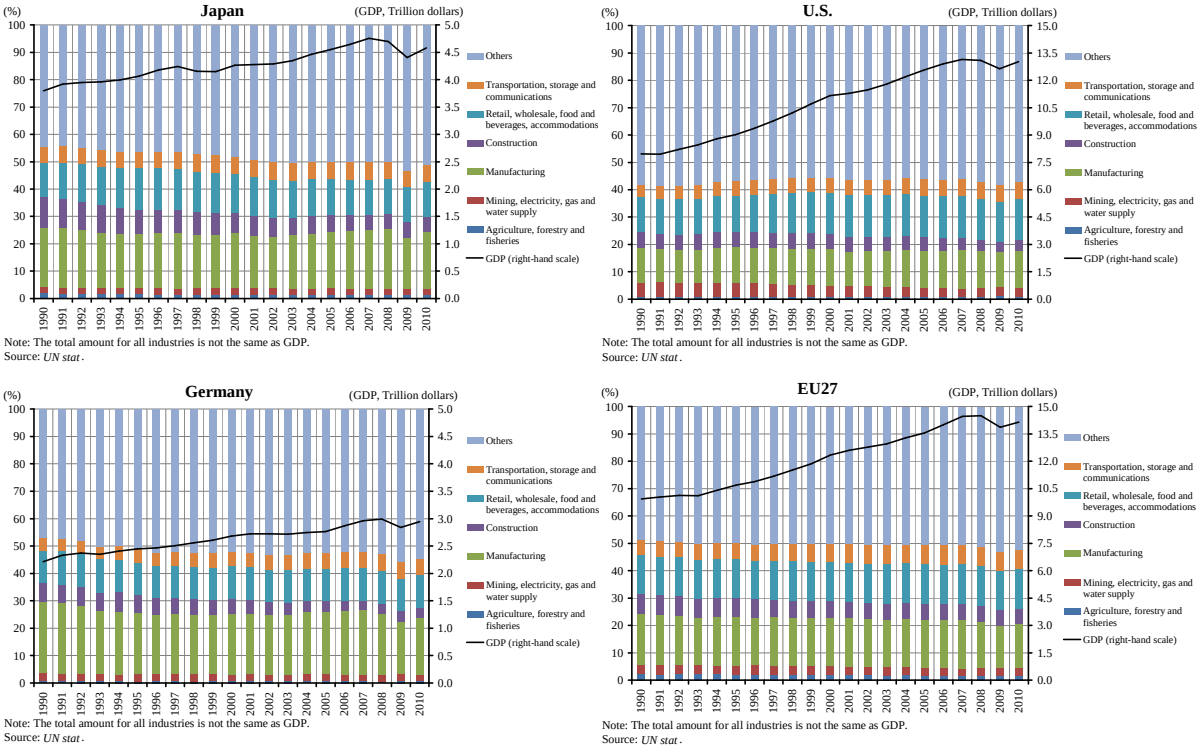
imports by EU27. This shows the explanation that “Japan is less dependent, considering it depends on other countries for resources and agricultural products” is out of date.

As for German trade and EU27 trade (including trade within the EU region), the ratio of exports and imports was almost the same before 2003, but German exports have increased more significantly than German imports since 2003. On the other hand, comparing the trade excluding trade within the EU27 region, German trade and EU27 trade with countries outside the EU27 region to GDP are almost the same as that of Japan and the U.S. This shows while German trade value is great regarding Germany as an economy, it is almost the same level as Japan, the U.S. and EU27, treating the country as an area within an “economic zone” and focusing only on trade with outside the “economic zone.”

(4) Change in industrial compositions

We compare the trend in GDP and the composition ratio by industry to GDP to show the trend in industrial compositions in each “economic zone” (Figure 2-1-2-2).

Figure 2-1-2-2
Change in GDP of each country/region and composition ratio by industry (real, 2005 base, dollar)

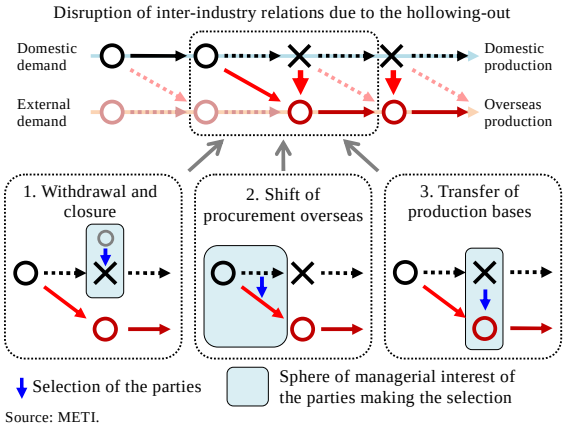


Note: The total amount for all industries is not the same as GDP.
Source: *UN stat*.

This shows while the ratio of manufacturing on a value-added basis declined after 2000 in the U.S. and EU27, it declined in the 1990s but did not decline after 2000 in Japan and Germany. Taking a closer look at the change in Japan, the composition ratio has greatly changed in the 1990s. There was a decrease in the “manufacturing” and “construction” industries and an increase in “others”. Tertiary industries even accounted for 70% of all industries. Since 2000, however, the composition ratio has not significantly changed.

This means we have not seen “deindustrialization,” the term often used when translating the term “hollowing-out,” in Japan since 2000. Therefore we summarize the effect of another “hollowing-out,” which means disappearance of industries and production bases from a region, on the domestic inter-industry structure. The selection of enterprises related to the disruption of the inter-industry structure is categorized into the following three types (Figure 2-1-2-3).

Figure 2-1-2-3
Selection of a company and disruption of inter-industry structure



The first type is for a company to withdraw or close production bases (such as factories). A simple closure of a factory not replaced by alternatives such as overseas transfers falls under this type.

The second type is for downstream industries or consumers of the production process to stop purchasing domestic parts and components, and raw materials. The case where they purchase or procure products, parts and components, and others and domestic production is not needed falls under this type.

The third type is for a company to transfer production bases overseas. From a standpoint of the company involved, this is only a move.

These are thought to be reasonable choices from the perspective of the parties making selections. From the second and third types of selections in particular, the company involved could get benefits such as lower costs, an upgrade of equipments using the latest technology and preferential treatment in special zones.

Looking at the effects on the domestic economy from a “macro-perspective,” all selections from the first to the third types would result in common consequences, the disruption of domestic inter-industry relations. The disruption of domestic inter-industry relations would eliminate production activities after the disrupted point. This could cause the decrease in distribution through wages and redistribution through taxes, and the contraction of domestic demand, which could reduce the scale of the domestic economy. As a result, unless changes are seen such as the generation of a new industry to replace this or the further attraction of external demand, the scale of the domestic economy would

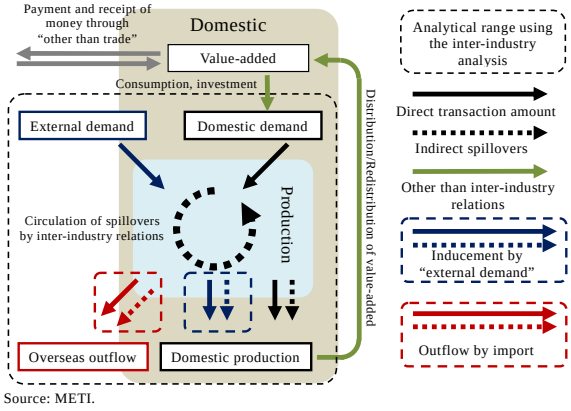
shrink[6].

(5) Economic linkages within an "economic zone" and roles of exports

When evaluating the domestic economy, instead of merely considering interests of individual economic entities, it is necessary to understand and evaluate the structure of domestic economic circulation from a "macro-perspective" through which to look down at the whole country. Accordingly, it will be important to assess whether "spillovers" are working well, in which the value-added resulting from production activities is used in domestic consumption and investment by the distribution through wages and dividends or the redistribution through taxes and welfare benefits, and causes production.

In this section, however, due to limitations of the inter-industry analysis used, we look at the "spillovers" resulting from domestic consumption and investment or exports to foreign countries. Figure 2-1-2-4 simplifies the circulation of "spillovers" based on the theory of the inter-industry analysis, regarding a country or region as an "economic zone."

Figure 2-1-2-4
Flow of "spillovers" within a country



Source: METI.

Based on Figure 2-1-2-4, the inter-industry structure is likened to a pipe network, "domestic demand" of consumption of final goods to water circulating and reinjected, "external demand" to water added from outside the circulation, and "spillovers" to something generated at the parts the water has spread. An increase in imports of final goods or highly processed intermediary goods, which is seen in Japan's trade, is also likened to an increase of water leaks from the pipe.

To spread the water to the same extent as before (cause certain "spillovers" in the country) with more water leaks ("outflow of spillovers" by imports), more supply ("external demand") is needed than before. This will increase the dependency on trade with outside the country.

From a "macro-perspective" like this, exports play two roles in the domestic economy.

Firstly, exports serve as a means of procuring funds necessary for imports in a country. There is a given condition that Japan cannot mine for resources within the country and cannot produce food

6 As an indirect and long-term effect which is difficult to quantify, it also would be difficult for economic zones which existed centered on factories to be formed.

enough to supply its people, meaning Japan cannot supply most of its primary industries. It has maintained a trade surplus for several decades in such a circumstance because it has secured from the processing trade more funds than it paid for imports.

Secondly, exports compensate for “spillovers” induced by “domestic demand,” which flow out by imports. Exports generate “spillovers” in a country, and imports transfer them overseas.

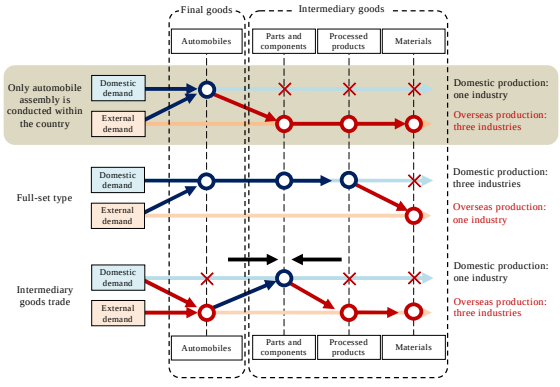
Therefore, to look at the domestic economy from a “macro-perspective,” it is important to assess the qualitative balance of exports and imports based on the two roles exports play in the domestic economy. Accordingly, it is necessary to judge whether forces causing the domestic economy to move are obtained by trade by looking at not only the trade balance but “spillovers.”

(6) Production process and intermediary goods trade

We move on to a change in the character of trade caused by this change in the inter-industry structure. In the inter-industry analysis, “spillovers” are calculated and analyzed by treating them as effects of inducing production activities by consumption of final goods (final demand). Final goods refer to goods consumed for other than production activities. The consumption is broadly classified into “domestic demand” (consumption and investment by households, companies and the government) and “external demand” (exports).

For example, as in Figure 2-1-2-5, we assume, in order to purchase “automobiles,” which are final goods, the production process is necessary where “materials” are processed into “processed products,” and “parts and components” are produced and used in producing “automobiles.” To explain this in reverse, demanding “automobiles” causes the chain of production inducement, where “automobiles” are produced, “parts and components” are purchased, which are intermediary goods for producing “automobiles,” “processed products” for producing “parts and components,” and “materials” for producing “processed products.”

Figure 2-1-2-5
Example of inter-industry relations and flow of “spillovers”



Note: Intermediary goods are classified according to the categories in RIETI-TID.
Source: METI.

When looking at the economy of a country from a “macro-perspective,” a question arises as to whether this chain of production occurs within or outside the country. Here we compare a “full-set

type" industrial structure with a situation where international division of labor has developed and intermediary goods trade is conducted.

Example of "outflow of spillovers": Only automobile assembly is conducted within a country

We evaluate the example of "Only automobile assembly is conducted within a country" in Figure 2-1-2-5, where "parts and components" are imported to produce "automobiles" from the varying viewpoints. To evaluate this from a viewpoint of the "automobile" industry from a "micro-perspective," "automobiles" are domestically produced in both cases. Meanwhile, to evaluate this from a "macro-perspective," production is conducted by the domestic "automobile" industry, which induces production of "parts and components," "processed products" and "materials." By importing "parts and components," however, not only "parts and components" but "processed products" and "materials" are produced in foreign countries.

Based on this assumption, we describe a change in the production structure in Japan.

Full-set type

In the "full-set type" industrial structure in Japan before 1990, as described in "full-set type" in Figure 2-1-2-5, when domestic "final goods" are needed by "domestic demand" (domestic consumption of final goods) and "external demand" (exports), final goods are produced by domestic industries, which induces production of domestic "parts and components" and "processed products." However, "spillovers" outflow overseas when "materials" are imported because "materials" depend on imports[7].

Intermediary goods trade associated with international division of labor

In the case where exports and imports of intermediary goods have developed as seen in recent years, as described in "intermediary goods trade" in Figure 2-1-2-5, "processed products," which are further processed than "materials," are imported, and "parts and components," which are intermediary goods, are exported so that "automobiles" are produced in overseas factories by foreign companies or Japanese companies. When "intermediary goods trade" is thus conducted, only "parts and components" are produced in the country.

When "intermediary goods trade" is thus seen from a viewpoint of exporters or preparers of trade statistics from a "micro-perspective," although export items are simply shifted from final goods to intermediary goods, it is evaluated to be good because the export amount is maintained. In addition, seen from a viewpoint of a company (management), it is evaluated to be proper because it earned a profit by exporting salable goods.

To evaluate this from a "macro-perspective," however, production inducement to one or two industries among three industries is lost, and matters such as a decline in employment and tax revenues are perceived. In addition, in the long run, indistinctive and indirect influences that are

7 For the definition of "full-set type," refer to Seki (1993), p.36.

difficult to evaluate such as a decline in consumption by people who had been employed in the two industries which lost production opportunity and government spending financed by capital investment by and tax revenues from these industries.

(7) Change in the degree of processing in trade

Based on these situations, we show goods trade in each country/region according to the degree of processing. In this case, due to the nature of statistics, trade does not include service trade and is limited to goods trade.

First we compare Japan with the U.S. and EU27. Figure 2-1-2-6 shows while intermediary goods trade has increased for both exports and imports in Japan, exports of intermediary goods have not increased so much, and imports of intermediary goods have increased in the U.S. and EU27. Looking at them with a change in net exports, we can see an increase in imports of intermediary goods has expanded a minus value of net exports.

Looking at imports of intermediary goods in Japan, we can see not only imports of “materials” but imports of processed products have increased. That is, Japan is increasingly importing highly processed products than resources from other countries/regions. We can also see that the share of “capital goods” in exports of final goods in Japan is high, and that a change in exports in the U.S. and EU27 is not as significant as that in Japan.

This shows while Japan conducted the processing trade (where a country imports resources and exports final goods produced through several production processes in the country) based on the “full-set type” production structure before 1990, it has recently increased exports of intermediary goods and imports of highly processed intermediary goods.

Next, comparing Japan with Germany, imports of intermediary goods are increasing in both countries. Meanwhile, Japan differs from Germany in that exports of various goods and net exports are increasing, that it does not import so much “materials,” and that imports of “parts and components” are greatly increasing.

Looking at German goods trade by the degree of processing divided into within the EU27 region and outside the region as in Figure 2-1-2-7, imports of “materials” are increasing more significantly outside the region than other goods, and at the same time, imports of intermediary goods are also increasing within the region. This shows EU27 countries are importing intermediary goods processed in other countries in the EU27 region through international division of labor instead of importing “materials,” namely, resources or similar goods.

We can see from the fact net exports from all countries and those from EU27 countries are nearly the same that a surplus in goods trade is attributed to inter-regional trade with EU27 countries, and the goods trade balance with countries other than EU27 is almost zero. A change in the figure also shows Germany is strengthening economic linkages with other EU27 countries and is increasing net exports through trade within the EU27 region.

Figure 2-1-2-6

Change in the ratio of goods trade to GDP by degree of processing in each country/region (nominal, dollar)

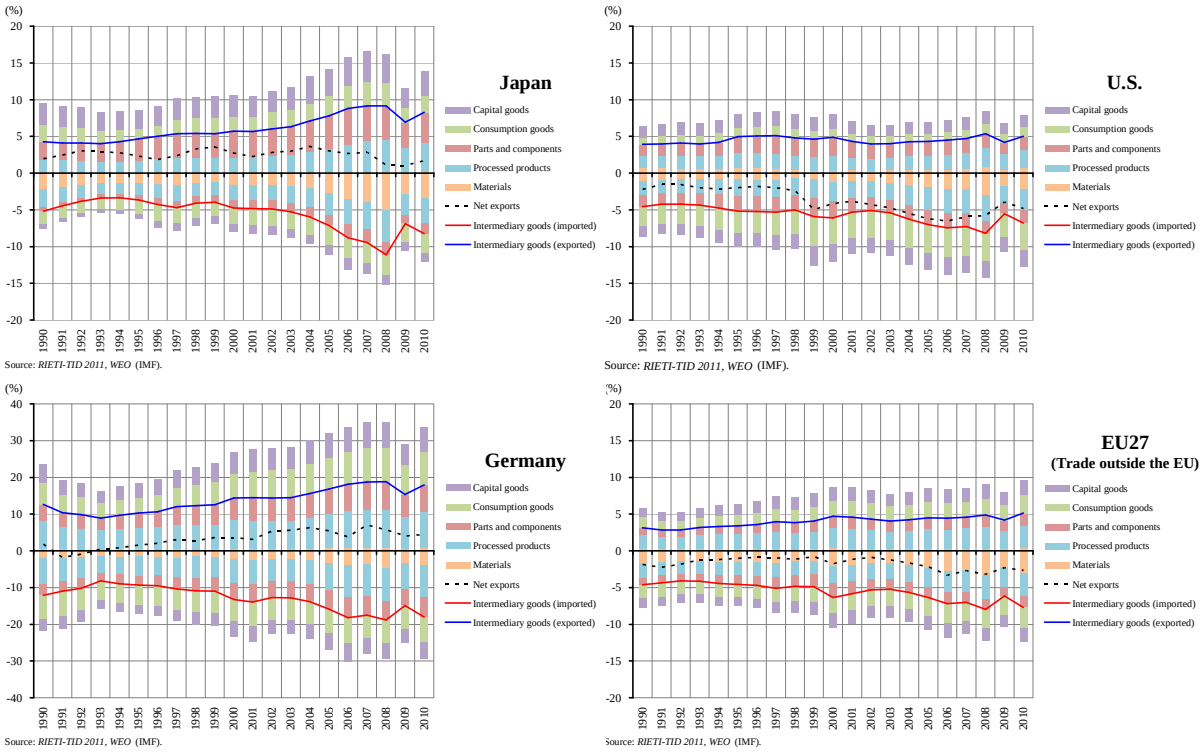
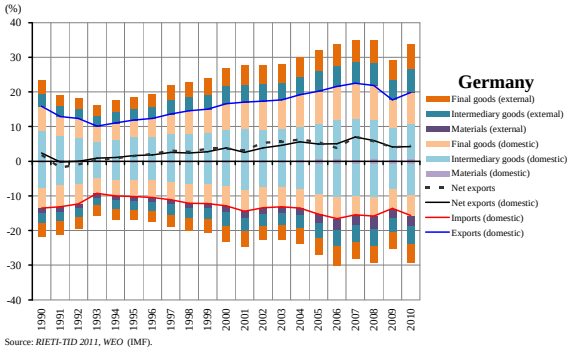


Figure 2-1-2-7

Change in the ratio of goods trade to GDP by degree of processing in Germany (nominal, dollar)



3. Analysis of economic structure using inter-industry analysis

(1) “Completed economic structure” and skyline chart

Based on these changes in trade, we show the economic structure of each “economic zone” using a skyline chart. A skyline chart measures the direct or indirect “spillovers” which “domestic demand” (domestic consumption of final goods), “external demand” (exports) and imports have on each industry, and illustrates them graphically.

Figure 2-1-3-1 shows how to read a skyline chart[8].

As Figure 2-1-3-1 shows, the column in a skyline chart relativizes the ratio of "spillovers" caused by consumption of final goods based on "spillovers" by "domestic demand." Therefore the value of trade ("spillovers" by "external demand" and suppression of "spillovers" by imports) exceeds the trade amount (exports and imports) in the Trade Statistics and others. The self-sufficiency rate also has a different meaning from general one[9].

In the skyline chart of an "economic zone" close to a "completed form", the line of self-sufficiency rate approximates 100%, and the height of bars is low and the bars have little height difference[10].

Looking at Figure 2-1-3-2, which is the skyline chart of the U.S. in 1972, we can see the "self-sufficiency rate" represented by a red line remains nearly 100%, and the height of the bars is low, not exceeding 120% at the maximum[11]. This shows although the U.S. trade balance turned into deficit around 1970, the country still maintained nearly a "completed form[12]."

8 Although the effect is generally expressed as "production inducement effect" in the inter-industry analysis, we uniformly describe it as "spillovers" in this section.

9 In a general skyline analysis, the row of the graph shows the production ratio. By replacing the ratio with the demand ratio, we can infer the demand, production and self-sufficiency rate of all or multiple industries from the area ratio, and therefore we use this in this section.

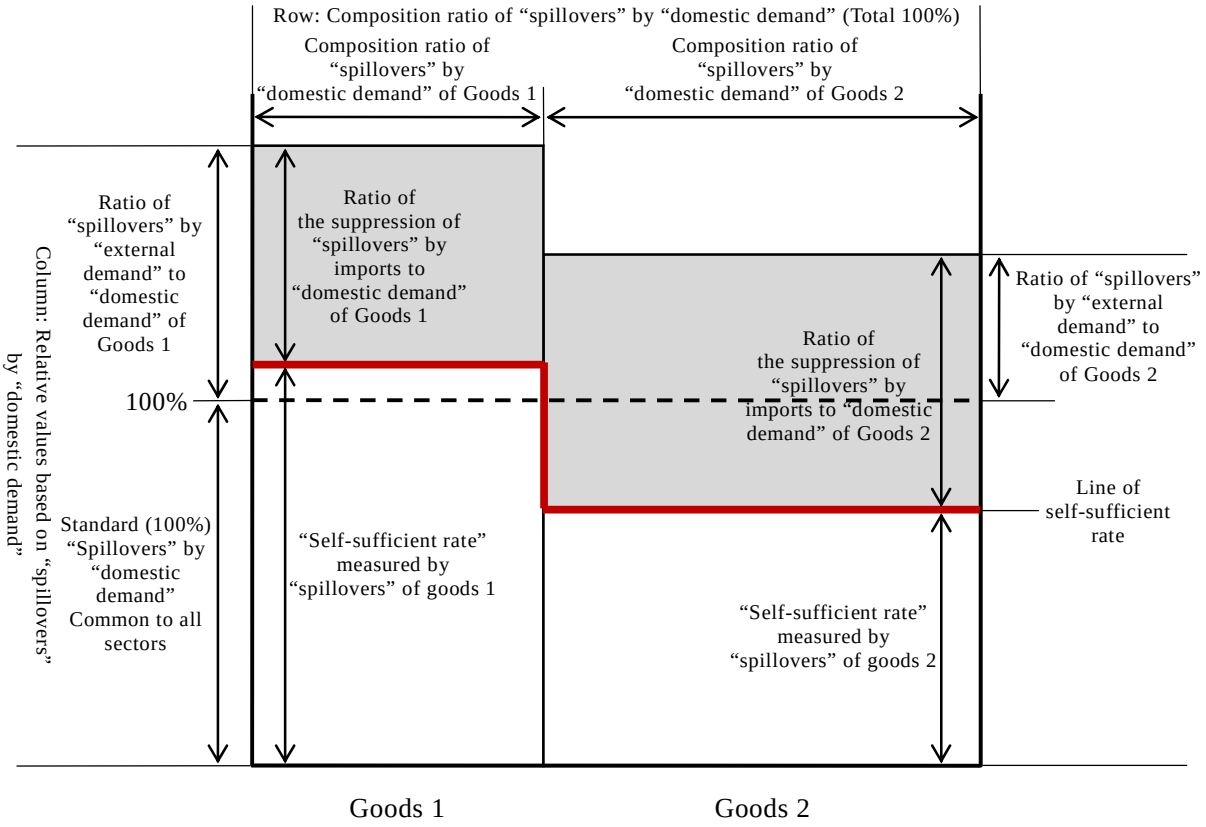
10 Leontief (1963) shows the U.S. economy in 1947 was a "completed form" using a skyline chart.

11 We prepared the figure by holding the U.S. inter-industry table published by the BEA (Bureau of Economic Analysis) close to sector classification of OECD charts.

12 The skyline chart in 1947 shown in Leontief (1963) is closer to a "completed form" than that in 1972.

Figure 2-1-3-1

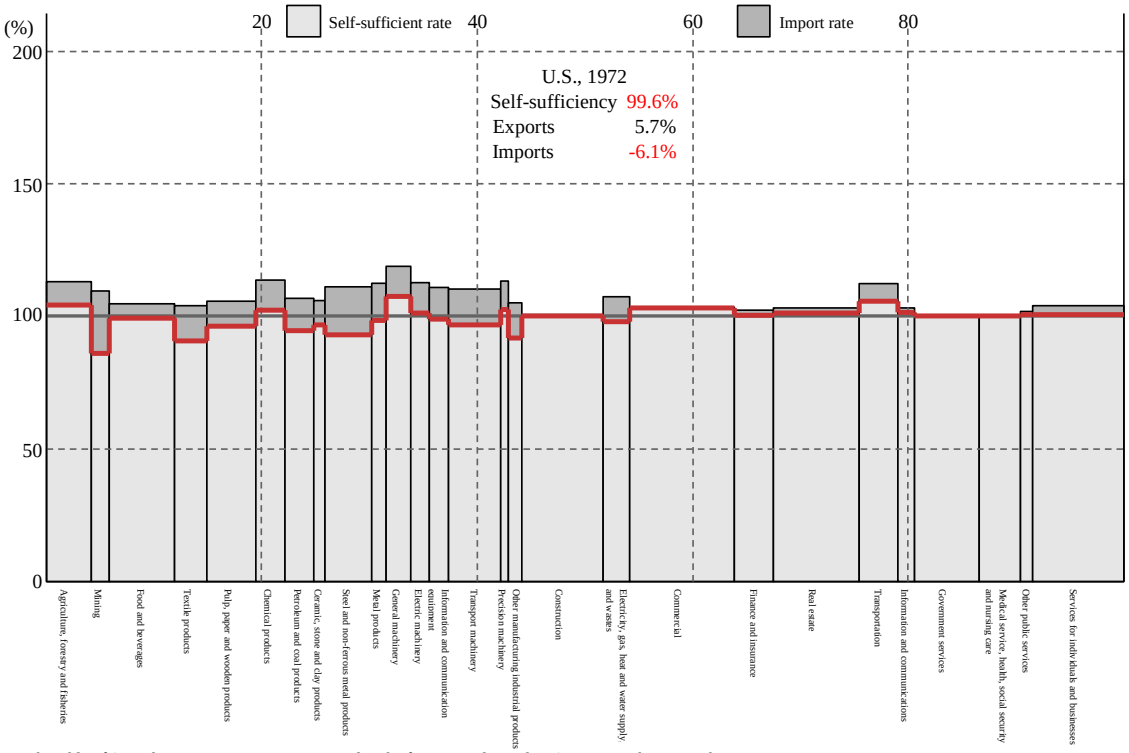
How to read a skyline chart



Source: METI.

Figure 2-1-3-2

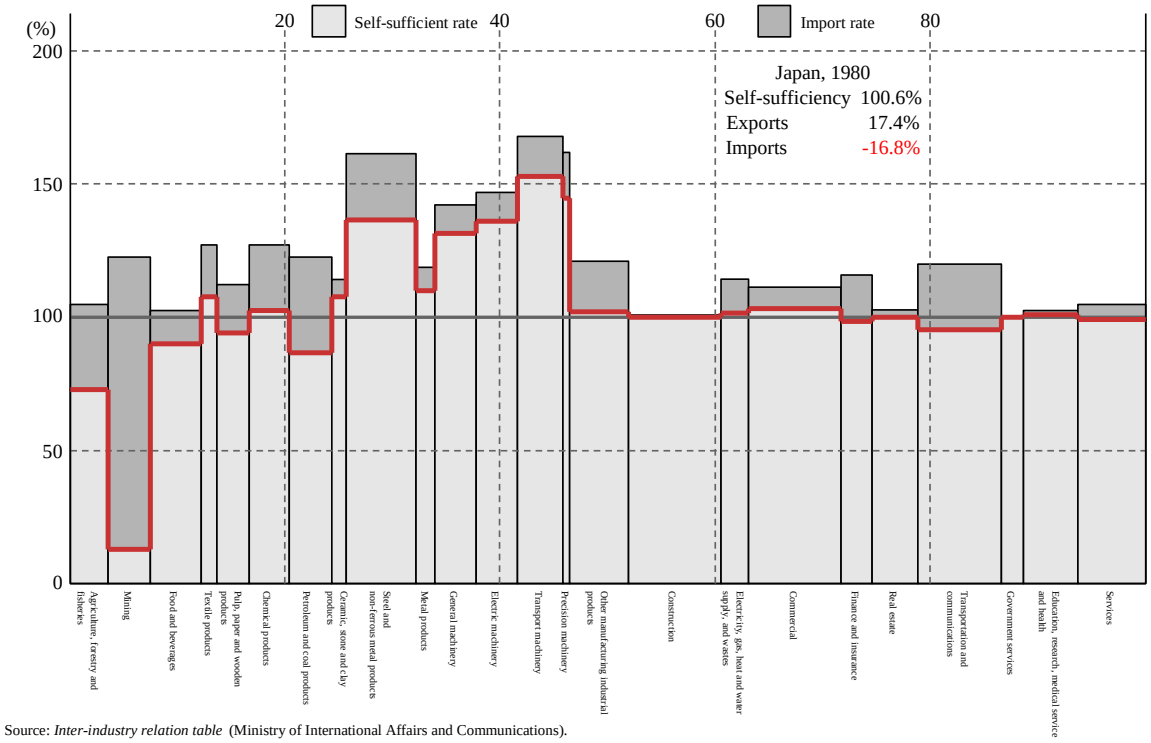
Example of “completed economic structure” (1972 U.S. skyline chart)



Note: The table of 85 endogenous sectors was integrated in the format similar to the 28 sectors in this research.
Source: *BEA* .

Meanwhile, we can see because Japan achieved a “completed form” on the condition that it depended on imports for foods, as shown in Figure 2-1-3-3, there is a considerable difference in height in bars in the country’s skyline chart even in 1980 compared to that of the U.S. in 1972.

Figure 2-1-3-3
Japan's 1980 skyline chart



Source: *Inter-industry relation table* (Ministry of International Affairs and Communications).

(2) Inflow and outflow of "spillovers" by trade

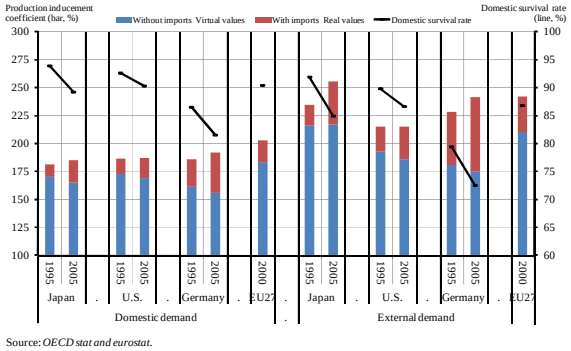
Based on these points, we analyze inducement and outflow of "spillovers" accompanied by a change in the economic structure using the inter-industry table. To begin with, we compare "inducement of spillovers" of each economic zone by factor, namely "domestic demand" and "external demand." However, as for EU27, due to the low accuracy of its inter-industry table, we present only values in 2000 for reference.

In Figure 2-1-3-4, the blue parts of the bars represent "spillovers" induced by consumption of final goods of the same amount. Meanwhile, the red parts represent "spillovers" which would be induced without imports, that is, those which flowed out by imports. These are opportunity losses of domestic production, not monetary losses caused by imports. Taking "domestic demand" in Japan in 1995 as an example, the blue part of the bar represents "spillovers" equivalent to 170% of "domestic demand" are induced by "domestic demand" in the country/region, and the red part of the bar represents "spillovers" equivalent to 10% of "domestic demand" flow out by imports. In addition, the lines represent the "domestic survival rate," obtained by setting "spillovers" which would be induced without imports and represented by the blue and red parts as the denominator, and "spillovers" which are induced in the country and represented by the blue part as the numerator[13].

13 In Paragraph 4, we show this "domestic survival rate" by industry by illustrating it graphically.

Figure 2-1-3-4

Comparison of “spillovers” by “domestic demand” and “external demand” among countries/regions



Source: *OECD stat and eurostat.*

Figure 2-1-3-4 shows “external demand” induces more “spillovers” from consumption of final goods of the same amount than “domestic demand” in all economic zones. It is probably because goods exported from industrialized economic zones have many production processes and cause many “spillovers[14].”

Comparing the “domestic survival rate” between Japan and the U.S., the rate declined more significantly in Japan. Breaking this into components, in the U.S., the blue parts decreased and the red parts replaced it without a change in the bars as a whole. This shows an increase in outflow by imports without a change in “spillovers” by “external demand.” By contrast, in Japan, an increase in “spillovers” caused by “external demand” was offset by an increase in outflow by imports.

We can also see that the “domestic survival rate” decreased in Japan and Germany, and that the decrease was more significant in Germany. This difference may be attributed to a difference in economic linkages in neighboring countries. As described above, there were circumstances in Japan where the “full-set type” production structure was formerly able or required to be maintained. Meanwhile, Germany already had deep economic linkages with other countries as of 1995 due to the high level of industrialization in other European countries, the country’s adjacency to many of these countries and the historical background from the establishment of the European Economic Community (EEC) in 1957 to the establishment of the European Union (EU) in 1993. In addition, the change in the decade shows these economic linkages further deepened.

Then we show the gap between the amount able to be detected and the amount difficult to detect by comparing “spillovers” flowing out abroad with imports.

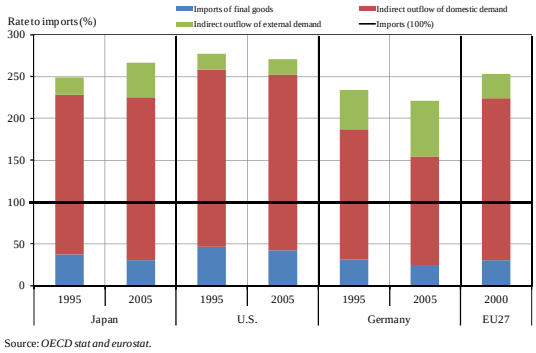
Figure 2-1-3-5 shows the amount of “outflow of spillovers” to the import amount by factor with 100% representing the import amount in each year. An increase in the bar as a whole indicates the amount of “outflow of spillovers” by imports increased more significantly than the import amount, and this trend was observed only in Japan. An increase in the amount of “external demand” shown in green represents an expansion of outflow of “spillovers” abroad by exports, and this expanded in Japan and Germany[15].

14 In contrast, in the trade structure of resource-rich countries, “external demand” is thought to have a lower production inducement coefficient and a higher domestic survival rate than “domestic demand.”

15 The difference between 100% and the ratio of imports of final goods is deemed as the ratio of imports

Figure 2-1-3-5

Comparison of the degree of “outflow of spillovers” among countries/regions



Source: *OECD stat and eurostat.*

We can also see the degree of outflow is higher in the U.S. than in Japan. In particular, the degree of “outflow of spillovers” by imports of intermediary goods in the production process is very high.

While the amount of “outflow of spillovers” to the import amount increased in Japan, the amount was smaller than in Japan and further decreased in Germany. In other words, the gap in the effect of imports on the domestic economy compared in terms of the import amounts shrank. However, the amount of “outflow of spillovers” by imports itself increased because the import amount increased by 150% in the decade in Germany.

(3) Self-sufficiency and balance of “spillovers” in “economic zones”

Now we compare “inducement of spillovers” by “external demand” (exports) and “outflow of spillovers” by imports, and the “degree of self-sufficiency in spillovers” and the “balance of spillovers”, which are the difference between the first two items.

First we describe the definition of the “degree of self-sufficiency in spillovers.” As described above, some “spillovers” caused by “domestic demand” flow out abroad by imports. An economic zone is deemed to be self-sufficient if “spillovers” enough to offset this can be induced by exports. This is quantified in terms of the “degree of self-sufficiency in spillovers.” However, while the reference value of the “self-sufficiency rate” in a skyline chart is set at 100%, the “degree of self-sufficiency in spillovers” in this section represents the difference with 0%.

The “balance of spillovers” is the difference between “spillovers” induced by exports and “spillovers” flowing out abroad by imports. In this case, “loss of production opportunity by exports,” which is part of “spillovers” caused by “external demand,” is also treated as outflow by imports.

Figure 2-1-3-6 summarizes inducement of “spillovers” by exports, “outflow of spillovers” by imports, the “balance of spillovers” and the “degree of self-sufficiency in spillovers” based on these points.

In Figure 2-1-3-6, in Japan, while the “degree of self-sufficiency in spillovers” increased by about

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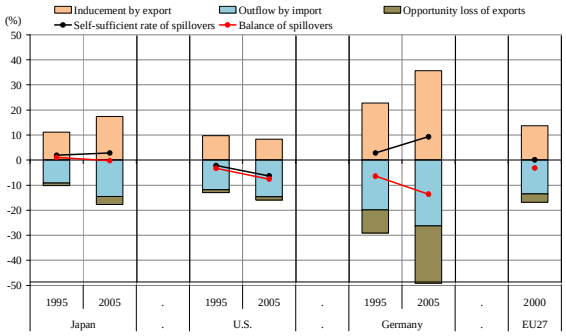
of intermediary goods, and this figure includes indirect outflow of “domestic demand” and “external demand. ” It is difficult to divide this figure into “domestic demand” and “external demand” due to the nature of the inter-industry table.

1% as a result of the increase in both “inducement by exports” and “outflow by imports,” the “balance of spillovers” turned into deficit[16]. This is due to the increase in “loss of production opportunity by exports,” namely, “spillovers” which was to be caused by exports and flowed out by imports.

Figure 2-1-3-6

Change in the “degree of self-sufficiency in spillovers” and the “balance of spillovers” in countries/regions



Source: *OECD stat and eurostat* .

In contrast, while “inducement by external demand” decreased compared to 1995, “outflow by imports” increased by about 3%. As a result, the “degree of self-sufficiency in spillovers” declined to -4%. However, “opportunity loss of external demand” slightly changed since “external demand” did not increase. In other words, only outflow increased without an increase in inducement by trade.

By contrast, in Germany, there is nearly twice as much inducement and outflow as in Japan since the trade volume was originally large. The amount of “opportunity loss of exports” is large and more than doubled. As a result, the “degree of self-sufficiency in spillovers” increased from 3% to 9%. Meanwhile, the “balance of spillovers” fell from -6% to -14%.

It follows from this that although the volume of exports and imports was originally large and further increased in the decade, and the deficit in the “balance of spillovers” expanded, Germany has established an economic structure where it cannot just maintain, but increase the “degree of self-sufficiency in spillovers” in the country. In other words, the country has linked the structure of international division of labor in the EU27 as an “economic zone” with the domestic economy.

Accordingly, while the U.S. has increased only imports and has not achieved the self-sufficiency of the trade amount and “spillovers” by trade, Germany has greatly increased the trade amount and the “degree of self-sufficiency in spillovers.” By contrast, in Japan, although the trade amount has increased, the “degree of self-sufficiency in spillovers” has not increased so much as the “balance of spillovers” has not increased.

16 According to the calculation using the inter-industry table of basic classification in Japan, the “degree of self-sufficiency” declined by 1% from 1990 to 1995. That is, the “balance of spillovers” decreased, and the “degree of self-sufficiency in spillovers” remained almost the same from 1990 to 2005. For a change in the balance, refer to p.142-143 of Chapter 2, Section 3, of “White Paper 2011.”

Column 8 “Spillovers” excluding trade

As shown in Figure 2-1-1-3 in Chapter 2, Section 1, “invisible” balance (excluding goods trade) turned into surplus in 2000 and has since been increasing. “Invisible” balance generally consists of “service balance,” “income balance” and “current-account transfer,” of which only “income balance” is a surplus.

Some argue, in light of the decreasing trend of trade balance after 2000 and a trade deficit in 2011, Japan will make income from overseas assets rather than exports in the future. Ways of boosting domestic demand by attracting inward direct investment from abroad have also been considered.

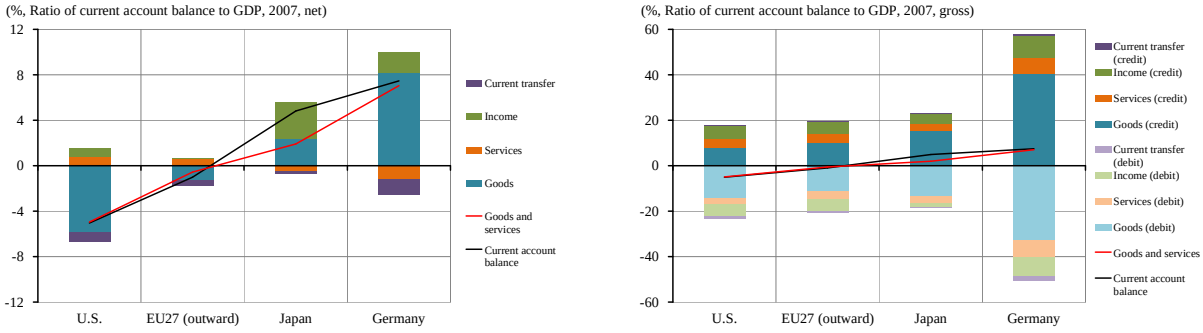
Commerce “excluding trade” has thus increasingly been of importance. Therefore it may be necessary to examine the effect of commerce “excluding trade” on the Japanese economy. It is, however, difficult to examine how many “spillovers” will be caused by “income balance” in the country due to the nature of the inter-industry table. For this reason, we try to infer it by a combination of multiple statistical data.

As in Chapter 2, Section 1, we compare “current account balance” and “income balance” among Japan, the U.S., Germany and EU27. We use figures in 2007 shortly before the failure of Lehman Brothers for a comparison purpose. Because the failure of Lehman Brothers had an impact on trade balance more than income balance, we select 2007 to compare with eliminating the impact.

Column Figure 8-1 compares “current account balance.”

Column Figure 8-1

Comparison of current account balance, ratio to GDP for 2007, (left: net, right: gross)



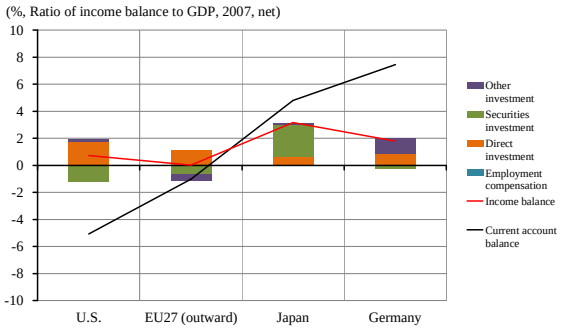
Source: *CEIC database*, *eurostat*, and *System of National Accounts (SNA)* (Cabinet Office).

Source: *CEIC database*, *eurostat*, and *System of National Accounts (SNA)* (Cabinet Office).

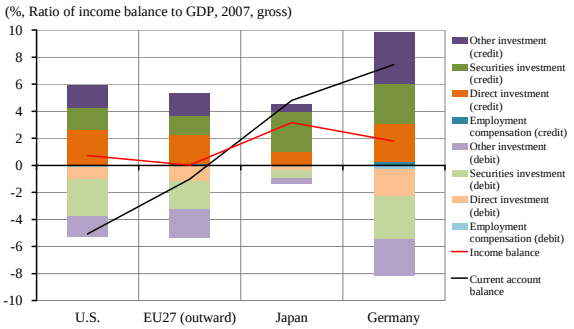
Column Figure 8-1 shows Japan’s “current account balance” to GDP in gross terms is comparable with that of the U.S. and EU27 (outward) and is about half of that of Germany. Meanwhile, its composition is closer to that of Germany than that of the U.S. and EU27 (outward) except for a small amount of debit in “income balance” in Japan.

Column Figure 8-2

Comparison of income balance, ratio to GDP for 2007 (left: net, right: gross)



Source: *CEIC database* , *eurostat* , and *System of National Accounts (SNA)* (Cabinet Office).



Source: *CEIC database* , *eurostat* , and *System of National Accounts (SNA)* (Cabinet Office).

Column Figure 8-2 compares “income balance.”

Column Figure 8-2 shows Japan is marked by a small amount of debit in “income balance,” credit centered on “securities investment,” and a small amount of “other investment.” Countries other than Japan are similar in that credit of “direct investment” is large and that debit of “securities investment” is large. The “direct investment” and “securities investment” in the *Balance of Payments Statistics* differ in the share holding ratio by definition, and we need to take into account their meaning different from the original meaning of “direct investment.” The difference is to be noted in discussing the future promotion of inward direct investment in Japan[17].

Various types of income included in credit of “invest income” are given back and distributed in the country and become various types of “domestic demand.” As Figure 2-1-3-4 shows, there are fewer “spillovers” of “domestic demand” than “external demand” (exports) in Japan. It should be noted that “direct investment returns” include “reinvestment returns,” which are theoretically deemed to be once given back to the country although they actually are not, and that the amount of “direct investment returns” is not equal to the amount of consumption or investment of “domestic demand.”

Additionally, as a matter of course, if inward investment is made, dividends and interests for the investment are paid outside the country when its income is distributed. Taking these points into consideration, “spillovers” caused by commerce excluding trade would be fewer than “domestic demand.”

It follows from this that “spillovers” caused to the domestic economy would decrease even if income balance increases by the same amount as a decrease in exports, and no change is observed in current account balance. Therefore we need to discuss the future commerce based on not only the trend in balance but a change in the quality of commerce.

4. Comparison using the “domestic production ratio” and the “domestic survival rate”

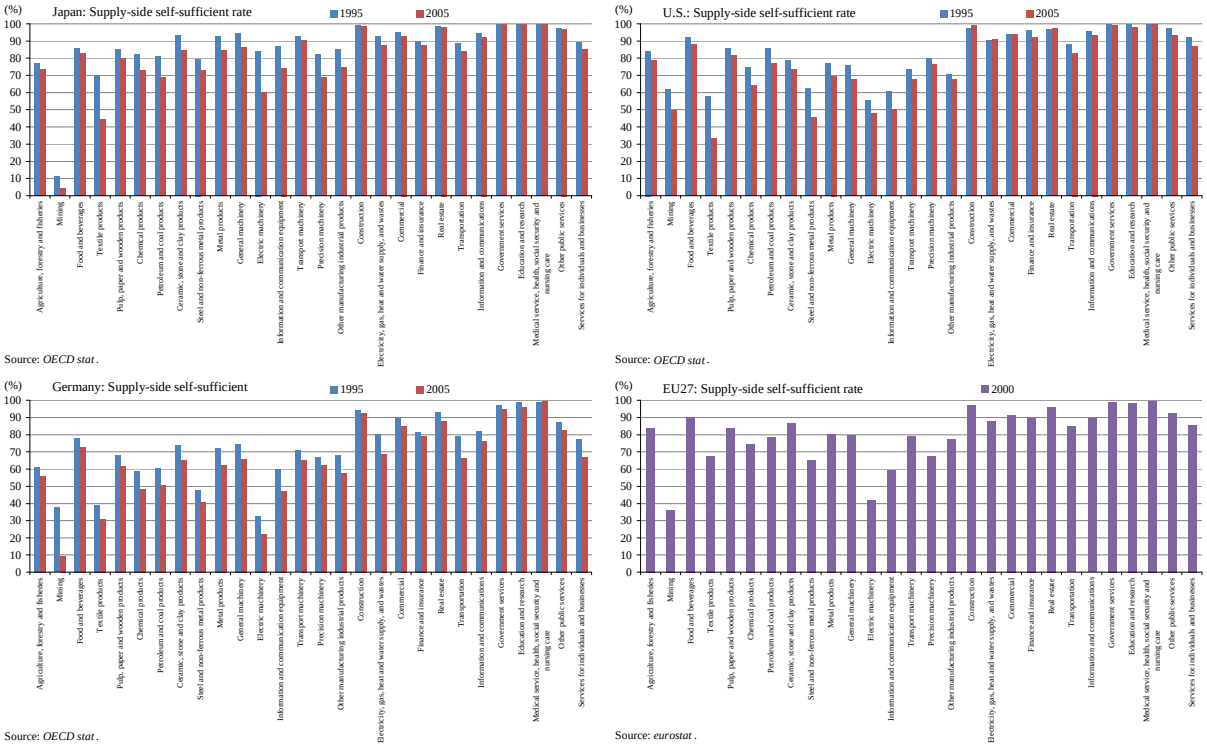
(1) Comparison using the “domestic production ratio”

We show the difference among countries by production sector. First we look at a change in the

17 *Balance of Payments Manual* (IMF) defines direct investment as the holding of or beyond 10% of the common shares or voting rights of a invested company or cases equivalent to it and defines securities investment as other cases.

"domestic production ratio," which shows the domestic ratio in supply and production of goods summarizing inter-industry relations. Unlike "spillovers," the "domestic production ratio" is to see the composition of domestic production and imports without tracking back production processes. Of the "domestic production ratio," here we compare the "self-sufficiency rate for supply" and the "local content ratio for production[18]." However, as for the EU27, due to the low accuracy of its inter-industry table, we present a graph in 2000 for reference.

Figure 2-1-4-1
Comparison of "supply-side self-sufficiency rate" in the country and region



Firstly, the "self-sufficiency rate for supply" is, taking an automobile as an example, the ratio of domestically-produced automobiles to domestically-sold automobiles, that is, the ratio of domestic production to supply.

Comparing the ratio among countries, the ratio generally and especially for secondary industries, is lower in the U.S. and Germany than in Japan. In the EU27 as a whole, the ratio is almost the same level as in Japan except for such industries as "12. Electric machinery", "13. Information and communications equipment", and "15. Precision machinery."

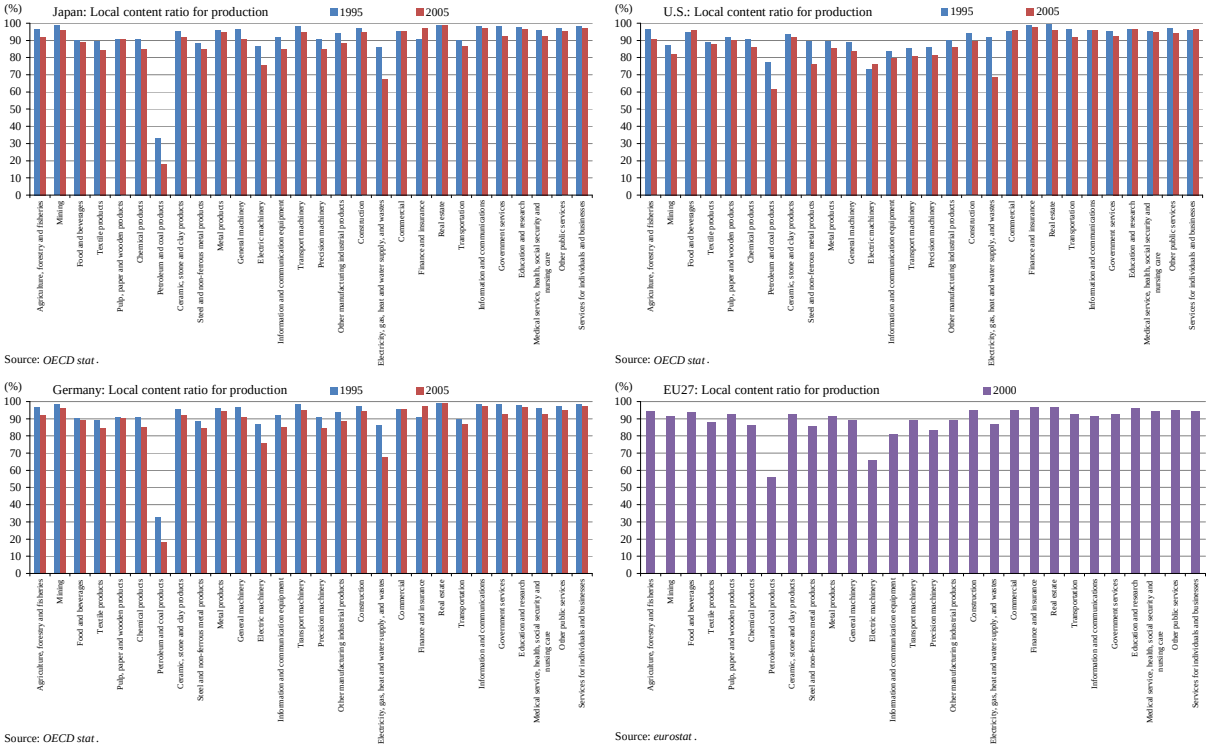
Meanwhile, the "self-sufficiency rate for supply" is on a declining trend in both countries. By sector, we can also see a significant decline in "4. Textile products", "13. Information and communications equipment", "15. Precision machinery", in addition to "2. Mining". In other words, the "self-sufficiency rate for supply" is declining in electronics related industries (Figure 2-1-4-1).

18 We used two of four types of the "domestic production rate" used in Fujikawa (1998).

Secondly, the “local content ratio for production” is, also taking an automobile as an example, is the domestic ratio of intermediary goods necessary for production of automobiles, that is, the domestic ratio of goods used in production. We can see the “local content ratio for production” is also generally on a declining trend.

Comparing the “local content ratio for production” among countries, the ratio in the U.S. is not lower than in Japan. However, taking low “self-sufficiency rate for supply” into consideration, the level of production itself is low although the domestic ratio of production is high. In contrast, the “local content ratio for production” is generally, and especially for tertiary industries, low in Germany. The “local content ratio for production” is generally high in the EU27. Because this ratio is high when international division of labor concludes within the EU27, the EU27 as a whole is highly independent as an “economic zone” (Figure 2-1-4-2).

Figure 2-1-4-2
Comparison of the “local content ratio for production” among countries/regions



Source: *OECD stat*.
Source: *OECD stat*.
Source: *OECD stat*.
Source: *eurostat*.

(2) The “domestic survival rate” in “production process” and “all processes”

We show by industry how many “spillovers” have been made easier to flow out abroad in the inter-industry structure to look closer at the domestic economic structure. For this purpose, we analyze using the “domestic survival rate.” The “domestic survival rate” refers to the ratio of “spillovers” in a production sector, which are caused by demand of final goods and remain in the country. Here we use two types of the “domestic survival rate” for “production process” and “all processes.”

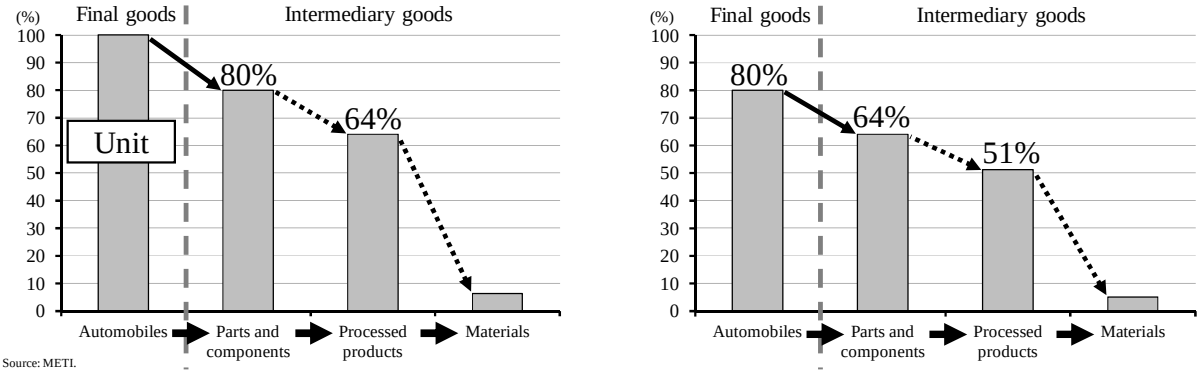
“Production process”: the “domestic survival rate” calculated on the assumption that domestic final goods are consumed.

"All processes": the "domestic survival rate" calculated assuming possibilities of domestic production and imports in consumption of final goods.

These two rates differ in whether the calculation is made including imports in consumption of final goods. We show this difference using an example. Assume that "spillovers" flow out in an order of "parts and components," "processed products" and "materials" after production of final goods, and that the purchase ratio of domestic goods excluding "materials" is uniformly 80%. Figure 2-1-4-3 shows the "domestic survival rate" for "production process" and "all processes" in the situation.

The rates in Figure 2-1-4-3 are the "domestic survival rate" of "spillovers" caused by "final goods" to each production sector. The "spillovers" remaining in the country thus shrink by a multiplier by tracking back production processes.

Figure 2-1-4-3
Example of a change in the "domestic survival rate" by imports



(3) Calculation method and graph of the "domestic survival rate"

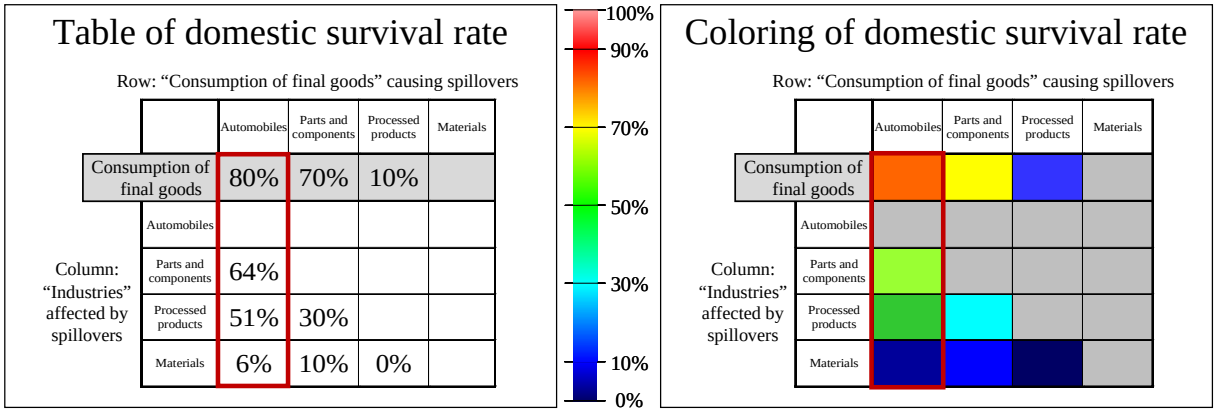
Figure 2-1-4-4 (left) illustrates vertically values shown in Figure 2-1-4-3 by final goods. That is, values of "automobiles" in Figure 2-1-4-4 (left) are those in Figure 2-1-4-3 (right) shown vertically. Some fields such as "materials" columns are left blank to show there is no consumption in these production processes unlike the case of zero consumption.

Values of the "domestic survival rate" are as numerous as the square of the number of production sectors, and it is difficult to cover all of these values. Therefore we visualize them using thermography as shown in Figure 2-1-4-4 (right)[19]. In thermography, a field with a high rate of "spillovers" remaining in the country is represented by warm colors such as red and yellow, and a field with a low rate is represented by cold colors such as light blue and blue. Fields left blank in Figure 2-1-4-4 (left) and gray fields in Figure 2-1-4-4 (right) show there are no values with distinction from values at or near zero.

19 For a change from 1990 to 2005 according to the industry classification in Japan, refer to Chapter 2, Section 3, of "White Paper 2011," where we also used this expression.

Figure 2-1-4-4

Numerical example and visualization of the “domestic survival rate”



Source: METI.

(4) Comparison of the “domestic survival rate”

We show the inter-industry structure of each “economic zone” using this “domestic survival rate[20]”. However, as for the “domestic survival rate” of EU27, due to the low accuracy of its inter-industry table, we present a graph in 2000 for reference.

Figures 2-1-4-5 to 2-1-4-8 illustrate graphically “production process”, “all processes” and their changes in each “economic zone.” We show clearly a change in Japan by comparing them.

First we look at a change in Japan shown in Figure 2-1-4-5. Looking at the “production process” in 1995, we can see sectors other than “1. Agriculture, forestry and fisheries” and “2. Mining” in the row are indicated in red, and “spillovers” tended to remain in the country. We can see from the fact many sectors are indicated in green in 2005 that the “domestic survival rate” greatly declined. This is also seen from the fact many fields in “a change in the production process” shown in the lower left are indicated in dark blue.

Next, looking at a change in colors of “consumption of final goods” in Japan’s “all processes”, we can see the ratio for “4. Textile products”, “12. Electric machinery” and “15. Precision machinery” declined. This means the domestic production ratio of these products in final goods significantly declined. Since production of final goods decreased following their imports, “spillovers” flowing into domestic production sectors decreased.

Looking at the “change in all processes” in the lower right, many fields are indicated in red for consumption of final goods and, almost all fields are indicated in blue for the production process. This means that the domestic inter-industry structure was disrupted, that “spillovers” were less likely to spread through the inter-industry relations of production activities, and that, at the same time, the domestic production ratio of final goods increased due to an increase in exports. This is because all exports are treated as “final goods” in the inter-industry table, and even an increase in exports of

20 We use the table of 28 sectors in this section. However, the “domestic survival rate” in tertiary industries is high and remains almost unchanged. Accordingly, as for the “domestic survival rate,” we use the table of 19 sectors where sectors from “19. Commercial” to “28. Services for individuals and businesses” are integrated into one sector.

intermediary goods due to the development of international division of labor in the production process is expressed in the data as an increase in final goods.

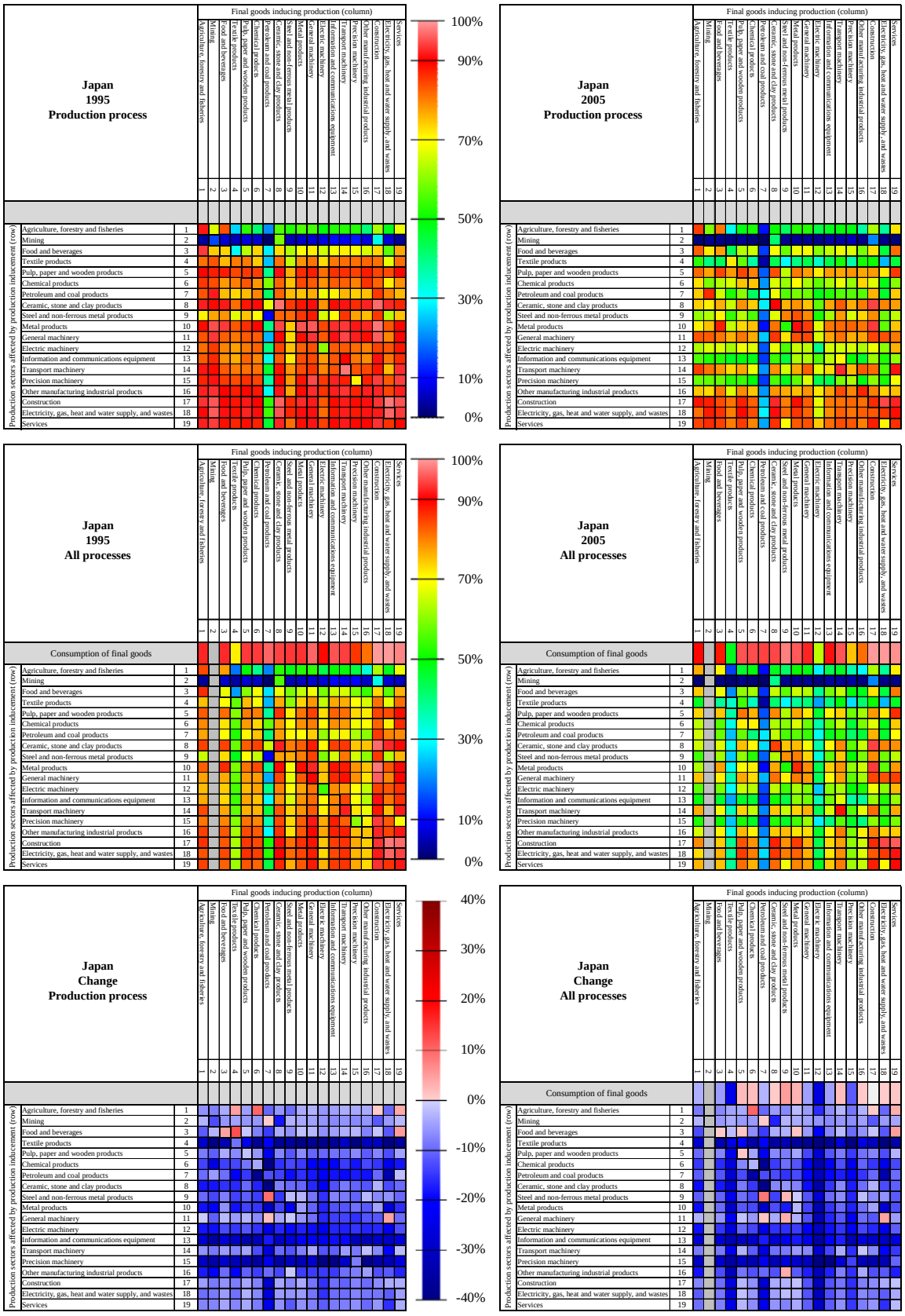
Then, looking at the U.S. “production process” in Figure 2-1-4-6, we can see the U.S. has depended on imports for procurement of intermediary goods in heavy industries from “11. General machinery” to “16. Other manufacturing industrial products” since 1995. This trend extended to overall manufacturing industries from “4. Textile products” in 2005.

As for the U.S. “all processes,” the domestic purchase ratio in consumption of final goods declined in industries of “4. Textile products”, and from “12. Electric machinery” to “16. Other manufacturing industrial products,” which led to a decline in the “domestic survival rate” of “all processes.” Looking at the “change in all processes” in the lower right, there are few fields in red for “consumption of final goods” than in Japan. This is because, while imports increased, exports did not increase in the U.S. as shown in Figure 2-1-2-1.

Next, taking a look at a change in Germany from Figure 2-1-4-7, many fields were already indicated in green in 1995. This indicates Germany already had strong economic linkages with other European countries in 1995. As for the “change in all processes,” the “domestic survival rate” declined as with Japan although in different sectors.

Figure 2-1-4-5

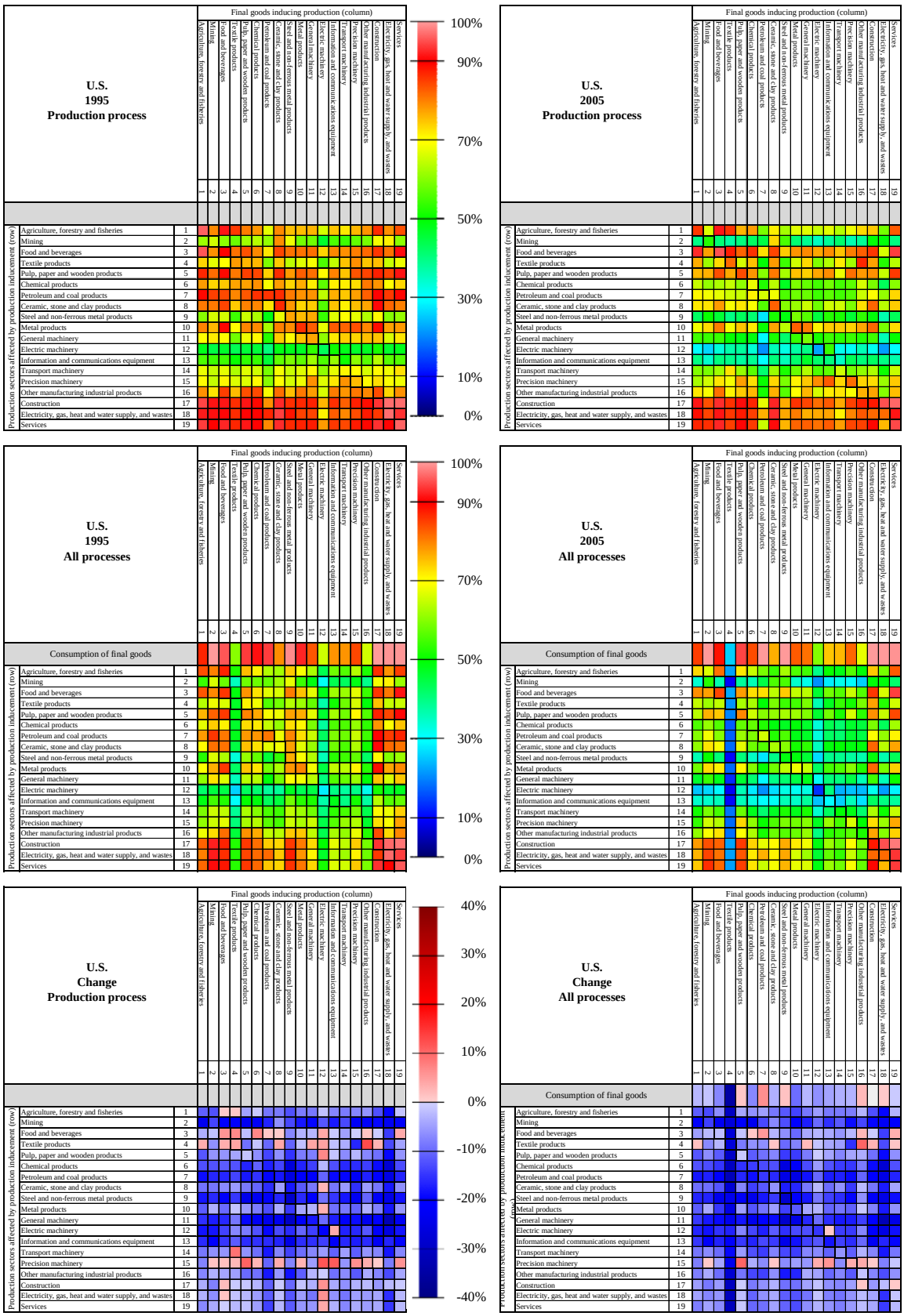
Japan's "domestic survival rate"



Source: *OECD* stat.

Figure 2-1-4-6

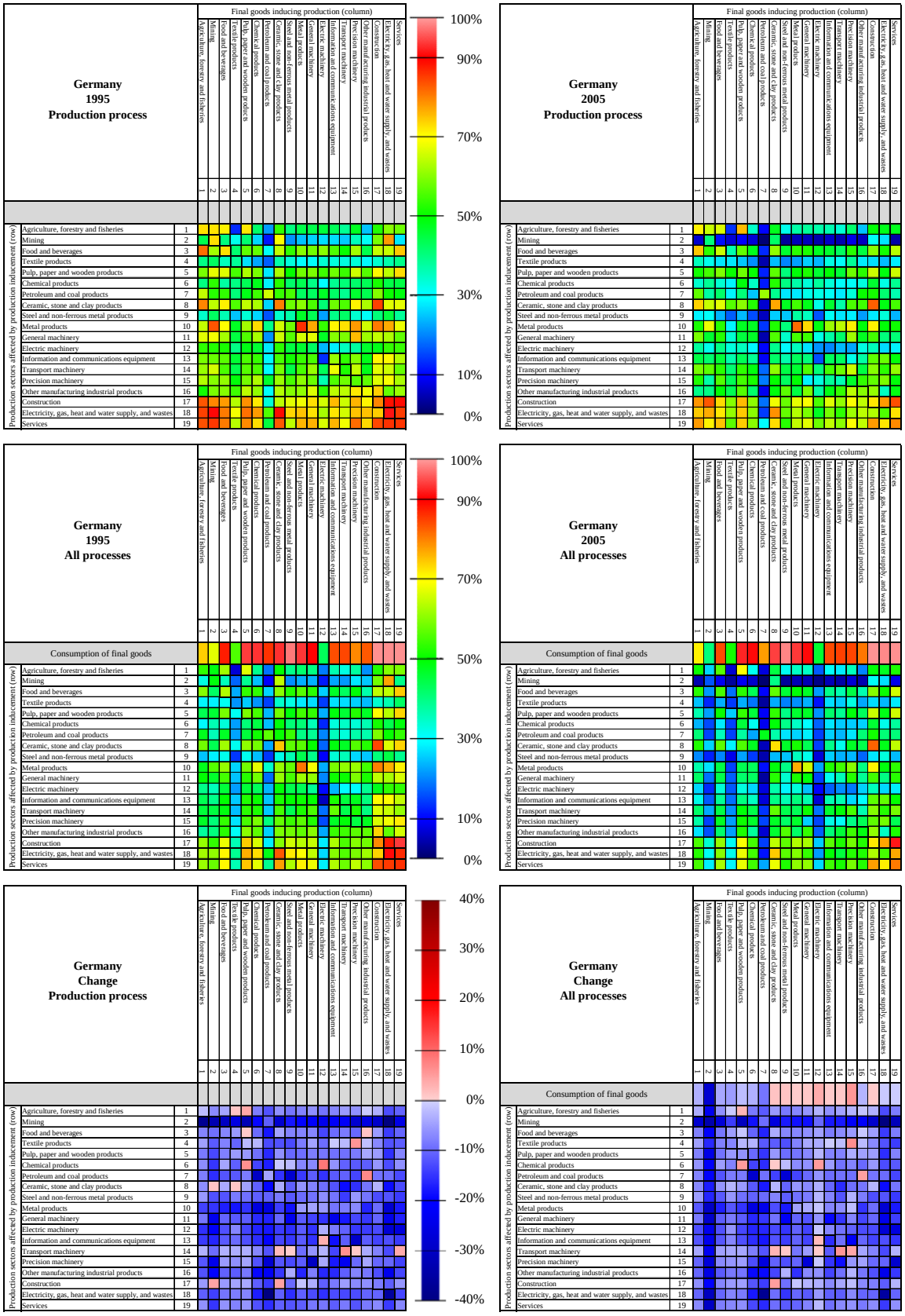
U.S. “domestic survival rate”



Source: *OECD* stat.

Figure 2-1-4-7

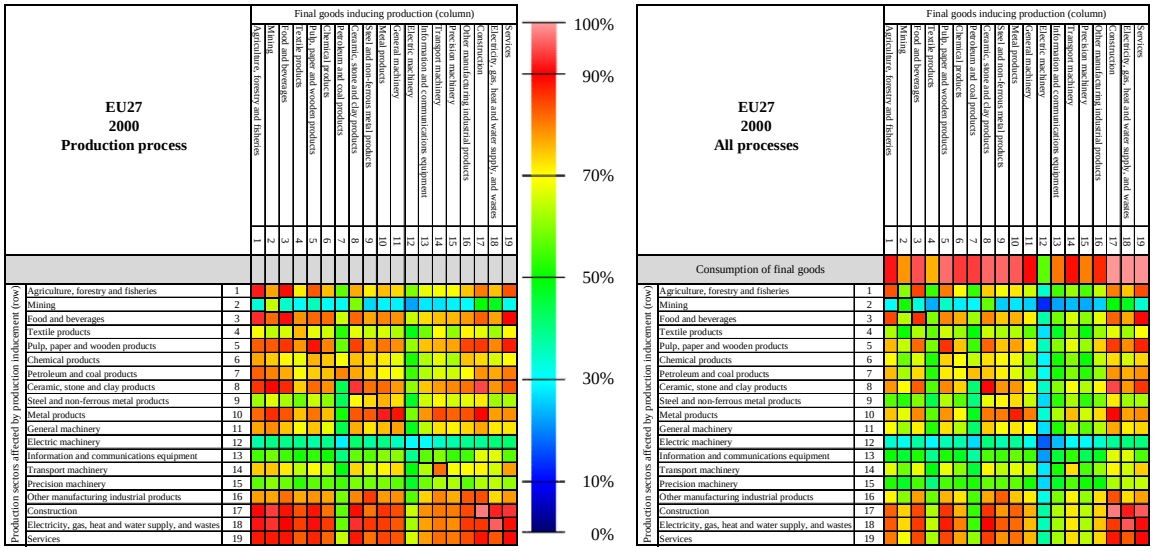
Germany's "domestic survival rate"



Source: *OECD* stat.

Figure 2-1-4-8

EU27 “domestic survival rate” in 2000 (reference)



Source: eurostat.

As for “all processes” in Germany, the rate is low for consumption of final goods in “1. Agriculture, forestry and fisheries”, “4. Textile products” and “12. Electric machinery.” Looking at the “change in all processes” in the lower right, we can see, as with Japan, the domestic purchase ratio in consumption of final goods increased in many sectors. However, considering an increase in the trade amount of the EU27 in Figure 2-1-2-7 and high “domestic survival rate” of the EU27 in Figure 2-1-4-8, this may be because Germany strengthened linkages with the EU27 as an “economic zone.”

(5) Summary of imports using the “domestic survival rate”

We have shown above the results of analysis using the “domestic survival rate,” which shows how many “spillovers” induced by “domestic demand” and “external demand” remain in the country.

To summarize these results, Japan’s “domestic survival rate” greatly declined from 1995 to 2005. Meanwhile, Germany’s “domestic survival rate” was far lower than in Japan in 1995 and declined as significantly as in Japan during a decade until 2005. There was a similar tendency in Japan and Germany that the domestic production ratio for “final goods” increased due to an increase in exports of intermediary goods, and that the “domestic survival rate” for the production process decreased due to an increase in imports of intermediary goods[21].

The situation in Germany seems more serious than in Japan because the ratio of exports and imports to GDP in Germany is originally more than twice as in Japan, and “spillovers” become easier to flow out. In Figure 2-1-3-6, however, while the “degree of self-sufficiency in spillovers” remains unchanged in Japan, it is increasing in Germany, which is inconsistent with this result. In order to understand the structure where these conflicting natures exist at the same time, it is required to see the

21 Exports of intermediary goods are treated as exports without distinction from exports of final goods in the inter-industry table. Since the table is prepared so that the domestic production ratio of exported goods is 100%, the domestic production ratio increases when exports of intermediary goods increase.

"degree of self-sufficiency in spillovers" including inducement by exports, not just "outflow of spillovers" by imports.

5. Sector-by-sector comparison of the "spillovers of trade"

(1) Expression of "spillovers of trade"

We see "spillovers" of trade on the domestic economy shown in Figure 2-1-3-6 by production sector. For this purpose, we use a skyline chart modified to look closely at the effect of trade.

In this graph, we express breaking down "inducement of spillovers" by exports and "outflow of spillovers" by imports as follows.

- Inducement by exports: "External direct inducement," which is direct "inducement of spillovers" by "external demand"
  "External indirect inducement," which is indirect "inducement of spillovers" by "external demand"
- Outflow by imports: "Domestic direct outflow," which is direct "outflow of spillovers" by "domestic demand"
  "Domestic indirect outflow," which is indirect "outflow of spillovers" by "domestic demand"
- Opportunity loss of exports: "External outflow," which is direct or indirect "outflow of spillovers" by "external demand"
- Degree of self-sufficiency in spillovers = Difference between "inducement by exports" and "outflow by imports"

Figure 2-1-5-1 compares this expression with a skyline chart.

As shown in Figure 2-1-5-1, unlike a skyline chart, it shows by factor "inducement of spillovers" by exports and "outflow of spillovers" by imports without showing " 'spillovers' by 'domestic demand', " "domestic production" and the "self-sufficiency rate" in the column. It also shows the "degree of self-sufficiency in spillovers" as their difference[22]. If this "degree of self-sufficiency in spillovers" exceeds zero, it indicates "spillovers" flowing out by imports are offset by "spillovers" induced by "external demand[23]."

The row shows the composition ratio of "spillovers" by "domestic demand" as with a skyline chart. The "spillovers" by "domestic demand" are those which would be caused in the country without imports. We can see integrating inter-sector values by adjusting the area of each graph.

In this analysis, to show not only which production sector was affected by "spillovers" but consumption of which final goods drove the domestic economy, we show "spillovers" in two ways: (affected) and (caused). (Affected) shows "spillovers" which each production sector was affected by as with a traditional skyline chart. In contrast, (caused) shows which final goods caused "spillovers."

The difference of graphs between (affected) and (caused) is shown in Figure 2-1-5-2.

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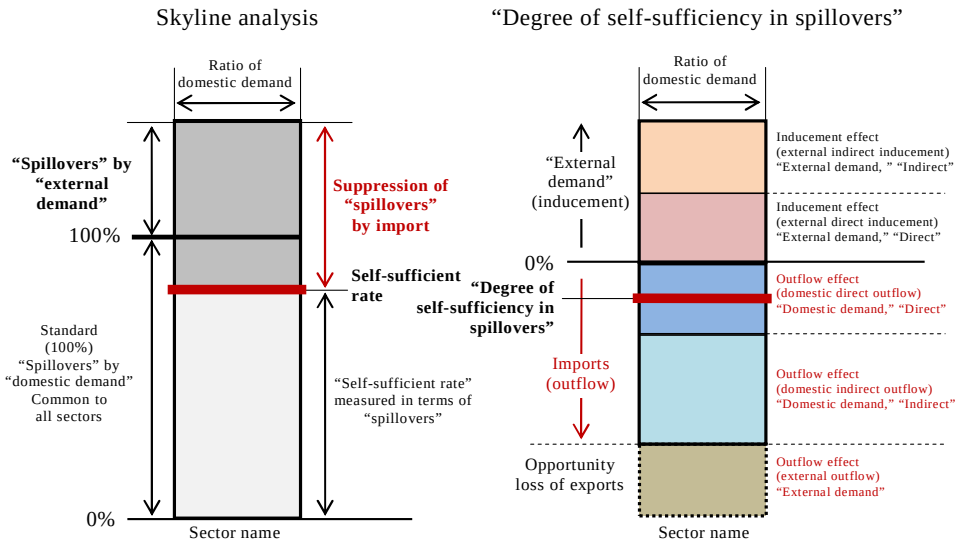
22 The "balance of spillovers" shown in Figure 2-1-3-6 is not shown in this graph.

23 The "degree of self-sufficiency in spillovers" is the level relative to "domestic demand" caused. Accordingly, even if the unemployed increases and "domestic demand" shrinks due to the weak economy, this effect cannot be reflected in the calculation.

Figure 2-1-5-2 shows an example of the difference of “spillovers” between (affected) and (caused). In this example, “spillovers” in production of two goods are shown divided into direct (solid arrows) and indirect (dotted arrows), and Goods 1 and Goods 2 are indicated in red and blue arrows, respectively. As shown in Figure 2-1-5-2, the difference between (affected) and (caused) lies in whether the points where arrows cross, namely, “spillovers” indirectly caused to other goods, are treated as those of the affected or those of the caused.

Figure 2-1-5-1

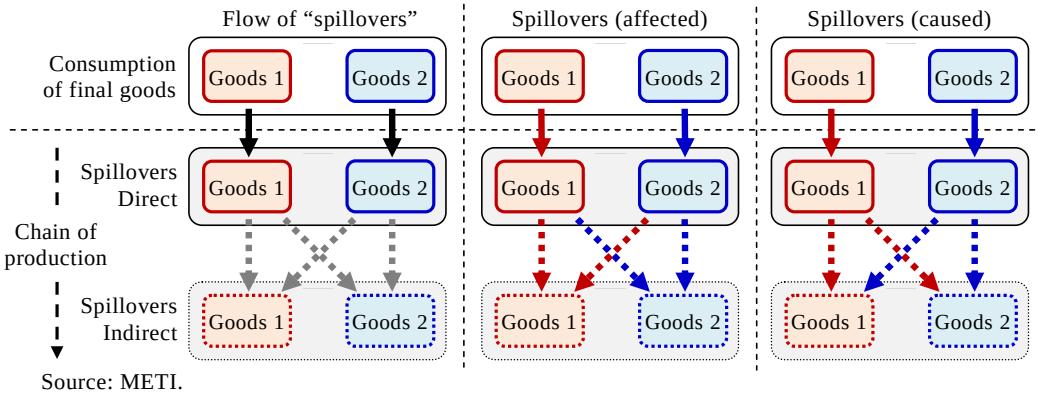
Difference in expressions between a skyline chart and “spillovers of trade”



Source: METI.

Figure 2-1-5-2

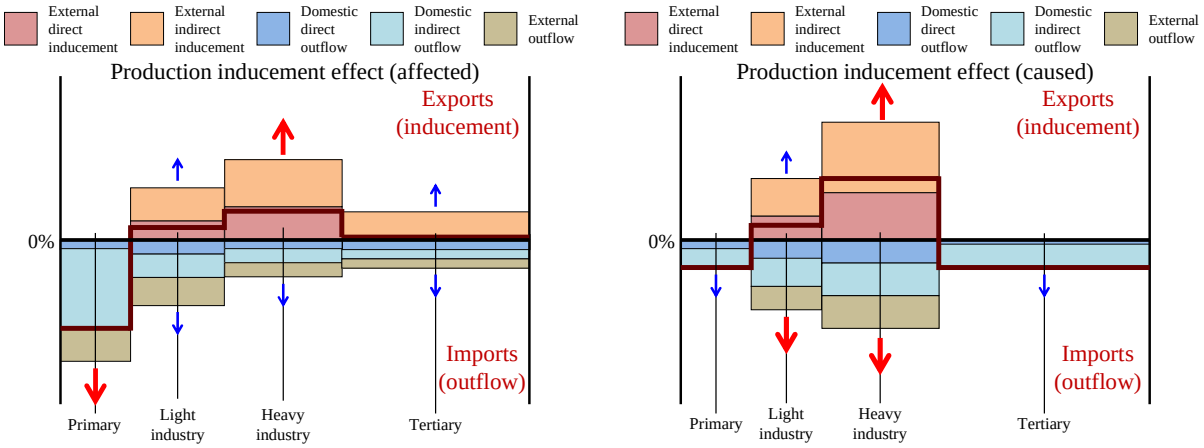
Difference of “spillovers” between (affected) and (caused)



Source: METI.

Figure 2-1-5-3

Two types of graphs for “spillovers of trade” (left: “affected,” right: “caused”)



Source: METI.

The difference caused by these two expressions is as shown in Figure 2-1-5-3. In the vertical axis of a graph in Figure 2-1-5-3 (left), bars above 0% represent “inducement of spillovers” by exports of goods, and bars below 0% represent “outflow of spillovers” by imports. We can show production sectors without exports are affected by indirect “spillovers” from other sectors by showing inducement and outflow of “spillovers” divided by factor and into direct and indirect. In this case, “outflow of spillovers” by imports concentrates on imported goods, namely, primary industries in Japan.

The degree of self-sufficiency for (affected) shows whether “spillovers” by “domestic demand” of all goods which could not be brought by imports could be offset by inducement of “spillovers” by “external demand.”

Meanwhile, the vertical axis of a graph (caused) in Figure 2-1-5-3 (right) shows which final goods induce production. In other words, bars above 0% represent “inducement of spillovers” of exports of each goods on the domestic economy, and bars below 0% represent “outflow of spillovers” of each goods on the domestic economy[24]. In this case, “outflow of spillovers” by imports concentrates on exported goods causing “spillovers,” namely, secondary industries in Japan.

The degree of self-sufficiency for (caused) shows whether “spillovers” induced by “domestic demand” of certain domestic final goods which were not caused could be offset by “spillovers” induced by “external demand” of the same final goods.

Arrows in both graphs in Figure 2-1-5-3 shows which parts increase due to the development of international division of labor in secondary industries. Thick arrows represent parts with a significant increase, and thin arrows represent parts with an increase, though not significant. As this difference of arrows between (affected) and (caused) shows, while they are similar in an increasing trend of inducement by exports, they differ in sectors where spillovers flow out by imports. The difference appears in the fact that, as for (affected), the amount of “outflow of spillovers” increases from

24 For this reason, when there are sectors where consumption of final goods is zero or sectors where it is below zero due to inventories or by-products, values in the graph become extreme. Therefore we decided not to show sectors whose composition ratio is below 0.5% in this article.

import-dependent industries and that, as for (caused), the amount of “outflow of spillovers” to be caused by highly exported goods increases.

(2) “Spillovers” by trade on each production sector

We compare each commerce and economic structure using these expressions of “spillovers of trade.” However, as for EU27, due to the low accuracy of its inter-industry table, we present a graph in 2000 for reference (Figures 2-1-5-4 to 2-1-5-7).

As for inducement of “spillovers” (affected) by exports (the upper side of the graph), countries/regions are similar in that even sectors with small exports such as “9. Steel and non-ferrous metal products” benefit from exports by indirect “spillovers,” and that sectors in tertiary industries without exports are also indirectly affected by “external demand.” This is because, for example, domestic transportation services related to production of automobiles are counted as exports of “22. Transportation.”

Meanwhile, as for “outflow of spillovers” (affected) by imports (the lower side of the graph) in countries/regions, “domestic direct outflow,” namely, imports for consumption of final goods by “domestic demand” of “4. Textile products” is high and greatly increased in 2005. We can see, except for the U.S., where exports did not increase, “external outflow,” namely, outflow of “spillovers” abroad by “external demand,” also increased.

Comparing red lines representing the “degree of self-sufficiency in spillovers,” the tendency that Japan depends on imports in primary industries and exports in heavy industries further grew in 2005. By industry, we can see that dependence on imports increased in light industries and some heavy industries, and that although exports were previously conducted in overall heavy industries, exports decreased in “12. Electric machinery” and concentrated in “13. Information and communications equipment” and “14. Transport machinery.”

In Japan, “domestic indirect outflow,” namely, “spillovers” which are caused by “domestic demand” and flow out in the production process, is high in many sectors and further expanded during the decade. This change in “domestic indirect outflow” is an indirect effect on the domestic economy, and is impossible to understand by looking at the *Trade Statistics* summarizing the trade amount with foreign countries and the trade data in the *System of National Accounts (SNA)*.

By contrast, the U.S. is different from other countries in that exports are conducted in primary industries as well, that imports are large in heavy industries, and that “domestic direct outflow” by imports, namely imports of final goods, is large. Looking at red lines representing the “degree of self-sufficiency in spillovers,” while the degree was near or below zero in sectors other than “22. Transportation” in 1995, it was near or below zero in all sectors including “22. Transportation” in 2005. The “degree of self-sufficiency” is low in industries from “1. Agriculture, forestry and fisheries” to “16. Other manufacturing industrial products,” namely, primary and secondary industries. In the U.S., since exports did not increase, “outflow of spillovers” by “external demand” did not also increase, and only “outflow of spillovers” by “domestic demand” increased.

Meanwhile, Germany exports in primary industries and light industries, where Japan does not conduct exports, and conducts imports in many sectors. That is, Germany is susceptible to “spillovers”

by trade. While Germany is little different from Japan in the size of exports relative to “domestic demand,” the maximum amount of exports, “outflow of spillovers” by imports in sectors other than “2. Mining,” particularly in secondary industries, is large in Germany. Although Japan increased imports in 2005, in Germany, the size of imports is far larger, and “spillovers” caused by “external demand” are also large and are significantly increasing.

(3) “Spillovers” of trade caused by consumption of each final goods

Then we compare graphs for (caused) shown by final goods causing “spillovers” and describe the characteristics we could not show by graphs for (affected) (Figures 2-1-5-4 to 2-1-5-7).

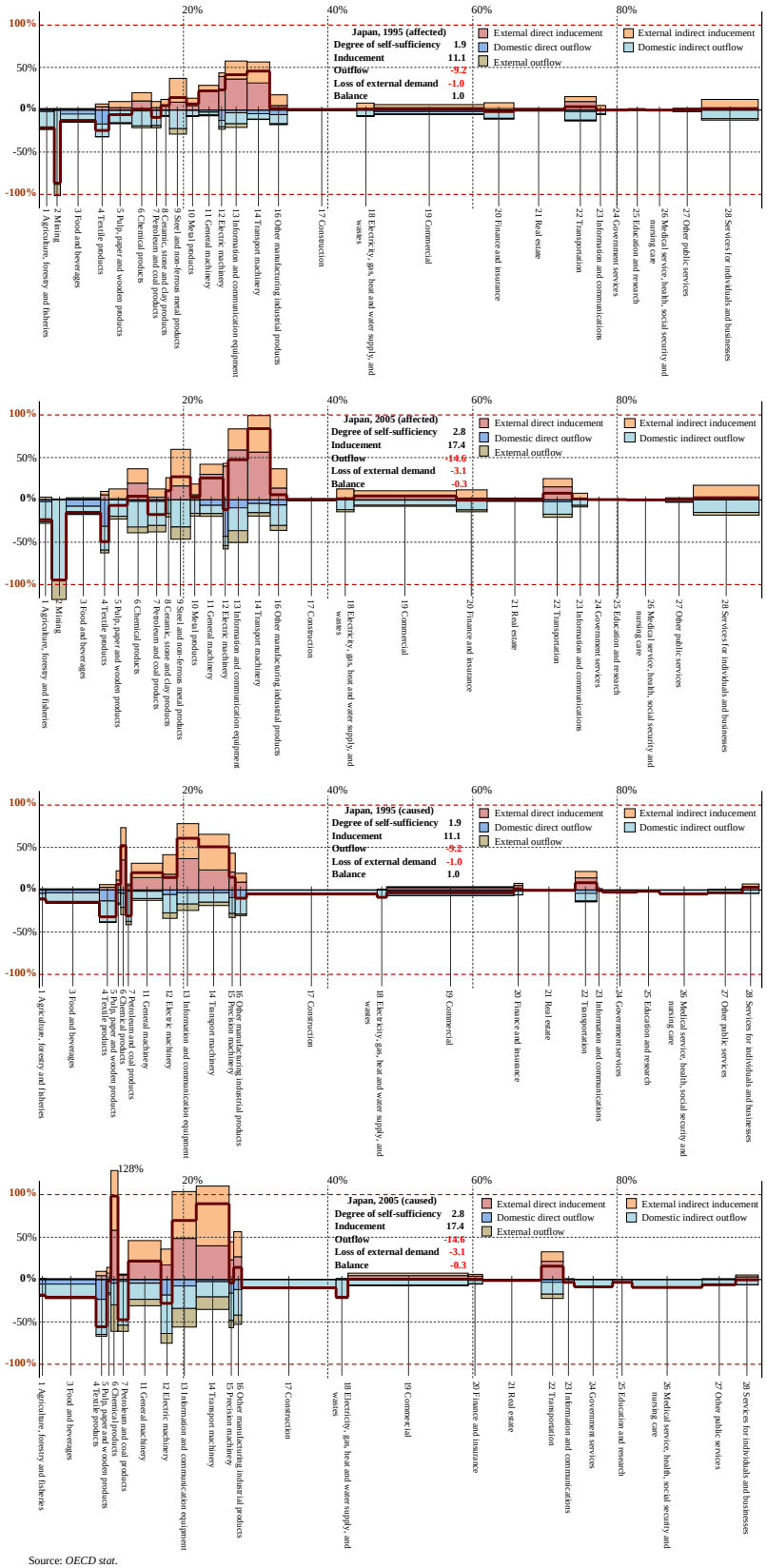
Graphs for (caused) are more likely to concentrate on some industries than “spillovers” on each industry sector shown in (affected) because they show “spillovers” caused by each final goods on the domestic economy.

The effect of exports for (caused) (the upper side of the graph) is the same as for (affected) except values concentrate on industries causing “spillovers” in the country. By contrast, the effect of imports (the lower side of the graph) shows “spillovers” to be caused but not caused by imports, and concentrates on sectors of consumption of final goods which induced “spillovers.” Accordingly, hereinafter we mainly describe the effect of imports (the lower side of the graph).

We can see that the amount of outflow increased in all economic zones and that the increase is remarkable in Japan. We can also see the increase in the amount of “external outflow,” namely, “spillovers” by “external demand” flowing out abroad is remarkable.

Figure 2-1-5-4

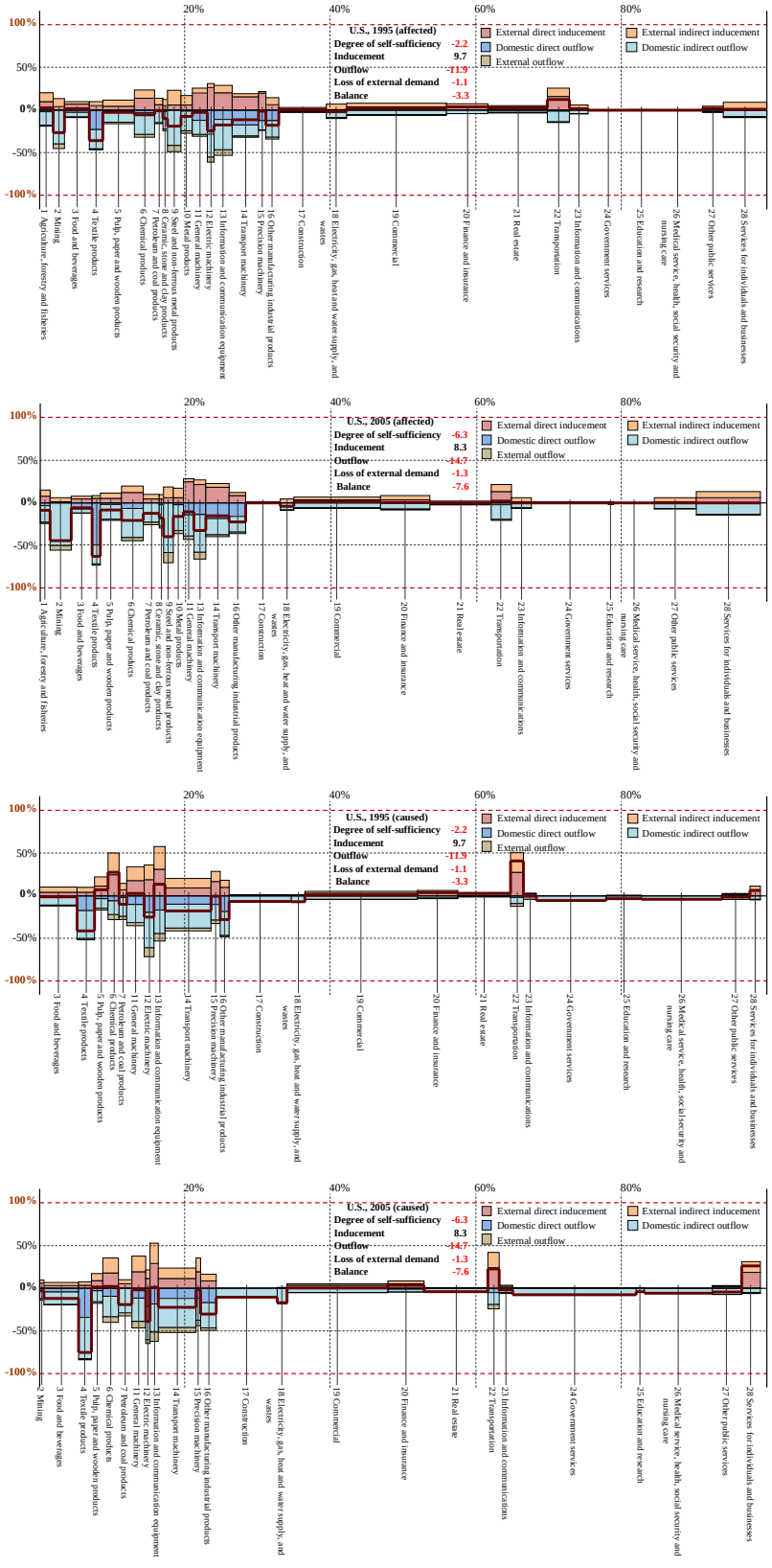
Change in Japan’s “spillovers of trade”



Source: *OECD stat*.

Figure 2-1-5-5

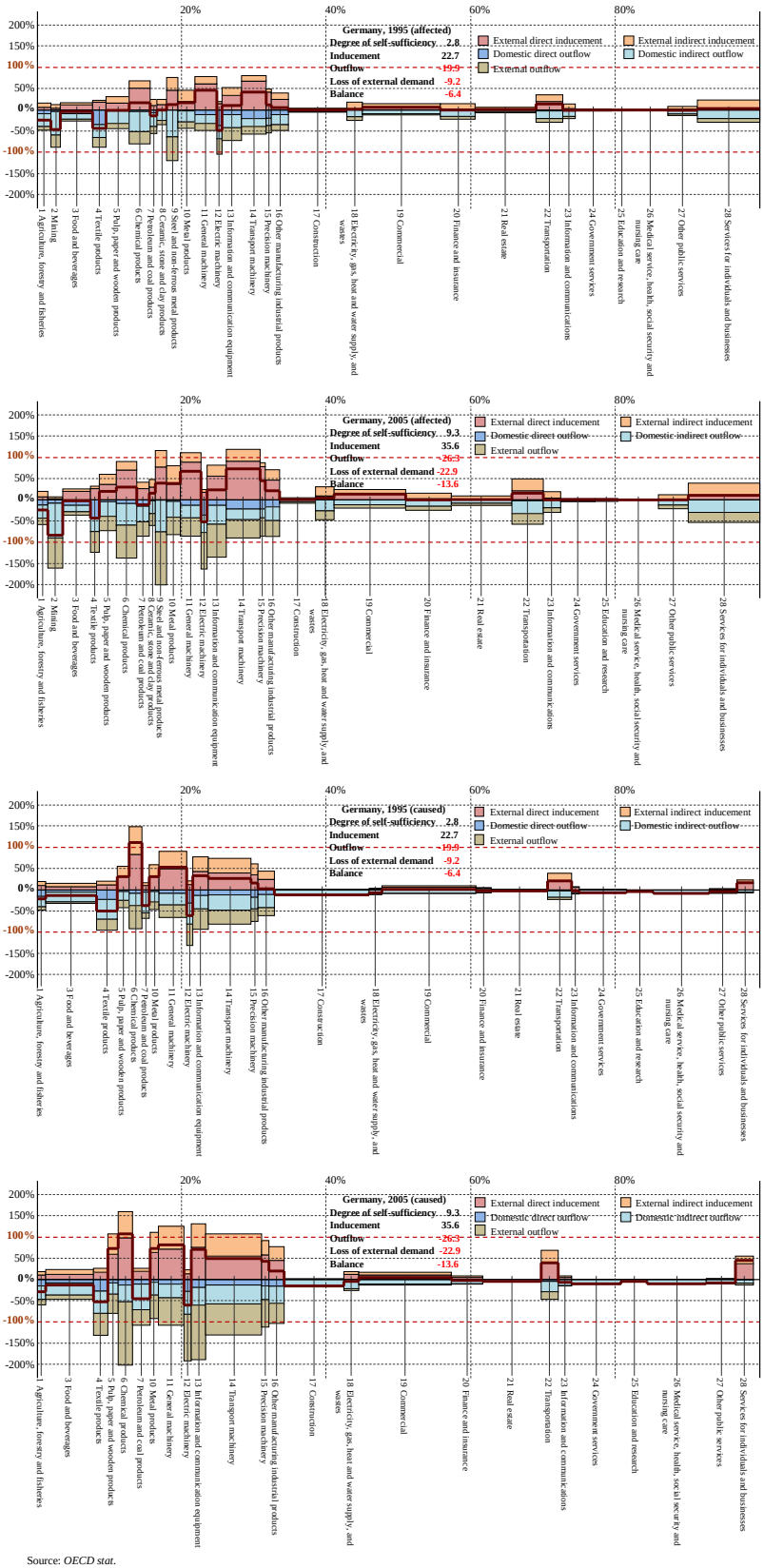
Change in U.S. “spillovers of trade”



Source: *OECD stat*.

Figure 2-1-5-6

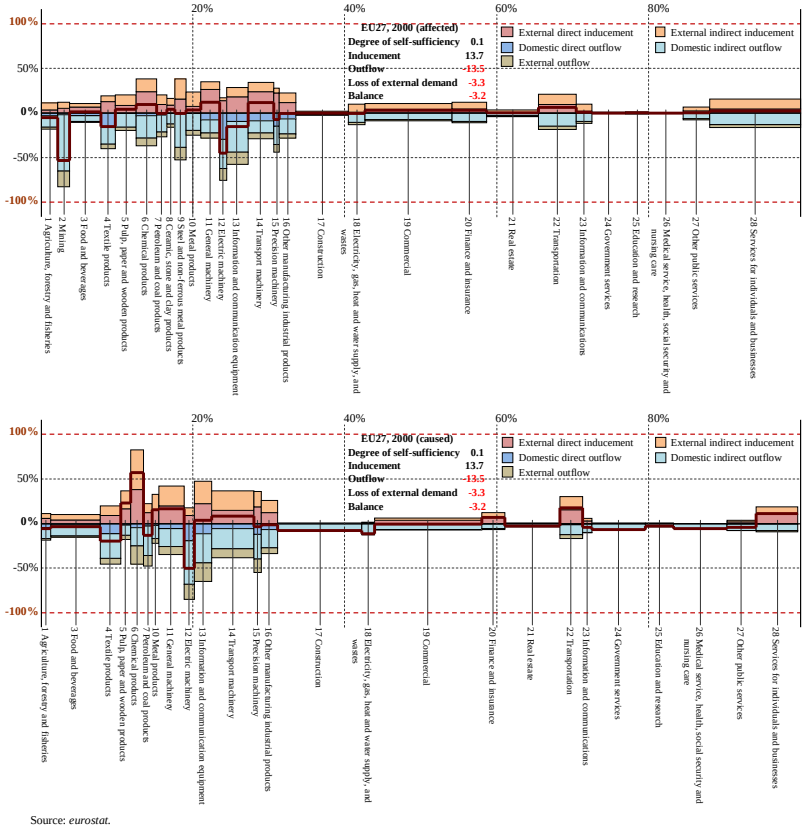
Change in German's "spillovers of trade"



Source: *OECD stat.*

Figure 2-1-5-7

Change in EU27 “spillovers of trade”



Source: *eurostat*.

Looking at Japan’s structure, while “domestic indirect outflow,” namely, “spillovers” flowing out in the production process for “domestic demand,” is observed in broad sectors, outflow itself in each sector is smaller than other countries.

In the U.S., while the “degree of self-sufficiency” was positive in “5. Pulp, paper and wooden products”, “6. Chemical products”, “11. General machinery” and “13. Information and communications equipment” of secondary industries in 1995, the degree was near or below zero in 2005.

Meanwhile, both in 1995 and 2005, Germany exported broadly in from primary industries to secondary industries, and exports were large in “6. Chemical products” in these industries and “22. Transportation” and “28. Services for individuals and businesses” in tertiary industries. As for imports, “external outflow,” namely, “spillovers” by “external demand” flowing out abroad by imports was large in sectors with large exports.

(4) Necessity of a trade policy based on the domestic economic structure

We so far have focused on “spillovers” which are chain reactions of production activities on the inter-industry structure, and have compared the self-sufficiency structure of the Japanese economy with the U.S., long having a persistent trade deficit and Germany bearing similarities to Japan as an

industrial country.

This comparison showed while international division of labor developed in all countries, only imports increased without an increase in exports in the U.S. Looking at the U.S. "spillovers," the "degree of self-sufficiency in spillovers" was near or below zero in almost all industries. This result may be attributed to the fact that, despite the existence of many companies with internationally strong competitiveness, the U.S. structurally lacks relations between these companies' business activities and domestic industries.

By contrast, in Germany, although most "spillovers" to be induced by exports flowed out by imports as a result of the international division of labor, its structure changed so as to increase the "degree of self-sufficiency in spillovers." In other words, in Germany, the domestic inter-industry structure changed so that the development of international division of labor benefits the domestic economy.

Germany could establish such a structure because it deepened economic linkages with neighboring countries over a long period of time and had access to the non-discriminatory and interactive free-trade system established in the EU region.

On the other hand, Japan has had difficulty keeping "spillovers" in the country due to the international division of labor and has increased the dependency on external demand to offset it. Germany, which underwent such a change, would serve as a model for Japan because Japan has an increasing need to think how it develops relations with other countries.

In the past, when the economy constantly expanded and the full-set type economy existed, an increase in exports caused "spillovers" in the country. Currently, however, a so-called "fallacy of composition" might occur, where, due to a change in the domestic inter-industry structure, the combination of a rational decision of a person or company does not necessarily have a positive impact on the domestic economy. It is essential to have a perspective of "keisei-saimin (governing a nation and providing relief to people)" without confusing a benefit of an economic entity with a benefit of the overall domestic economy in considering a trade policy.

Column 9　International division of labor and trade balance on a value-added basis

As a result of the international division of labor, final goods began to be produced by assembling intermediary goods produced by various countries. For example, iPhones of Apple, Inc. are produced in Chinese factories by assembling parts and components from various countries. On the back side of an iPhone, the wording "Designed by Apple in California Assembled in China" is used and does not contain the wording "Made in."

Thus it has become less important which country a company belongs to or in which country a product was produced, and instead, it has become more important how many parts and components Japan can provide for production of international products such as iPhones. It became an issue in "Industrial Structure Vision 2010" that few parts and components produced in Japan were used for iPads (2010), new products at the time, than in iPods (2005), which was quoted in newspapers at the time of the release[25].

25　Industrial Structure Council (2010), p. 287

Recently, however, the discussion is intensifying on a value-added basis, not on a trade basis. That is, a study on a value-added basis, which shows where value-added is generated by inter-industry relations through trade, not in which country trade balance is a surplus, is carried out using the international inter-industry table.

It started with the analysis by the Institute of Developing Economies using the Asian international inter-industry table. The analysis showed the trade balance between the U.S. and China "would be less than half from 218 billion dollars to 101 billion dollars when it was calculated using trade in value-added approach and made adjustments related to export processing zones" instead of using a traditional approach in terms of the trade amount[26]. iPhones are counted as exports from China, a final assembly site. Using trade in value-added approach, however, "while China itself accounted for less than 4% of the U.S. trade deficit with China for iPhones in 2009, Japan accounted for 35% or more of it[27]".

As the structure of international division of labor is thus being established, Japan is forced to change its commerce and economic structure, and the "hollowing-out" of domestic industries accompanied by the overseas transfer of factories is seen as a problem. As described above, Japan had a trade structure where it imported resources, exported highly-processed final goods and drove the domestic economy through the processing trade. As a result of an increase in intermediary goods trade, "spillovers" driving the domestic economy became small even with the same trade amount. In such a circumstance, it has become important to evaluate whether "spillovers" are caused to the Japanese economy and become a driver to value-added by providing Japanese intermediary goods in production of products of other countries, not simply by competing with these products.

As an advanced and complicated structure of international division of labor has been established multilaterally, it has become less simple how Japan could attract production, cause and distribute value-added, and the analysis of this matter is increasingly important.

26 Farooq (2011), p. 100.
27 Id.