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A positive observation of long-term knowledge industries change in France and Japan.

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<Abstract>

No economy in the world can escape taking risks to adapt to global institutional changes or technological innovations.

France, having recognized the increasing technology gap in the 1980s, established the European Single Market (ESM) and engaged it strongly, while Japan concentrated its effort to improve productivity in the private sector and entered into the global competitive market under GATT/OECD institutions in the 1980s.

We observed a series of IO tables published by the French INSEE from 1959 to 2008 with 40 branches, and by the Japanese Soumsho from 1960 to 2005 with more than 104 branches, to see if the following hypothesis works; "Long-term meso-economic performance depends on institutional change rather than the private R&D expenditure."

Positive observation of "Skyline Charts", "IO induction analysis" and "long-term input coefficients changes" shows us that the ESM gave France the ability to expand its agriculture, commerce and some types of the knowledge industries[1], such as type Band C, while Japan enjoyed GATT's free trade scheme and concentrated her capacity into the knowledge industry type A with well trained engineers, skilled workers and intensive input of knowledge services.

However, after 1991, Japan seemed neither to adapt well to the post cold-war order nor to be prepared for the rise of the new industrialized economies, while France seemed to continue the trade development with stronger linkage with EU member states.

These two cases show us that the hypothesis should be accepted, and Japan should prepare its institutions to get profit from the continuous high risk investment for R&D and to mitigate private activities into the service trade, namely by reinforcing the knowledge industries type B or C.

[1] Reference of three types of knowledge industry: NAKANO Yukinori, 2007, Comparison of several types of knowledge industries between Japan and Europe, the 16th conference of IIOA, Istanbul.

1. Introduction

To understand the Japanese Industrial Policy change from the 1960s to 1985, we have to re-read carefully the industrial structure visions published in the 1950s and 1970s by Ministry of International Trade and Industry (MITI founded in 1949, renamed in 2001 as METI). The important industrial structure visions are published in 1955, 1964, 1972 and 1981 respectively by MITI (see Appendix 1). These industrial structure visions show us the primordial change of MITI's industrial policy for let adapt Japanese industries to the domestic and international demands.

MITI re-adjusted Japanese industrial structure policy from the "Keisha-Seisan", namely, direct redistribution policy of the production resources to the private sectors, to the higher productivity industrial structure in 1955. In 1964 vision, MITI has already announced the importance of the endogenous technology development to re-open Japanese domestic market. The 1970s vision introduced the new target, higher income elasticity, to improve the people's QOL to shift industrial resources toward processing and assembly industries.

West German and Japanese people had to reconstruct and modernize their domestic heavy industries, such as iron, chemical, shipbuilding etc. under the finance assistance widely provided by the World Bank and direct assistance of allied nations, and they have developed processing and assembling manufacture industries, such as automobiles and the electric appliances industry from 1950 to 1970.

In 1985, at the Plaza Hotel in New York, West German and Japanese governments accepted a drastic change in marc-dollar and yen-dollar exchange rates to reduce the imbalance of USA trade, public expenditure and house-hold dispense, called triplet deficit.

Before the agreement made at the Plaza Hotel, France, the UK and the USA launched the argument in the industrial committee of OECD to analyze MITI's industrial policy called, "Positive Adjustment Policy" or "Targeting Policy" in the end of 1960s to prepare the next Round Negotiation just after Kennedy Round (1964-67).

They advised Japan, under table negotiation, to quit its direct technology assistance policy in early 1970s, and this argument was published, after the political compromise at Tokyo Round (1973-79), in Council Communiqué entitled "General guide-lines for PAP" of OECD in 1978. MITI had no choice to accept it and abandoned all direct subsidiaries to the private sector and public procurement system linked to the national standard system.

Thus, the equality that had been achieved between Japanese and foreign companies accelerated not only the price taking competition but also R&D and new products

development competition, and the domestic market was really opened to foreigners.

MITI started a new technology development framework in the middle of the 1970s, instead of direct subsidiaries, called national large-scale technology development project of which image was taken from NASA project, to fulfill the national proper needs. These national projects were not welcomed by private companies because the aim of technology development was different. Private companies sought R&D money and new market without any public restriction. MITI's projects could not provide the new national procurement market because of the program management was so poor. This point was clear point of difference between France-Japan and USA-Japan. France and USA had a big public procurement domestic market, namely the market of defense.

The Japanese companies left MITI, and its industrial policy and entered into the fierce competition of the international market.

The MITI's vision for 1980s pointed out the further increasing mega-competition among private companies without any chart of navigation or guidelines from the central government. Accord of Plaza has been concluded without any resistance of MITI, which had been already demilitarized through the discussion of OECD industrial committee against "Positive Adjustment Policy", namely MITI's old fashioned industrial policy.

As Paul Romer says, the advanced economy development is propelled by the endogenous technological change (ETC). The ETC, which is composed of the scientific knowledge and also of the “bricolage”, techniques or skills, is accelerated by education and also by learning by doing. The exchange of individual knowledge and skill is stimulated firstly among the peer people and later through social system to the outsiders. Japan lost this kind of social system when MITI abandoned its technology developing policy at the private sectors.

Now, we analyze the two contrasted cases observed in France and Japan to understand the importance of the industrial policy, which includes international trade policy and research and development policy, with or without the social procurement system. This challenge could also give some suggestion to the hypothesis, "Long-term meso-economic performance depends on institutional change rather than R&D expenditure."

2. Methodology

2.1. Compilation of IO tables

On the basis of French I0 tables with 40 sectors from 1959 to 2008 published by INSEE and Japanese IO tables with about 92 to 108 sectors from 1960 to 2005 published by Soumusho, we compiled seven and ten sector IO tables to show the

meso-economic performance in both countries.

The seven sectors are composed of primary, secondary, tertiary, knowledge industry type A, type B, type C and energy industry. The criteria to separate the three types of knowledge industry from the original IO tables are explained in the pre-paper published at the occasion of the 16th IIOA conference in Istanbul (Nakano, 2007).

We added three sectors on seven sectors; education, tourism and social action industry, to observe detailed performance of knowledge industry in the French economy**.** The three types of knowledge industry, energy sector and the added three conventional sectors are composed of the French written industries shown in Fig.1 " The composition of knowledge industries from type A to C and other industries ".

2.2. Method of Analysis

Using compiled IO tables with seven or ten sectors, we calculated input-coefficient tables and inversed matrix tables.

2.2.1. Preparation of Skyline Chart

From these inversed matrix tables and final demand vectors, we estimated the domestic production levels induced by final domestic demand (final consumption + capital formation), export and import.

Applying these three estimated domestic production levels to UDA's skyline chart generating tool, "Ray" Version2 (2011), we obtained of the skyline charts of the French and Japanese economies.

2.2.2. Preparation of the total domestic production induced by targeted sector

To get the intensity of induction levels of the given industrial structure, we calculated a domestic production vector induced by additional 100 units of final demand of targeted industrial sector, and obtained total induced domestic production by summing up the elements of a vector. .

2.2.3. Preparation of the input and output coefficients

As the French IO table is set up with a vector of intermediate use by branch (sector) and final demand at raw direction, and a vector of intermediate production by product and added value at column direction, we calculated the input coefficients by the composition of the intermediate production and the added value, and the output coefficients by the composition of the intermediate use and the final demand.

See the appendix 1 and 2 to follow some parts of the detailed calculation process.

3. Observation

3.1. Skyline Chart Observation

3.1.1. Observation from 1959 to 1975

The first point that we observed was the drastic change of French industrial structure from 1959 to 1975 (see Fig 2, "Skyline charts of France, 1954-2008"). The primary industry lost important share in French economy, and external trade was relatively stagnant, but the self-sufficient ratio improved significantly.

The position of the secondary industry in France did not change drastically until 1975, and the section of trade intensity (export and import) and self-sufficient ratio were also stable.

French tertiary industry augmented its share in total domestic production progressively in the 1960s and self-sufficient ratio was improved despite of the decrease of the trade intensity.

The domestic production shares and the trade intensity of the knowledge industries were relatively stable but the self-sufficient ratio improved clearly in 1970s.

The self-sufficient ratio of the secondary energy industry improved from 25% to 60% in the decade of 1960s and jumped up to 80% in 1975. Education, Tourism and Social Action sectors followed a similar path of the secondary energy sector's movement.

3.1.2. Observation from 1980 to 2000

From 1980 to 2000, we have found the clear augmentation of French trade intensity.

The weight of the primary sector's domestic production continued to decrease and reached a level of 10% in 2000 from a level of more than 25% in 1959, but its self-sufficient ratio improved constantly according to the increase of trade intensity after 1970s. In contrast, the secondary industry lost its good position in trade, and its self-sufficient rate hardly maintained an even point (100%). The tertiary domestic production progressed significantly in the 1990s and the self-sufficient rate improved despite the fact that the trade intensity did not increased a lot.

The French knowledge industry type A (KIa) was one of the weakest industries in international competitive market in the 1970s. Its self-sufficient ratio dropped to the order of 80% in 1980. But, after 1980, the position of KIa dramatically improved. Its position reached near 100% in 2000. The trade intensity of KIa doubled from 1970 to 2000.

The self-sufficient ratio of KIb improved from 1960s to 2000, constantly. The trade intensity of KIb was augmented after 1980 tremendously from 40% to 60%.

KIc's performance change in the 1990s was not so evident. The domestic production

decreased once in 1985 but re-gained in 1990, and the trade intensity was stagnant in 1990s.

Another important observation could be possible in the Education, Tourism and Social Action sectors. Their self-sufficient position has been improving from the beginning of the 1960s and it reached an even level in 2000.

The self-sufficient ratio of the secondary energy sector exceeded 100% in 1995.

3.1.3. Observation from 2000 to 2008

It is clear that French international trade position faced the trade imbalance difficulty in the first decade of 2000s, because their self-sufficient ratio has been falling once more after it achieved an even point in every industry in 2000. However, the trade intensity is not decreasing in every industry.

3.1.4. Comparison between France and Japan

To compare the "pittoresque" pattern of French skyline and Japanese one, we have chosen 1965 and 2005 as a reference year (see Fig 3. "Comparison of skyline chart between France and Japan").

As you can see in the skyline charts shown in Fig. 3, the trade intensity (export and import) covers wider sectors in France than in Japan in 2005 but not in 1965. In 1965, both countries' trade intensity rested flat or even level with all industrial sectors, even French level was already higher than that of Japan.

Japanese trade intensity level became very high in the KIa and the secondary industry but still low in tertiary, KIc and education industry even in 2005. This is a typical pattern of Japanese industrial structure after 1980. We can see the concentration of trade activity in specific industry, such as KIa, in Japan.

Contrarily, French developed her trade intensity harmoniously and constantly in the primary, tertiary, energy, education etc., and also even in the action social industry.

Regarding the Japanese uneven skyline in 2005, French one is much more flat. Two countries' skyline shows us the similarity in 1965 at the departure of internationalization of the world economy, but the clear difference in 2005, the result of adaptation to the world-wide technological or institutional change.

3.2. Induced production analysis

As the final demand induces the total output, or domestic production, of a national economy, we calculated the total amount of induced production by adding 100 units to the selected industrial sector.

3.2.1. Observation in France

We obtained a series of national induced production figures from 1959 to 2008 in France with an additional 100 units of each KI's final demand.

The induced production reached 330 units by an additional 100 units of the KIa's final demand. This amount is followed by the amount of 270, induced by KIb's increase of final demand, and 230 by KIc's.

Regarding Fig.4, "Trend of domestic production induced by additional 100 unit of each final demand for Knowledge Industry (1959-2008, France)", we observed a tendency of gap extension between the induced amounts by each KI sector's final demand augmentation. While the gap in 1959 was about 60 units from KIa to KIc, we see a wider gap in 2008, of more than 100 units. The trend of KIa and KIb are clearly growing after 1995, but decreasing in the 1980s. The trend of KIc is rather stable but slightly declining constantly.

The order of the induced amount is KIa> KIb> KIc.

The tourism industry in France induces the same level of domestic production as KIc in 2008, but its amount is clearly declining from the levels of the 1960s.

Thus, consumer oriented industry has a tendency to lose induction production level (induction power) to multiply the nation-wide domestic production, year by year. Tertiary industry's induction power is still decreasing at the meso-economic level.

3.2.2. Observation in Japan

Just looking superficially at the trend of domestic production in Japan induced by additional 100 units' final demand of each sector of knowledge industry, we observed the stability of the output (see Fig. 5 "Trend of domestic production induced by additional 100 unit of each final demand for Knowledge industry (1960-2005, Japan)"). The induced amount by KIa reached near 300 units, but this level is not higher than the French case. The levels of induced national production in Japan by KIb and KIc increased consumption are slightly lower than those in France. But the order of the amount is KIa> KIb> KIc just as in the French case.

3.2.3. Comparison of induced domestic production level between France and Japan

In Fig. 6 "Comparison of induced production by additional final demand for knowledge industry between France and Japan (1960-2005)", you can see the difference of the level of induced domestic production between France and Japan from 1960 to 2005.

The first impression of the observation is that each line is almost flat and has not clear tendency of increasing nor decreasing for 45 years span.

The difference of induced national production by the additional consumption for knowledge industry between two countries is the amount or volume of induced production. There are 50 to 100 units difference according to the year and the sector of additional consumption.

3.3. Long -term input and output coefficients change

Firstly, we observe the long-term input and output coefficients change into the intermediate consumption, because it shows us the national average level technical change.

Secondly, we observe the input and output coefficients change of the knowledge industry type A to type C.

3.3.1. Observation of Meso-economic change in France

Fig. 7 "Trend of the input coefficient for intermediate production (France)" and Appendix 2 show us the change of the industrial structure, observed in the intermediate production input.

The primary industry input coefficient to the total intermediate production is strongly decreased from 1959 but the declining speed is softening after 2000. It goes down from 0.14 in 1959 to 0.07 in 1985 and 0.04 in 2008.

Contrarily, the tertiary industry input coefficient is jump up to 0.14 in 2008 from 0.08 in 1959.

The secondary industry loses progressively its weight in the intermediate production from 0.1 in 1959 to 0.07 in 2008, and the knowledge industry type C increases its input coefficient from 0.05 in 1959 to 0.1 in 2008. The knowledge industry type B's input coefficient is not clearly changed and slightly decreasing from 0.05 in 1959 to 0.04 in the 1990s and after 1995 it becomes flat at the level of 0.04.

The input coefficient of secondary energy is very slightly waving but almost flat at the level of 0.015. Tourism's input coefficient is doubled from 1980 to 2000 but the value is very small at the order of 0.01. The activity of action social and education has very small interaction with other industries, thus their input coefficients rest very small value, below 0.02 so that upstream influence is very limited, but have an increasing tendency.

Fig. 8 "Trend of the output coefficient for intermediate use (France)" and Appendix 3 show us the change of the industrial structure, observed in the intermediate production output.

The tendency is almost the same of the trend of the input coefficients, but the knowledge industry type B stays at the lower level from 0.02 in 1959 to 0.03 in 2008

and the action social, tourism and energy industry augment their output coefficient to the intermediate use. The education's output coefficient is stable at the lowest level, 0.02.

The common clear trend is observed in the knowledge industry type A in input and output coefficient change curve. This is the convex curve observed at the period from 1970 to 1995 in both figures. This period corresponds to the period of the beginning of the OECD industrial committee's discussion and the European Single Market has been constructed as a fortress to exclude the imported goods from newly emerging industrial economies.

3.3.2. Observation of input coefficients changes in KIs

(1) Input from KIa

Fig. 9 "Trend of KI's input coefficient change from KIa in France, 1959-2008" shows that the input coefficient from KIa to the KIc, the total intermediate production (pi) and the KIb are declining in roughly speaking. The declining tendency is clear in KIc.

The peak observed at KIb input coefficient curve reflects the strong increase of the input coefficient from KIa to KIb from 1970 to 1980, and it disappeared from 1985 to 1995. This means that KIb bought lot of KIa products to produce KIb products or services in the period of 1970s and 1980s. KIa produces high end machine or electronics equipments so that KIb needed to buy them but not in the case of the KIc.

Remembering the construction process of "European Fortress" in 1970s and 80s, we could relate this KIa's movement to the institutional trade condition's change in Europe.

The peak of intermediate input curve does not show any remarkable evidence because it reflects only the average tendency of other KIs.

(2) Input from KIb

Fig,10 "Trend of KIs input coefficient change from KIb in France, 1959-2008" shows two interesting trends. One is the movement of KIa curve and another is of KIc.

KIc bought less and less domestic products or services, such as chemical goods, rubbers or telecommunication services, from KIb at the period of the 1960s and the 1970s but, after 1980, the curve became horizontal and maintained 0.03% of KIb use for KIc domestic production.

For KIa, it is much more interesting. KIa in France bought less goods from KIb till 1980 but after 1980 or 1985 the input coefficients rebounded. This period corresponds to European Single Market Policy and Enlargement Policy.

(3) Input from KIc

Fig. 11 " Trend of KIs input coefficient change from KIc in France, 1959-2008" shows us that KIc sold more and more to the neighbor knowledge industries. Or, KIa and KIb needed year by year the products of services provided by KIc. The input coefficients' movement of KIa and KIb was similar from 1959 to 1985, but separated in two ways after 1990.

Anyway, the input coefficient started from 0.03 in 1959 reached 0.08 in KIb and 0.09 in KIa. This is an interesting observation. We are going to discuss this point in next head, 4.Analysis and Interpretation.

4. Analysis and Interpretation

This paper's aim is to provide the positive or objective observation at the meso-economic level, namely long-term industrial structure change level, from the 1960s to 2005 or 2008 to know whether the endogenous technological change or the institutional change is essential for national economic growth.

We observed cautiously the trend of the skyline charts, the domestic production levels induced by additional consumption and input or output coefficients trends between two advanced economies, Japan and France.

According to the observation of skyline chart, we have analyzed the uneven self-sufficient curve observed in Japanese case after 1965, and concluded that the knowledge industry type A (KIa) characterized Japanese industrial structure.

KIa is composed of the high end manufacturing industry called in Japanese, "Mono-dukuri Sangyo", such as information and communication technology equipments, semi-conductors, electronics and precision appliances, pharmaceutical medicines, robotics, aeronautics etc.

MITI called the concentration of production resources in private sectors, well trained engineers, low cost finances, mitigation of foreign patents, direct R&D subsidiary to the private sector and public procurement endorsed JIS, Japanese Industrial Standard.

This kind of "Positive Adjustment Policy (PAP)" menaced a lot French, UK and USA government in the early 1970s. They protested the MITI's policy in the OECD. MITI gave up and omitted these "Targeting Policy" from its industrial structure vision policy. But Japanese manufacture companies, which had suddenly lost the chart of navigation or given guidelines of central government, had no choice to survive in the fierce competitive market and continued the MITI's PAP by own decision. They continued to export lot of high end manufactured goods to Europe and America even after 1980 and they faced the Accord of Plaza in 1985. The exchange rate has been dramatically

changed but they struggled to adapt this external condition change and find the way to invest much more money to propelled endogenous technology development. They surmounted this problem in 1988 and enjoyed bubbled economy till 1992. They never imagined the institutional change would be alternative resolution even they have heard the destruction of the Wall of Berlin and the collapse of USSR.

The case of France is a little bit different.

The observation of skylines has shown us the trade intensity did not increase in the 1960s but the self-sufficient ratio was improved.

France has been hesitating between European Policy and independent autarchy policy for long time after the Second World War. But after having joined to ECC, the UK government pushed the European countries toward the Single Market Policy by proposing the introduction of British Standard System in European Norm to reduce the trade barrier between neighbor countries. The high end manufactured goods entered in French domestic market from Great Britain, Ireland, Belgium, Holland and Germany, assembled by a screw driver with the goods of "made in Japan". France declared the battle of Poitier to stop the video-players import from Japan in 1983.

They launched "Minitel project" and invested lot of money to streamline the ICT industry, such as BULL. The input and output coefficients of KIa was increasing in the early 1980s, because of French national ICT program and European Framework Initiative to confront the American and Japanese high tech industries. The technology gap was still widening in this era.

The Single Market Initiative has been launched in 1985 to establish the European Single Market, namely the European Fortress. France had no choice but to follow this open market policy in Western Europe.

European Single Market Initiative gave France the ability to expand its domestic productions, such as agriculture, commerce and some types of the knowledge industries, such as type B and C, while Japan enjoyed GATT's free trade scheme and concentrated her capacity into the knowledge industry type A, namely high end technology manufacture industry, "Monodukuri Sangyo" in Japanese, with well trained engineers, skilled workers and intensive input of knowledge services, but the rest of the society was sleeping because they could not find any chart of navigation to develop themselves.

The trade intensity and self-sufficient ratio of France was improved in the 1980s and 1990s and the volume of trade increased and self-sufficient ratio reached at the line of equilibrium point (100%) from primary to social action industry in 2000.

The institutional change to adapt the external change has been successfully done in France and they became free from the threat of high tech manufacture industries which

exports huge amount of new products that no one ever saw, thanks to the European Single Market and European Union's technology development framework.

After the 1990s, France enjoyed good performance of meso-economy but Japan could not exit the stagnated economy after the collapse of overheated domestic stock and estate markets after the agreement made at the Plaza Hotel. Japanese companies failed to grasp the chance to change themselves when they lost the chart of navigation provided for long time by MITI in 1980. The MITI's industrial structure vision for the 1980s said, "Now, you are free and make proper decision and take your responsibility."

5. Conclusions

Having been analyzing the long-term series of input output tables published in France and in Japan, we could conclude that the proposed hypothesis, "Long-term meso-economic performance depends on institutional change rather than the private R&D expenditure." was probably accepted.

Japan should re-build her social framework to be much more affective for the private sector to enjoy some synergy effects among the universities, enterprises and national laboratories. The key is hidden in the further activities in KIb and KIc.

Do not forget that it would depend on the performance of government people and the private companies' managing people.

Positive observation of "Skyline Charts", "IO induction analysis" and "long-term input coefficients changes" shows us that the European Single Market Initiative gave France the opportunity to expand its agriculture, commerce and some types of the knowledge industries, such as type B and C, while Japan enjoyed GATT's free trade scheme and concentrated her capacity into the knowledge industry type A with well trained engineers, skilled workers and intensive input of knowledge services.

However, after 1991, Japan seemed neither to adapt well to the post cold-war order nor to prepare herself for the rise of the new industrialized economies, while France seemed to continue the trade development with stronger linkage with EU member states.

Japan should prepare its institutions to get profit from the continuous high risk investment for private R&D and to mitigate private activities into the service trade by reinforcing the knowledge industries type B or C.

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Fig.1 The composition of knowledge industries from type A to C and other industries.

(1) Knowledge Industry, type A
PHARMACIE PARFUMERIE ENTRETIEN, CONSTRUCTION NAVALE AERONAUTIQUE ET FER, INDUSTRIES DES BIENS D'EQUIPEMENTS MECANIQUE, INDUSTRIES DES EQUIPEMENTS ELECTRIQUES, INDUSTRIE DES COMPOSANTS ELECTRIQUES, PRODUCTION DE COMBUSTIBLES ET DE CARBURANT

(2) Knowledge Industry, type B
CHIMIE CAOUTCHOUC PLASTIQUES, POSTES ET TELECOMMUNICATIONS

(3) Knowledge Industry, type C
INDUSTRIES DES PRODUITS MINERAUX, BATIMENT TRAVAUX PUBLICS, CONSEILS ET ASSISTANCE, RECHERCHE ET DEVELOPPEMENT

(4) SECONDARY ENERGY
EAU GAZ ELECTRICITE

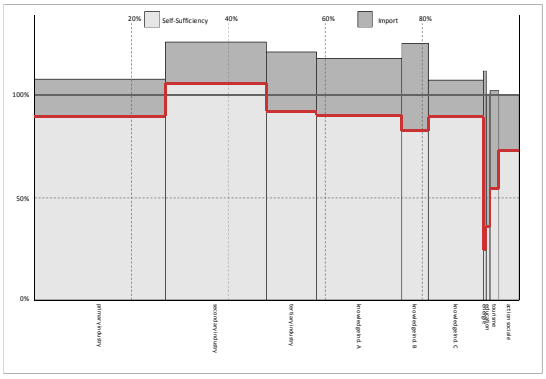
(5) EDUCATION
EDUCATION

(6) TOURISM
HOTELS ET RESTAURANTS, ACTIVITES RECREATIVES ET CULTURELLES

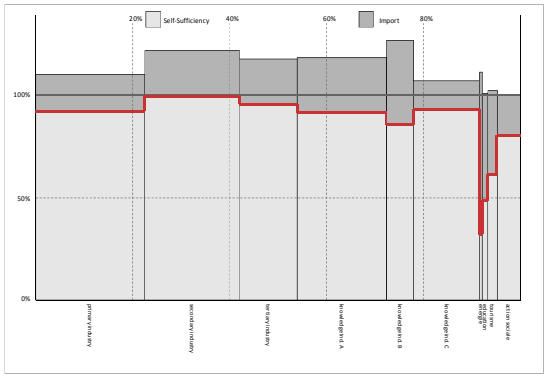
(7) ACTION SOCIALE
SANTE, ACTION SOCIALE, ADMINISTRATION PUBLIQUE, ACTIVITES ASSOCIATIVES

Fig. 2　Skyline charts of France, 1954-2008

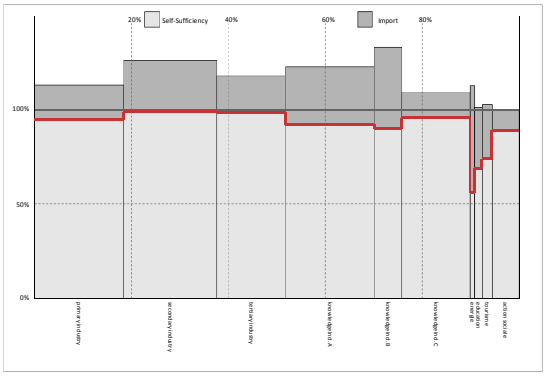
Skyline Chart, 1959France



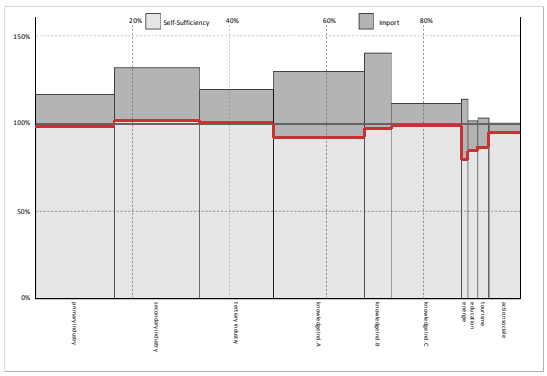
Skyline Chart, 1965 France



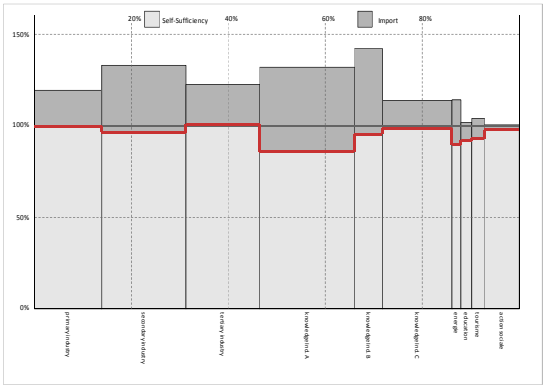
Skyline Chart, 1970 France



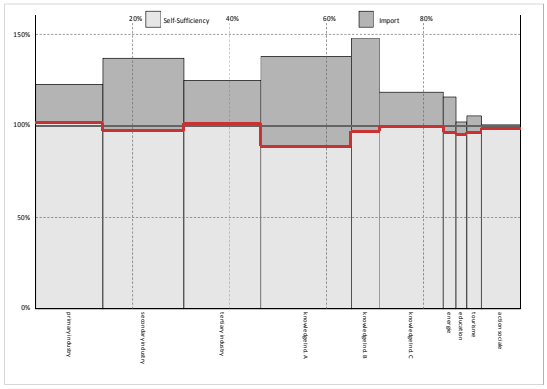
Skyline Chart, 1975 France



Skyline Chart, 1980 France



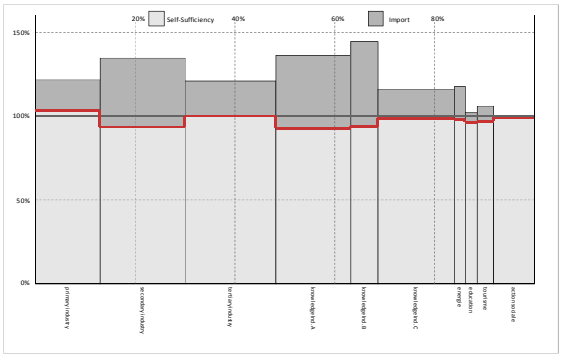
Skyline Chart, 1985 France



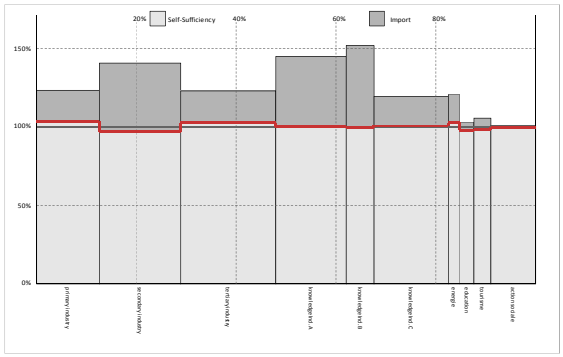
cf. calculated and drawn by Ray 2.0-e, provided by Kenjiro UDA (*).

Fig. 2 Skyline charts of France, 1954-2008, continued

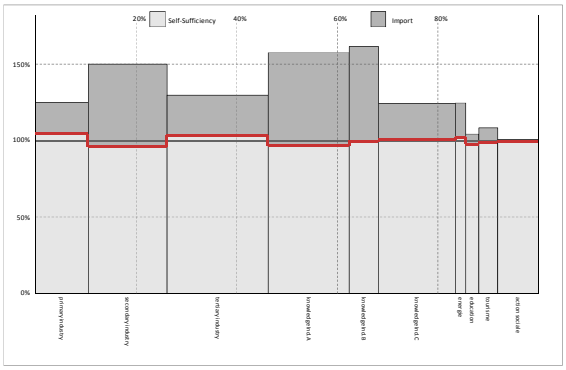
Skyline Chart, 1990 France



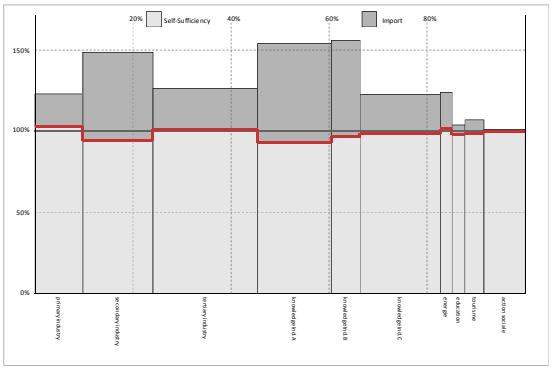
Skyline Chart, 1995 France



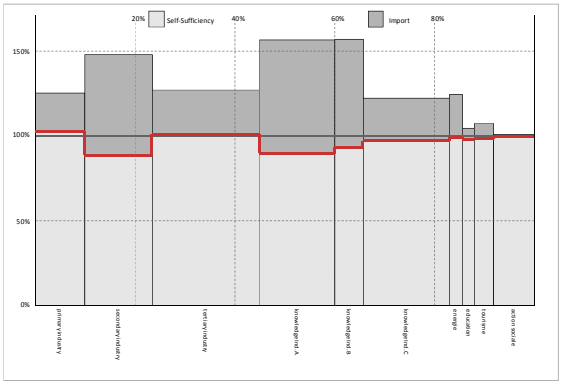
Skyline Chart, 2000 France



Skyline Chart, 2005 France



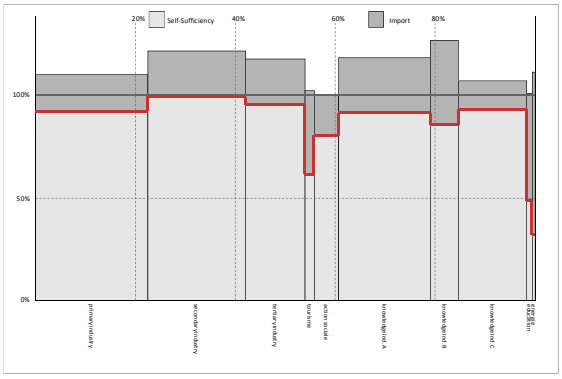
Skyline Chart, 2008 France



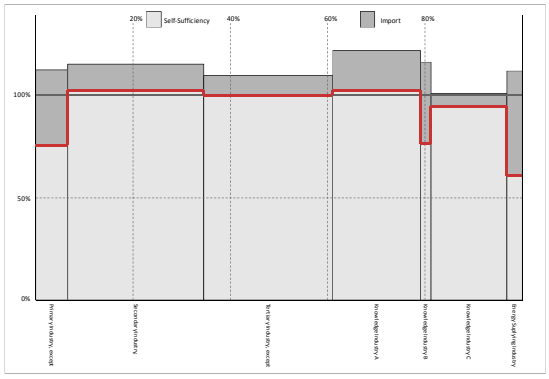
cf. calculated and drawn by Ray 2.0-e, provided by Kenjiro UDA (*).

Fig. 3 Comparison of skyline charts between France and Japan, 1965-2005

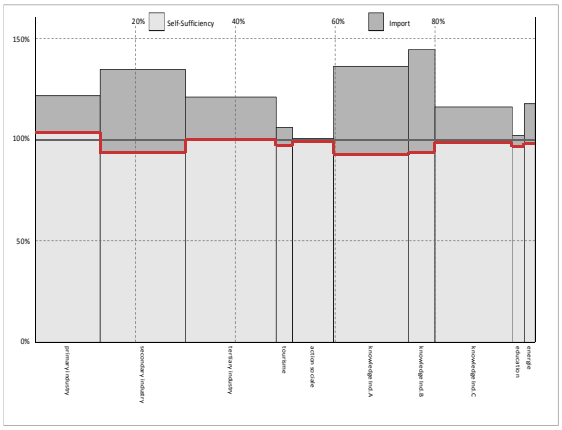
Skyline Chart, 1965 France



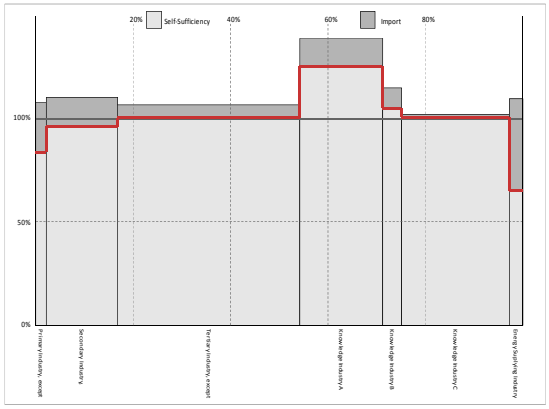
Skyline Chart, 1965 Japan



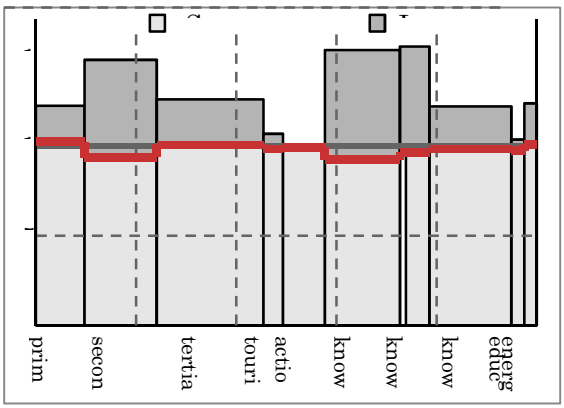
Skyline Chart, 1990 France



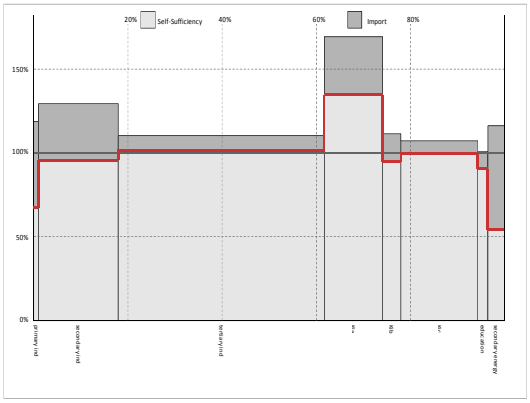
Skyline Chart, 1990 Japan



Skyline Chart, 2005 France



Skyline Chart, 2005 Japan



cf. calculated and drawn by Ray 2.0-e, provided by Kenjiro UDA (*).

Fig. 4 Trend of domestic production induced by additional 100 unit of each final demand for Knowledge Industry (1959-2008, France)

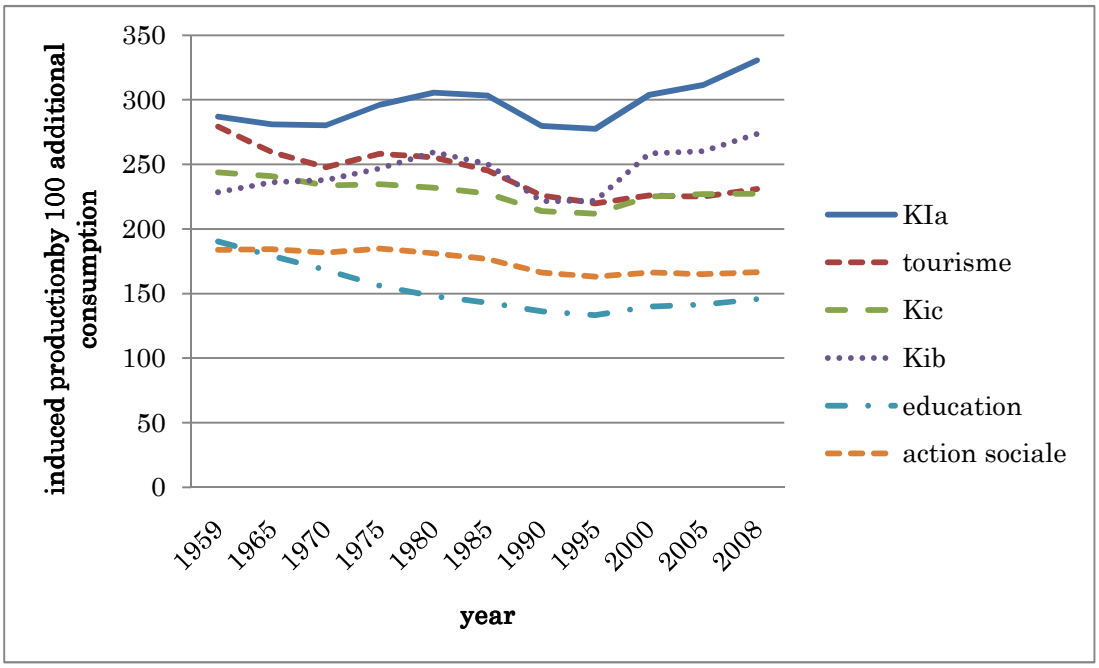


Fig. 5 Trend of domestic production induced by additional 100 unit of each final demand for Knowledge industry (1960-2005, Japan)

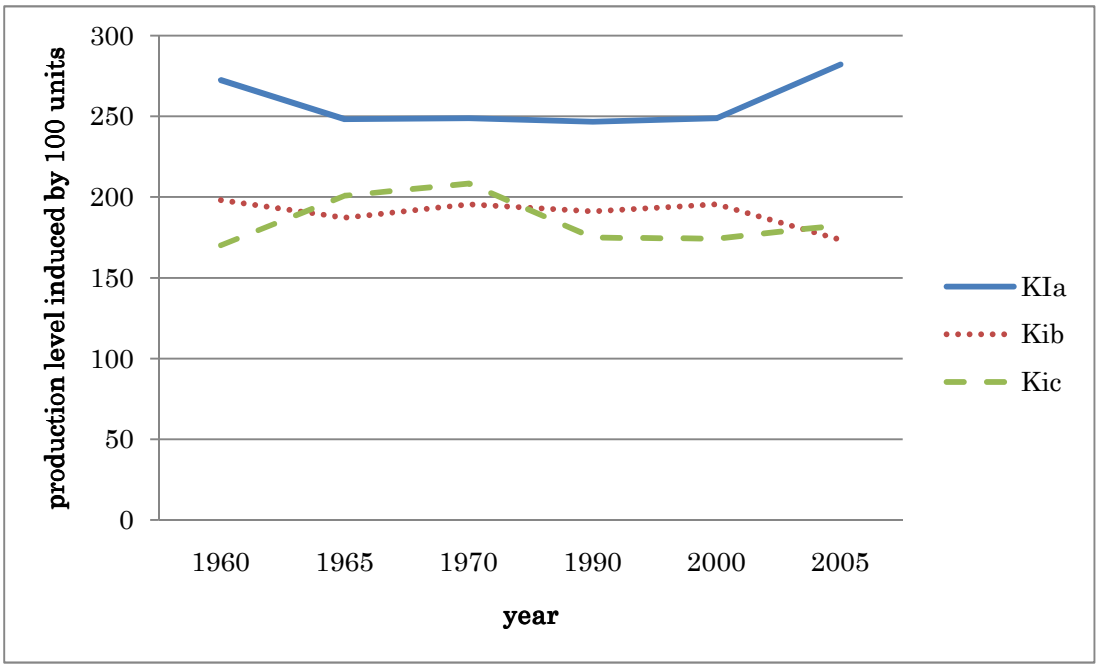


Fig 6　Comparison of induced production by additional final demand for knowledge industry between France and Japan (1960-2005)

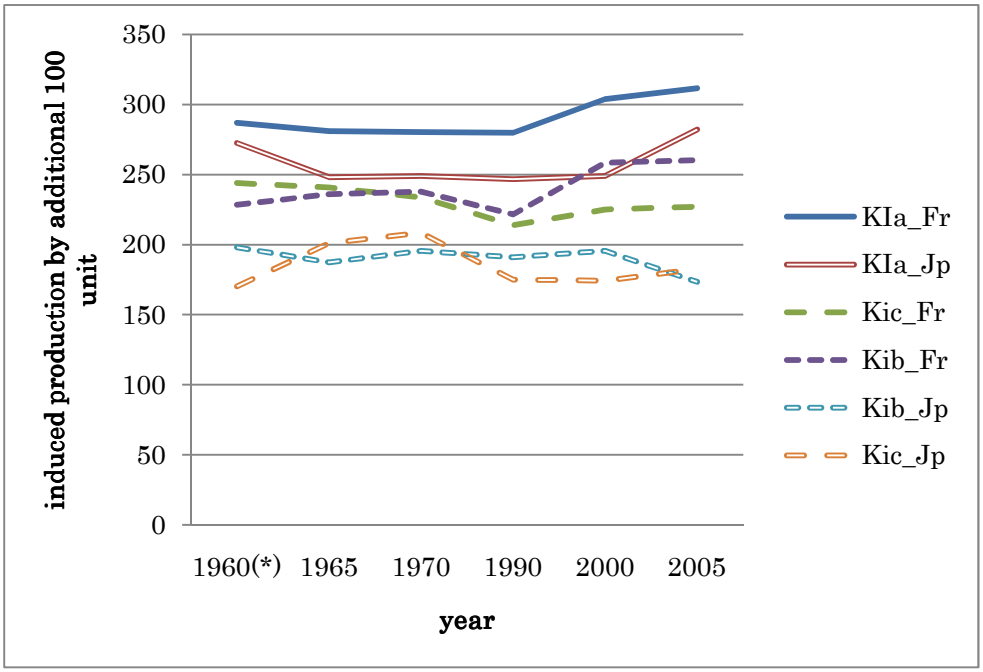
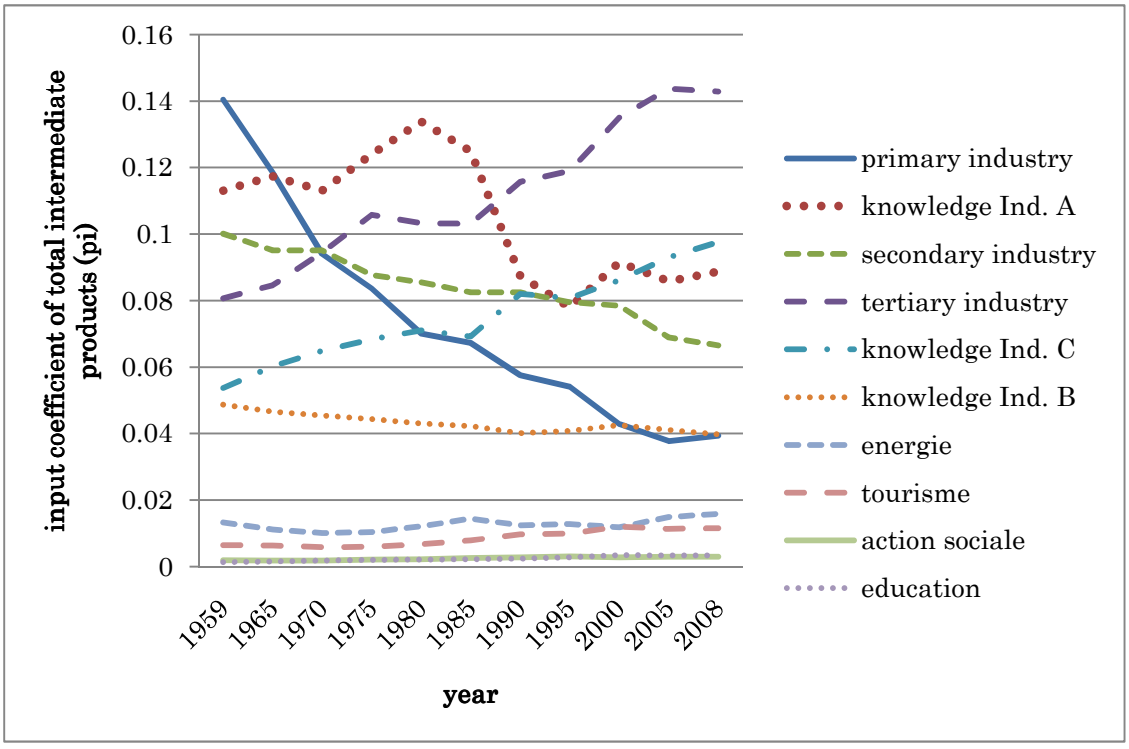
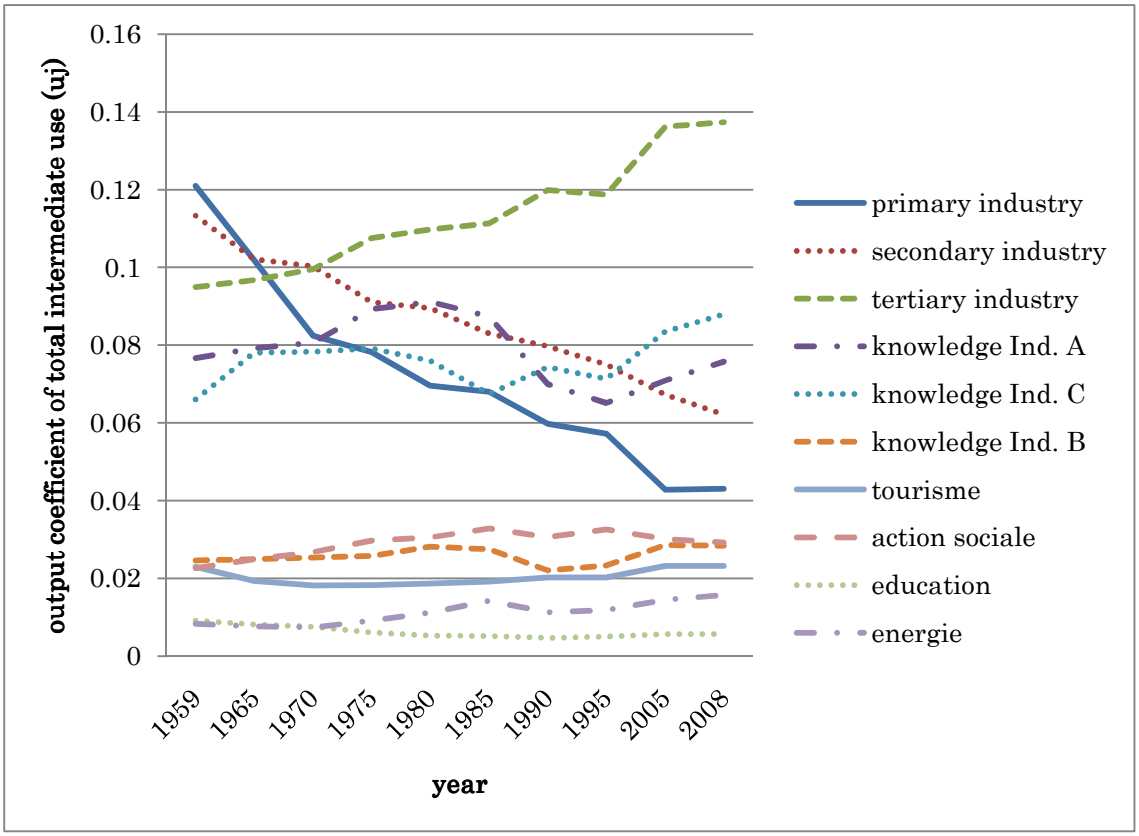


Fig 7. Trend of the input coefficient for intermediate production (France).



(see Appendix 2 to know the calculation method of pi)

Fig 8 Trend of the output coefficient for intermediate use (France).



(see Appendix 3 to know the calculation method of uj)

Fig. 9 Trend of KI's input coefficient change from KIa in France, 1959-2008

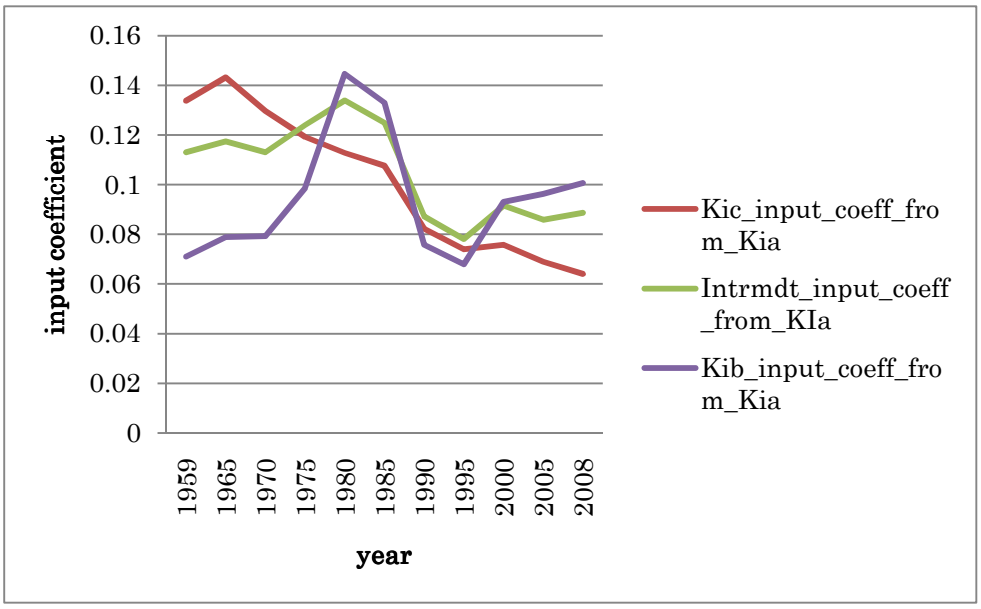


Fig.10 Trend of KIs input coefficient change from KIb in France, 1959-2008

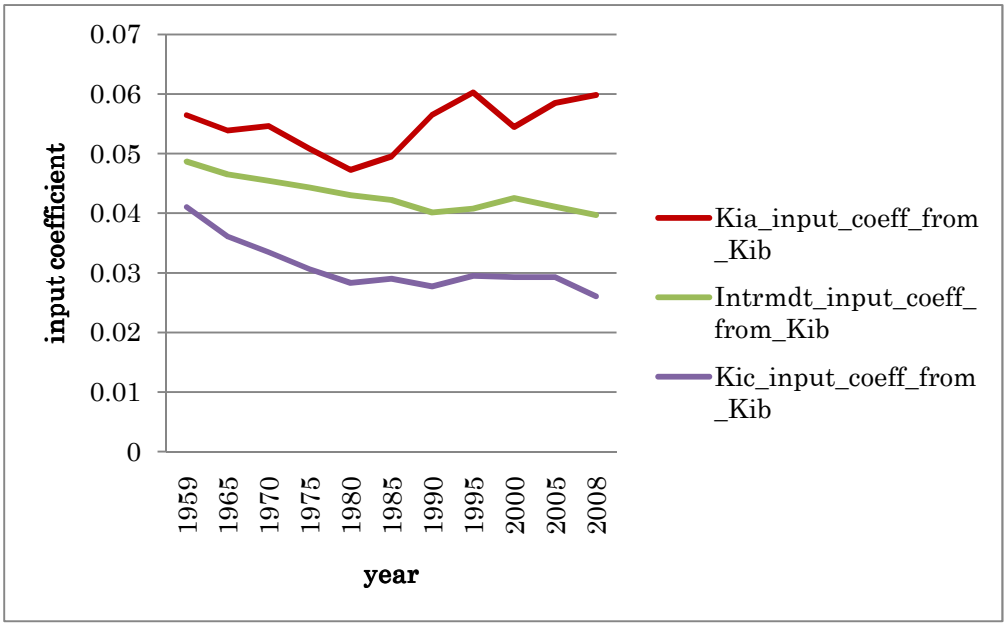
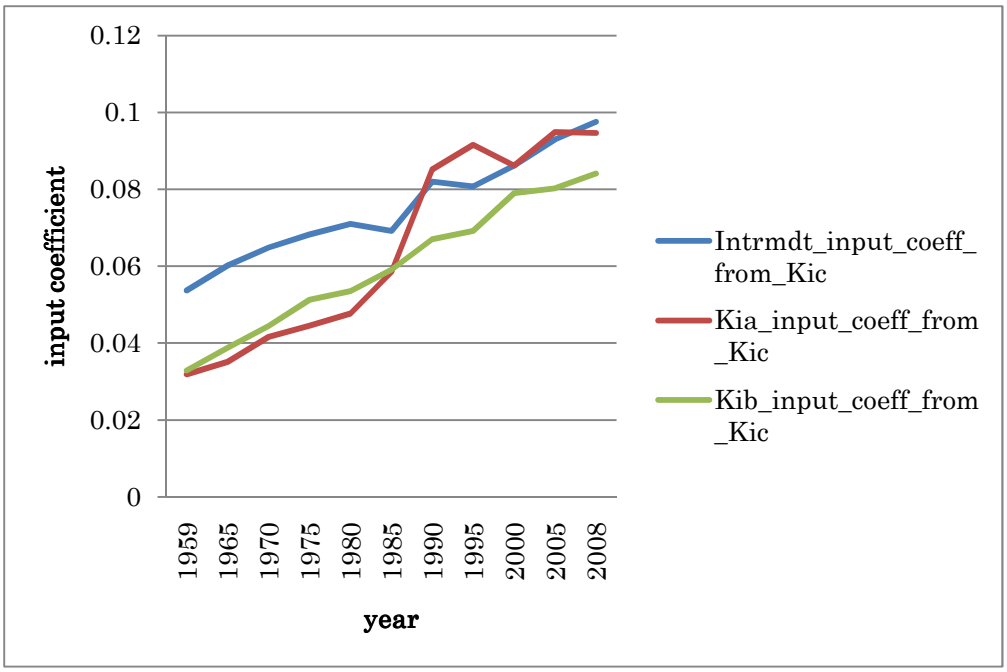


Fig.11 Trend of KIs input coefficient change from KIc in France, 1959-2008

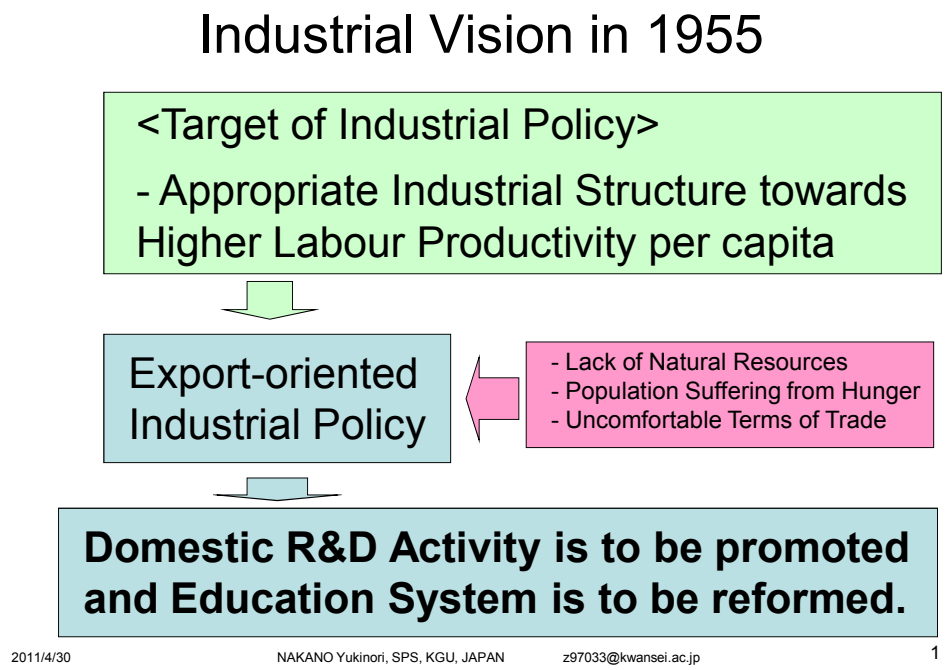


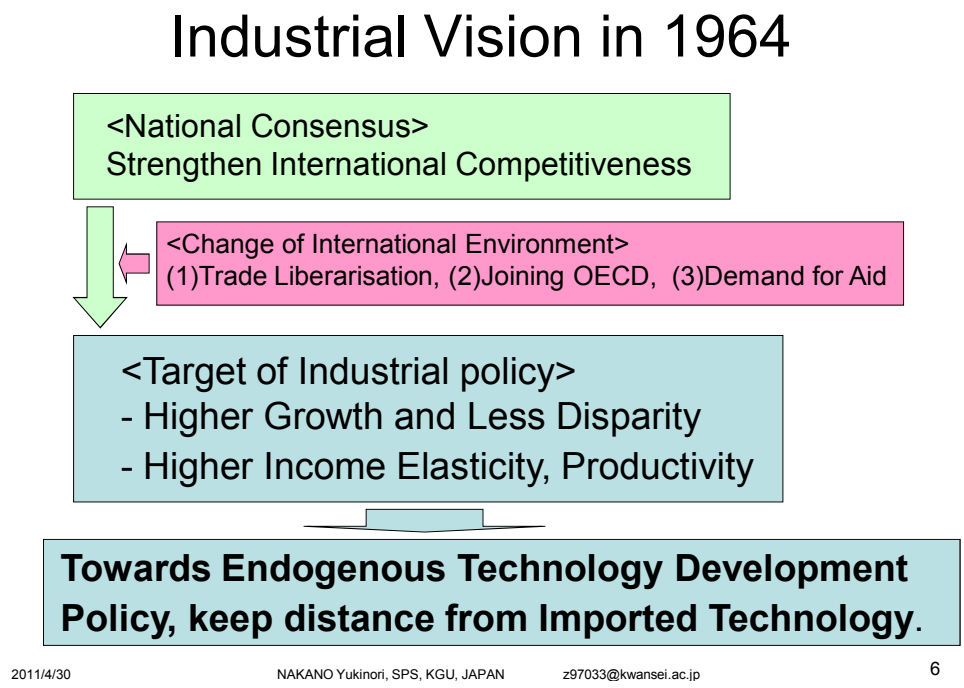
<References>

- FUJITAKE Akatsuki, translated in Japanese, Gijutsu Kakushin no Fukyu Katei, Baifukan, 1966, Everett M. Rogers, Diffusion of Innovations, Freepress, 1962
- Fritz Machlup, "The Production and Distribution of Knowledge in the United States", Princeton, New Jersey, Princeton University Press, 1972.
- IWAI Katsuto, ITO Motoshige, edited, Gendaino Keizai Riron, p.299, University of Tokyo Press, 1994
- Keizai-Kikaku-tyo, Nenji Keizai Hokoku, 1977
- NAKANO Yukinori, Comparison of several types of knowledge industries between Japan and Europe, International Input-Output Association , The 16th IIOA Conference, Istanbul, 2007
- NAKANO Yukinori, L'analyse structurelle de l'industrie de la connaissance: une comparaison entre la France et le Japon., JFR' 09, Journée Francophone de la Recherche, Sciencescope, Maison Franco-Japonaise, 2009
- NEZU Rizaburo, Chapter 5 Joho-infura p.113-158, Yori Kodono Chishikikeizaide Issono Hatten wo Mezasu Nihon - Shogaikokuheno Kyokun, ITTOSHA, The World Bank, 2007, translated from "JAPAN Moving Toward a More Advanced Knowledge Economy Vol.1: Asseement and Lessons", " JAPAN Moving Toward a More Advanced Knowledge Economy Vol.2:, Advanced Knowledge Creating Companies", edited by SHIBATA Tsutomu/ TAKEUTI Hirotaka and translated by TAMURA Katsunori, 2006, The World Bank.
- OHASHI Yasuo, translated in Japanese, Yaseino Shiko, 1976, Misuzushobo, Claude Lévi-Strauss, La Pensée Sauvage, Librairie Plon, Paris, 1962
- Paul Romer, Endogenous Technology Change, p.187-218 , Landmark papers in economic growth, selected by Robert M. Solow. -- Edward Elgar Pub., 2001
- UDA, Kenjiro, 2011, An Introduction to skyline chart generating tool "Ray" Version2, Research of Economy Statistics, 34(4), pp.41-57, Economy, Trade and Industry Statistics Association
- YONEZAWA Akizumi/ KOSUGI Reiko, Chapter 7 Kyoiku/ Kunren/ Jintekishigen: Ginono Yoseini Kotaeru, p.202-203, Yori Kodono Chishikikeizaide Issono Hatten wo Mezasu Nihon - Shogaikokuheno Kyokun, ITTOSHA, World Bank, 2007, translated from "JAPAN Moving Toward a More Advanced Knowledge Economy Vol.1: Assessment and Lessons", " JAPAN Moving Toward a More Advanced Knowledge Economy Vol.2:, Advanced Knowledge Creating Companies", edited by SHIBATA Tsutomu/ TAKEUTI Hirotaka and translated by TAMURA Katsunori, 2006, The World Bank.

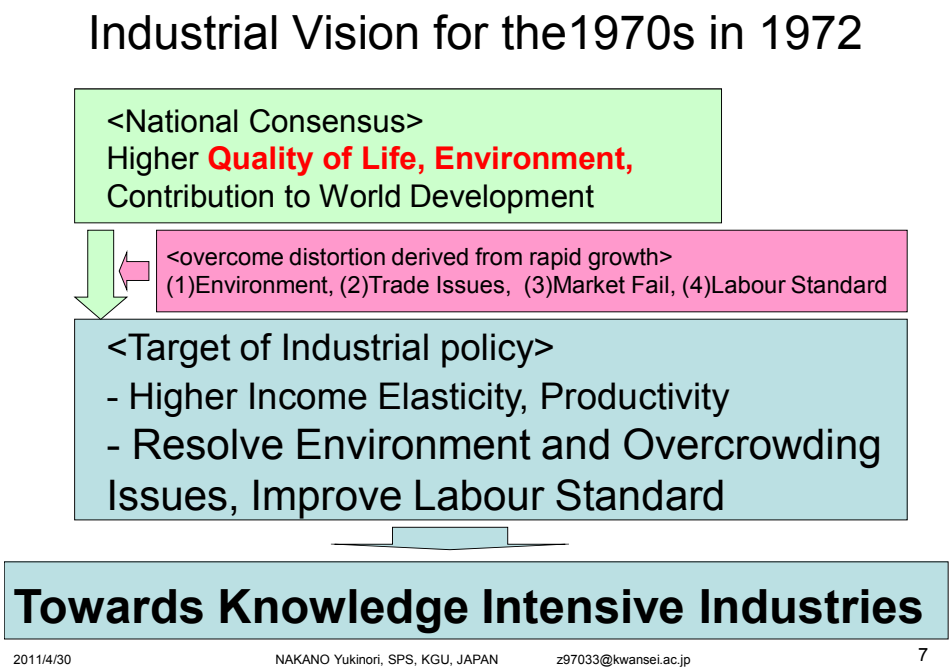
<Appendix 1>

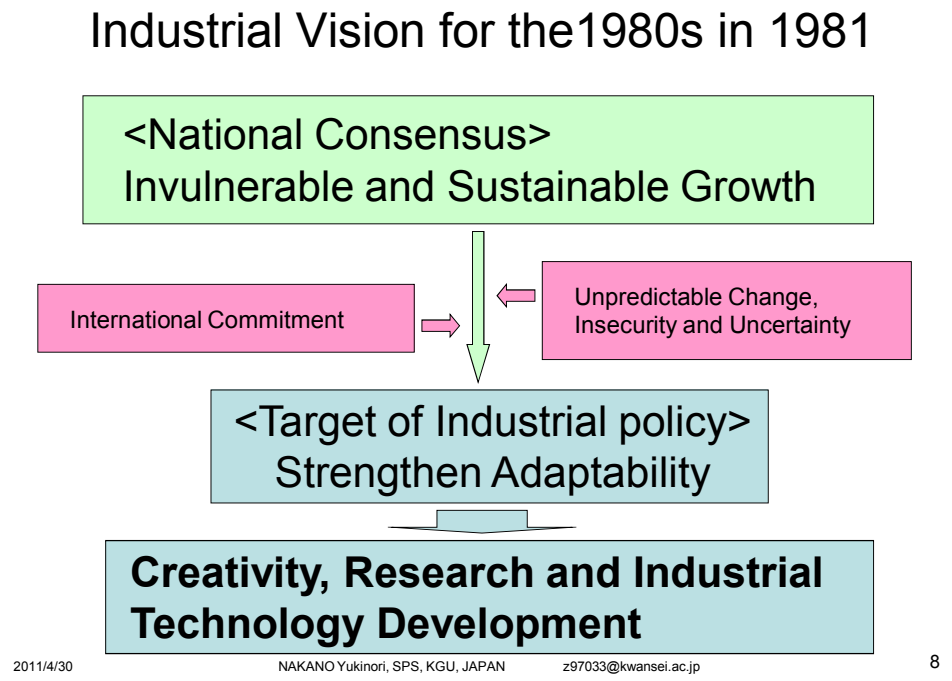
The trend of the industrial structure vision published by MITI from 1955 to 1982





<Appendix 1 continued>





<Appendix 2>

The j-branch's production, Yj, is composed of j-branch's total intermediate use of products and the value added, VAj, so that it is expressed by equation (1).

$$Yj = \sum_{i=1}^{m} xij + VAj \quad \text{-----} \quad (1)$$

Here, xij is i-product's use (input) by j-branch.
VAj is the total final demand of i-branch.

The input coefficient, aij, is defined by equation (2).

$$aij = xij/Yi \quad \text{-----} \quad (2)$$

The total internal production by industrial branches, PII, is defined by equation (3).

$$PII = \sum_{j=1}^{n} Yi \quad \text{-----} \quad (3)$$

The total intermediate production of i-product, Pi, is defined by equation (4).

$$Pi = \sum_{i=1}^{m} xij \quad \text{------} \quad (4)$$

The input coefficient of total intermediate products, pi, is defined by equation (5).

$$pi = Pi/PII \quad \text{------} \quad (5)$$

The trends of the input coefficient of total intermediate production of each branch, from primary to action social, is shown in Fig.7.

<Appendix 3>

The i-product's total use, Xi, is expressed by equation (1).

$$Xi = \sum_{j=1}^{n} xij + FDi - (IMPi + MCi) \quad \text{-----} \quad (1)$$

Here, xij is i-branch's production (output) for the intermediate use of j-branch.
FDi is the total final demand of i-branch.
IMPi is the import of i-branch.
MCi is the marginal cost of i-branch.

The output coefficient, bij, is defined by equation (2).

$$bij = xij/Xi \quad \text{-----} \quad (2)$$

The total internal use or production by industrial branches, PII, is defined by equation (3).

$$PII = \sum_{i=1}^{m} Xi \quad \text{-----} \quad (3)$$

here, $\sum_{i=1}^{m} Xi = \sum_{j=1}^{n} Yi$

The total intermediate use of j-branch, Uj, is defined by equation (4).

$$Uj = \sum_{i=1}^{m} xij \quad \text{------} \quad (4)$$

here, Uii=Pii.

The output coefficient of the total intermediate use, Uj, is defined by equation (5).

$$uj = Uj/PII \quad \text{------} \quad (5)$$

The trends of the output coefficient of total intermediate use of each branch, from primary to action social, is shown in Fig.8.