

Chapter 2

Journey Though the Secret History of the Flying Geese Model

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1 Introduction

The economic development in East Asia is characterized by the sequential “take-off” of member countries. First, Japan succeeded in modernizing its economy after *Meiji* Revolution during the latter half of the 19th century. Japan had continued to develop its economy for a century, despite of the interruption by World War II, and becomes the sole developed country in Asia as early as 1960s.

The second wave of industrialization in East Asia had started in Asian NIEs or “four tigers”, namely, Taiwan, South Korea, Hong Kong and Singapore during 1960s, and followed by the leading ASEAN countries, namely Malaysia, Thailand, the Philippines and Indonesia.

The third wave of industrialization in East Asia in 1990’s is leaded by China after the Economic Opening in 1994, followed by India, and the latecomer ASEAN countries, represented by Vietnam.

This multi-tiered economic development in East Asia is often termed as the “Flying Geese” pattern of economic development. The concept of the “Flying Geese” is originally developed by Akamatsu (1935, 1937, 1962) and then elaborated and expanded notably by Kojima (1960, 1970, 1995).

On the other hand, some authors say that traditional Flying Geese pattern is not applicable to some industries, like electronics industry in which Japan is not necessarily the sole “leading goose” any more, caught-up by some followers like China, now producing cutting-edge products. Is this means that the Flying Geese model becomes “obsolete” in the 21st century?

In this paper, the historical development of the Flying Geese model and its variants are re-introduced and matched against the empirical figures to check if it is still valid. The main objective of this paper is two fold. One is to clarify the now confused two concepts of the Flying Geese, one is applied to the pattern of economic development in one specific country, and the other is applied to the pattern of economic development of multiple countries in sequence. Because of the confusion of these two concepts, the debate on the validity of the

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Flying Geese model is also very much confused. Thus, the second objective of this paper is to check the validity of the Flying Geese models properly, after separating two concepts of the model clearly.

This paper is structured as follows. First, The original Akamatsu Flying Geese model and its variant are introduced in Chapter 2. Then, some empirical evidence is presented to check the validity of these models in Chapter 3. Chapter 4 concludes the paper by revisiting the original Akamatsu Flying Geese model and interpreted in the context of East Asia in the 21st century

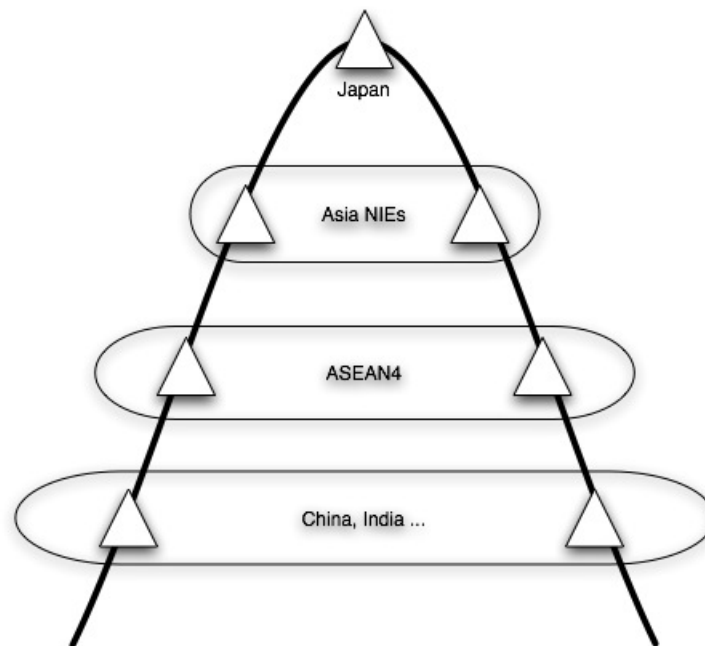
2 The “Flying Geese” Model

Kojima (2000, p385) explains the FG model by citing the famous speech of Saburo Okita, an economist and a former foreign minister of Japan, as follow.

The division of labor in the Pacific region has aptly been called the FG pattern of development. (. . .) Traditionally, there have been two patterns or types of international division of labor: the vertical division of labor such as prevailed in the 19th century to define relations between the industrialized country and the resource-supplying country or between the suzerain and the colony; and the horizontal division of labor typified by the EEC with its trade in manufactures among industrialized countries, often among countries at the same stage of development and sharing a common culture. By contrast with both of these types, the FG pattern represents a special kind of dynamism. In the Pacific region, for example, the United States developed first as the lead country. Beginning in the late 19th century, Japan began to play catch-up development in the non-durable consumer goods, durable consumer goods, and capital goods sectors in that order. Now the Asian NICs and the ASEAN countries are following in Japan's footsteps. (. . .) Because there is such great variety in the Asian nations stages of development, natural resource endowments, and cultural, religious, and historical heritages, economic integration on the EEC model is clearly out of the question. Yet it is precisely this diversity that works to facilitate the FG pattern of shared development as each is able to take advantage of its distinctiveness to develop with a supportive division of labor (Okita, 1985, 21).

It is true that this Okita's speech in 1985 triggered the recent interest in the Flying Geese model and the actually East Asia had developed as Okita described, at least, before the Asian Currency Crisis in 1997-1998. The Flying Geese patten of economic development, as described by Okita is, as Figure 1.

Figure 1: Famous “Flying Geese” pattern of economic development in East Asia



Apparently, Okita's description is based on Akamatsu (1962), and he applied it to the actual economic situation in East Asia around the mid-1980's. On the other hand, the original Flying Geese model in Akamatsu (1935, 1937) differs significantly from this version. Actually, there are two significantly different concepts of the Flying Geese models. One is applied to the pattern of economic development in one specific country, and the other is applied to the pattern of economic development of multiple countries in sequence. Here, the historical development of Flying Geese model is introduced¹.

2.1 One-country Model

The basic pattern of the flying geese appeared in Akamatsu (1935, 1937) is named here as "one-country" model. There are two versions of the one-country model. One is “one-country one-product” model and the other is “one-country multi-product” model.

¹Aside the original Akamatsu(1935, 1937, 1962), Kojima(2000) is the most comprehensive review of the variants of the Flying Geese model. This chapter is mainly based on these two literatures.

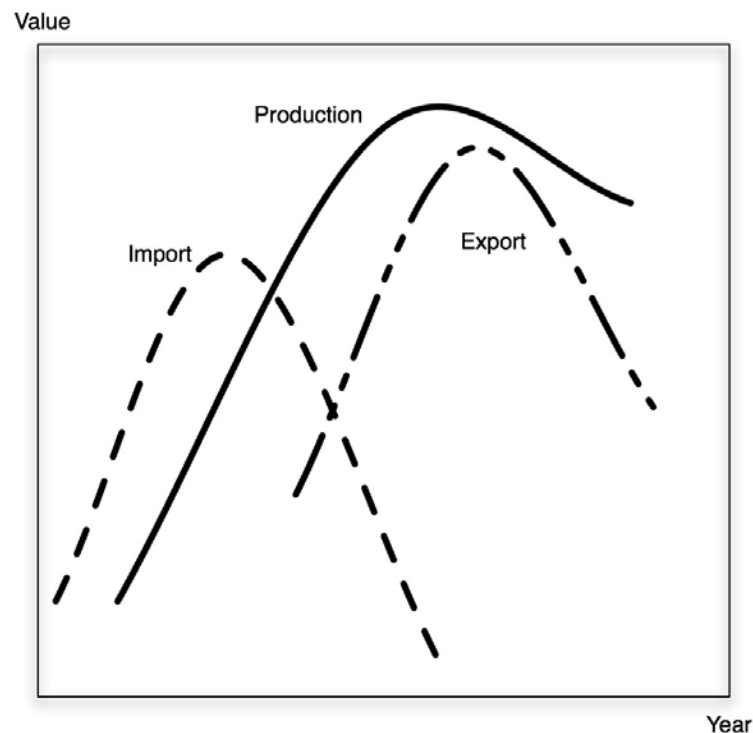
2.1.1. One-country one-product model

“One-country one-product” model explains a historical pattern of the development of an industry in a country from the viewpoints of import, export and production of one specific product. Later, Akamatsu himself explains this basic pattern as follows:

Wild geese fly in orderly ranks forming an inverse V, just as airplanes fly in formation. This flying pattern of wild geese is metaphorically applied to the below figured three time-series curves each denoting import, domestic production, and export of the manufactured goods in less-advanced countries (Akamatsu 1962, p11).

The figure that Akamatsu mentioned above is just like Figure 2. It is not as much like “flying geese” as Okita’s description (Figure 1), but actually, this is the origin of the flying geese pattern of economic development². Akamatsu (1962, p12) called this as “fundamental wild-geese-flying pattern.”

Figure 2: Akamatsu “Fundamental” Flying Geese Pattern of Economic Development



²It is now quite confusing to call both the original one-country version and famous multi-country version “Flying Geese.”

Akamatsu (ibid) explained the “fundamental pattern” of the Flying Geese model in the following four stages:

- | | | |
|----|-------|---|
| 1: | Stage | Starting the import of manufactured consumer goods. |
| 2: | Stage | Domestic industry starts the production of previously imported manufactured consumer goods, while importing the capital goods to manufacture those consumer goods. |
| 3: | Stage | Domestic industry starts export the manufactured consumer goods. |
| 4: | Stage | The consumer goods industry completes catch up with that industry in developed countries. The export of the consumer goods starts decline, and the capital goods used in production of the consumer goods is now exported. ³ |

Akamatsu “fundamental” model is based on the cases of Japan’s industrial development, namely, those of cotton yarn and wool industries. He shows the statistical evidence of the Flying Geese pattern, drawing the picture of import, production and export of Japan’s cotton yarn and wool industries from the 1860’s to the 1930’s (Akamatsu 1935, 1937).

2.1.2. One-country multi-product model

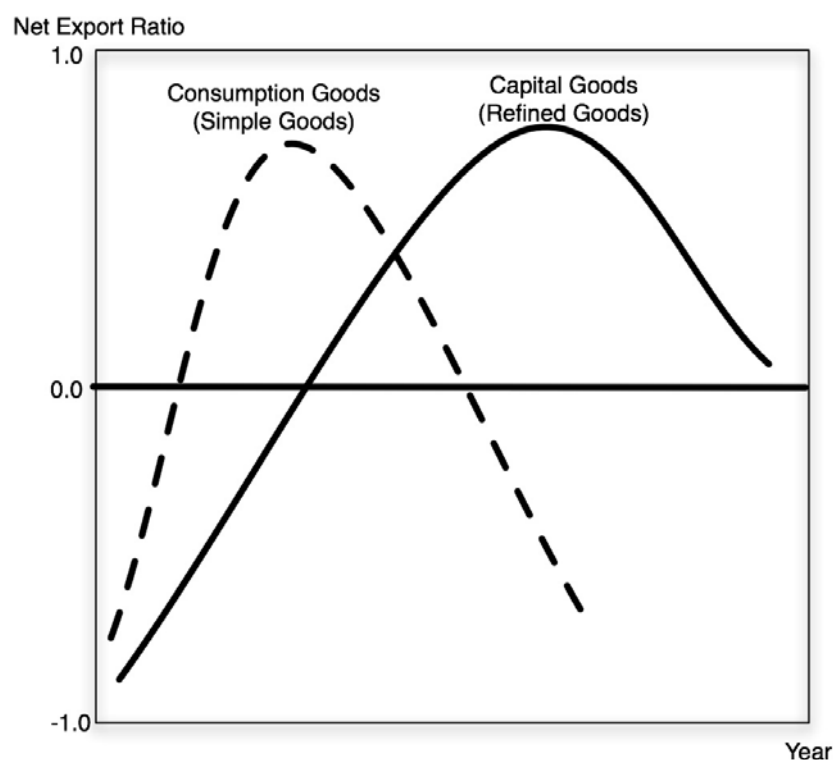
Akamatsu soon expands the one-country one-product model to one-country multi-product model in his first paper on the Flying Geese model (Akamatsu 1935). He compared above “one-country one-product” pattern of industrial development between cotton yarn industry and wool industry, and also final goods, intermediate goods and capital goods within each industry. He found that there are some sequential patterns in the economic development both between industries and within an industry.

Later, he generalized this pattern as “the time for the curves of domestic production and export to go beyond that of import will come earlier in crude goods and later in refined goods, and similarly, earlier in consumer goods and later in capital goods” (Akamatsu 1962, p11).

³Akamatsu mentioned some sort of “multi-industry” ingredients in the fourth stage, but here I separate it to the next subsection for simplicity.

Now, based on his description just mentioned above, Figure 3 is proposed⁴. The vertical axis is now “net export ratio” of goods, instead of three lines of import, production and export in Figure 2. Let us call this the “Flying Fish” diagram of industrial development, because the inverse-V shape crossing the horizontal axis twice, just like flying fish jumping up from the surface of the sea and then sinking below again.

Figure 3: Flying Fish Diagram of industrial development for a country



2.1.3 Mechanism behind one-country multi-product model

One problem of the Flying Geese model is that Akamatsu didn't explain the mechanism behind the pattern using the terminology of neo-classical economics. He even calls his own model as "a historical theory (Akamatsu 1962, p11)." Instead, Kojima (1960) tries to explain that the accumulation of capital, i.e., the Heckscher-Ohlin factor is the fundamental driving force of the Flying Geese model. Kojima (2000) also mentioned that another driving force is Ricardian advantage by learning-by-doing and economies of scale.

⁴ Kosai and Tran (1994) also explains the FG model based on the same kind of figures like Figure 3, setting the vertical axis as “production/consumption ratio,” and Kwan(2002) set it “competitiveness.”

2.2 Multi-country Model

2.2.1. Multi-country multi-product model

While Akamatsu model mentioned so far is focused on the industrial development of a country, his theory is fundamentally structured given the existence of the countries that are in different development stages. So, the Flying Geese model is naturally extended to a multi-country model. He explicitly proposes a multi-country model in Akamatsu (1962, p17), as “Development of Advanced and Less-Advanced Countries in a Wild-Geese-Flying Pattern.”

This multi-country model of the Flying Geese pattern, just like Figure 1, is now well known as “THE” Flying Geese model.

2.2.2. Mechanism behind multi-country multi-product model

Actually, Akamatsu flying-geese model is a building block of his larger theory of historical development of the world economy, driven by countries iterant “heteronization” and “homogenization.” However, again, his theory is meticulous but descriptive(see Akamatsu 1962), and not integreted in the theories of mainstream international economics. Later, Fujita and Mori(1999) tried to reproduce the multi-country multi-product Flying Geese pattern of economic development using a simulation model of spatial economics, or new economic geography.

3 Empirical Evidence

There are some empirical studies to verify the Flying Geese model. Kojima (2000) reviews these studies comprehensively. After year 2000, Kwan (2002) checked the relationship between Japan and China is still “flying-geese” or changed to “leaping-frog” by U.S. trade statistics. He concludes that the exports of Japan are still “high-tech” than that of China in 2000.

3.1 One-country model

Here, I check the one-country multi-product model by the Flying Fish diagram. I draw the diagram for Thailand, Korea and Japan during the 1960s to 2005 using COMTRADE database by UNCTAD. I shows the development of clothing industry (SITC rev.1: 841), textile yarn and thread industry (651), passenger car industry (7321) and iron and steel industry (674). These four industries are selected with the intention described in Table 1.

Table 1: Types of Selected Industries

	Light Industry	Heavy Industry
Up Stream	Textile	Iron and Steel
Down Stream	Clothing	Passenger Car

Akamatsu predictions on the order of industrial development are interpreted as a) light industries develop first, and then heavy industries follow, b) downstream industries come first, and then upstream industries follow. Unfortunately, it is not possible to check these predictions for single country, because the coverage of the COMTRADE database, about fifty years, are too “short” to check the Flying Geese pattern of economic development⁵. To overcome this problem, I assumed that the diagram for Thailand is similar to that of Japan in its “take-off” stage of economic development, and that for Korea is similar to that of Japan in a few decades ago. Thus, I assumed that the figures of Thailand-Korea-Japan are the figures for the sequential development stages of hypothetical single country.

Figure 4 is the Flying Fish diagram for Thailand. It shows that 1) clothing industry developed first, and then textile industry followed 2) passenger car industry comes first and then iron and steel industry followed 3) clothing and textile industry developed earlier than passenger car and iron and steel industry. This diagram perfectly matches the hypotheses of Akamatsu, both a) and b).

⁵ Akamatsu used the trade data of Japan for 80 to 100 years to depict the flying geese pattern.

Figure 4: Flying Fish Diagram for Thailand



Figure 5 is the Flying Fish diagram for Korea. It shows that 1) clothing industry had already developed in the 1960's and declined during the 1990's 2) textile industry followed the clothing industry, but it started declining before clothing industry 3) iron and steel industry has developed before passenger car industry, but soon caught-up.

Figure 5, the Korean case diverges from Akamatsu predictions in an interesting way, i.e., upstream industries doesn't always follow the downstream industries steadily, and sometimes not fully-developed and sometimes declines before the downstream industries.

Figure 5: Flying Fish Diagram for Korea

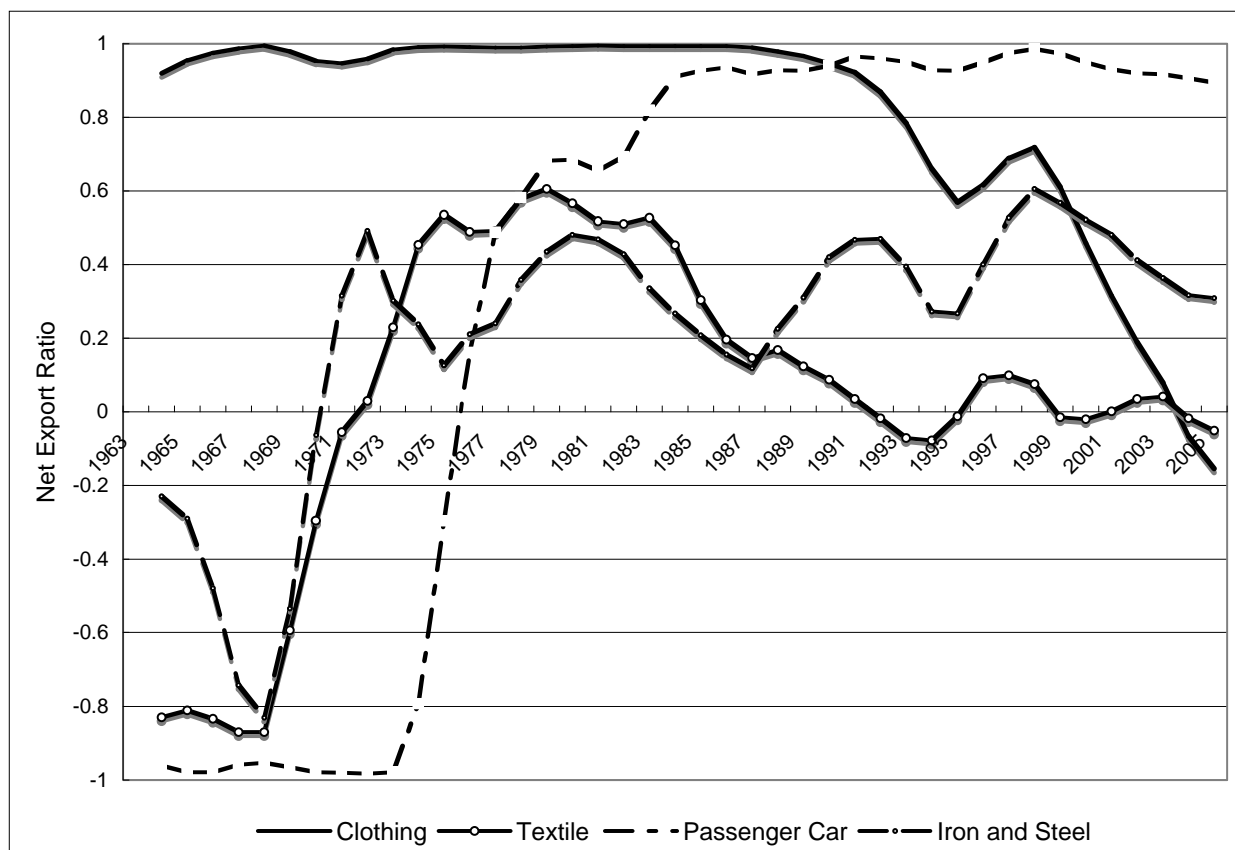
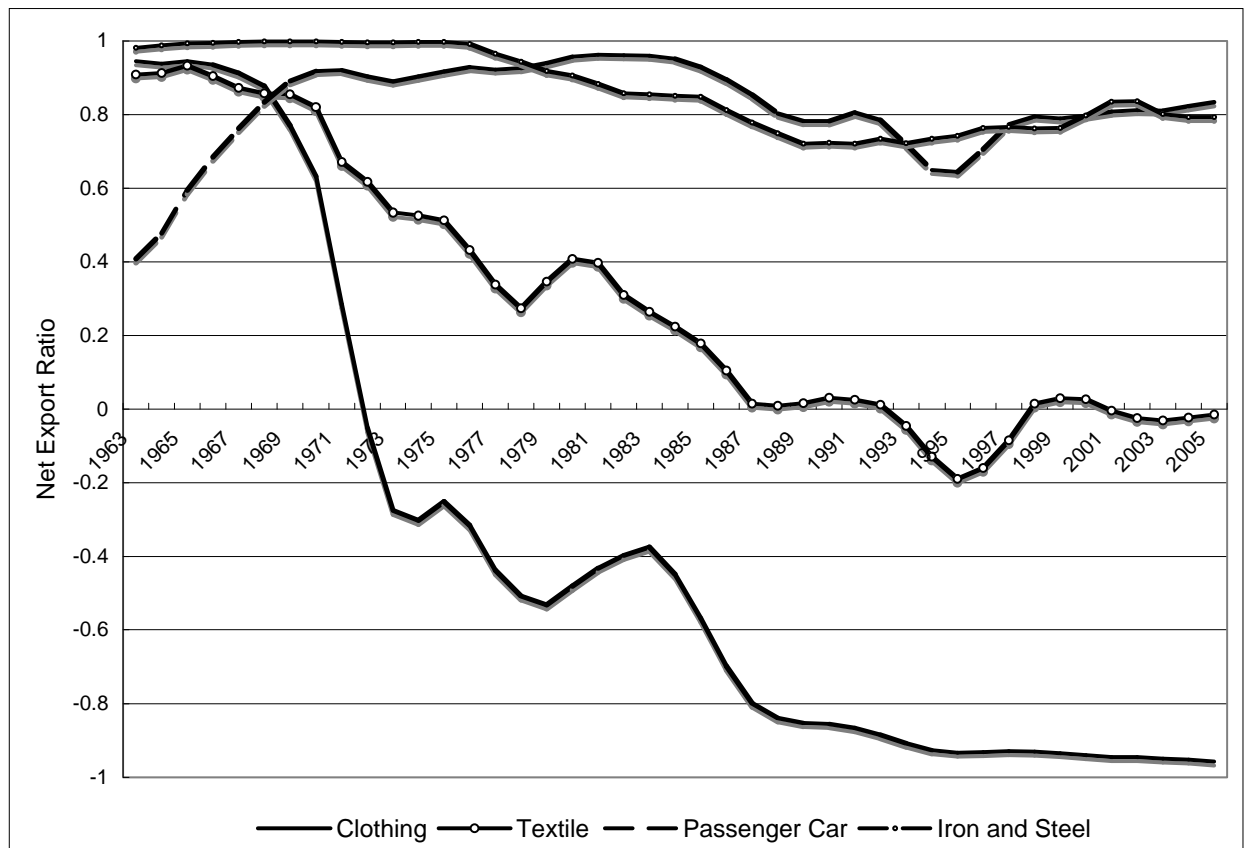


Figure 6 is the Flying Fish diagram for Japan. It shows that 1) clothing industry has declined earlier than textile industry, 2) iron and steel industry had developed earlier than passenger car industry.

Figure 6, the Japan's case also diverges from Akamatsu predictions in a interesting way. In heavy industry, an upstream industry(iron and steel) had developed earlier and a downstream industry(passenger car) followed.

Figure 6: Flying Fish Diagram for Japan



Because Figures 4,5,6 are for three countries, not one country, the analysis above is not exactly check the validity of Akamatsu “one-country multi-product” model. However, the findings of this quasi-one-country analysis shows pros and cons for Akamatsu “one-country” Flying Geese model very clearly.

First, light industry seems to develop earlier than heavy industry. This fact subscribe an Akamatsu prediction, developed “earlier in crude goods and later in refined goods.” Akamatsu himself doesn’t explain explicitly what is the driving-force for a country to upgrade its product from crude to refined. Later, as mentioned in 2.1.3, Kojima(1960) explained it by H-O theory with some Ricardian ingredients. It is reasonable to think that a less-developed countries starts industrialization from labour intensitve goods and then going into more capital intensive industries with the accumulation of capital in the country.

Second, upstream industry doesn’t always follow the downstream industry. In some country, upstream industry doesn’t develop enough, and in other country, upstream industry develop earlier than downstream industry. Especially, this tendency is obvious in heavy industry. This fact denies another Akamatsu prediction, developed “earlier in consumer

goods and later in capital goods.” Akamatsu “fundamental” flying geese model is the industrialization driven by domestic demand, or that driven by backward linkage. In case of Japan’s cotton and wool industry, its large market ensure the development of the consumer industry first, and the demand from that consumer industry fostered the intermediate or capital industry later. However, there are some less-development countries which have not enough large markets to foster the upward industries. In addition to that, the industrialization driven by domestic supply, or that driven by forward industry is also reasonable way of economic development. The industrial revolution in England is a typical case. The invention of steam engine enhanced various industries that used the engine as a capital goods. Japan’s iron and steel industry is another example.

All in all, the industrial development from crude goods to more elaborate goods is yet quite robust, while the industrialization driven by backward linkage is also valid, but it is not “the” way but “a” way of industrial development.

3.2 Multi-country model

Next, I check the multi-country multi-product model by using the correlation of export structure between Japan and other countries. I assume here that Japan is the leading goose and the country that the export structure is more similar to Japan is more advanced in the flying geese. I compared the correlation of the export structure of 8 countries (ASEAN5 + China, Korea and Taiwan) with Japan in 1985, 1990, 1995 and 2000 using 24-sector Asian International IO Table.

In 1985, the order of the flying geese is clear. Japan is the leading goose, and Taiwan and Korea follows, and then come ASEAN5 and China. However, the following geese has caught-up by year 2000, and the slope of the flying geese becomes flatter. It seems that the flying geese pattern of economic development in East Asia has changed dramatically during 1985 to 2000, and Japan is now not a sole leading geese in the region.

On the other hand, Figure 8 shows the same picture except for the machinery sector, mainly consists of electronics industry. The picture is quite different from Figure 7. The order and slope of the Flying Geese pattern in East Asia haven’t change much for the last two decades.

All in all, the flying geese pattern of economic development in East Asia has not be disturbed much for the last two decade, except for the machinery sector. This result is understandable. The development of electronics industry in East Asia is quite different from the pattern supposed in the Akamatsu Flying Geese model almost 70 years ago. The development of electronics industry in East Asia, especially after 1970’s are based on

“off-shore” transaction through Free Trade Zones (FTZs). This is fundamentally different from the market-driven industrial development in Japan, which is the base of Akamatsu model.

Figure 7: Correlation of Export Structure with Japan

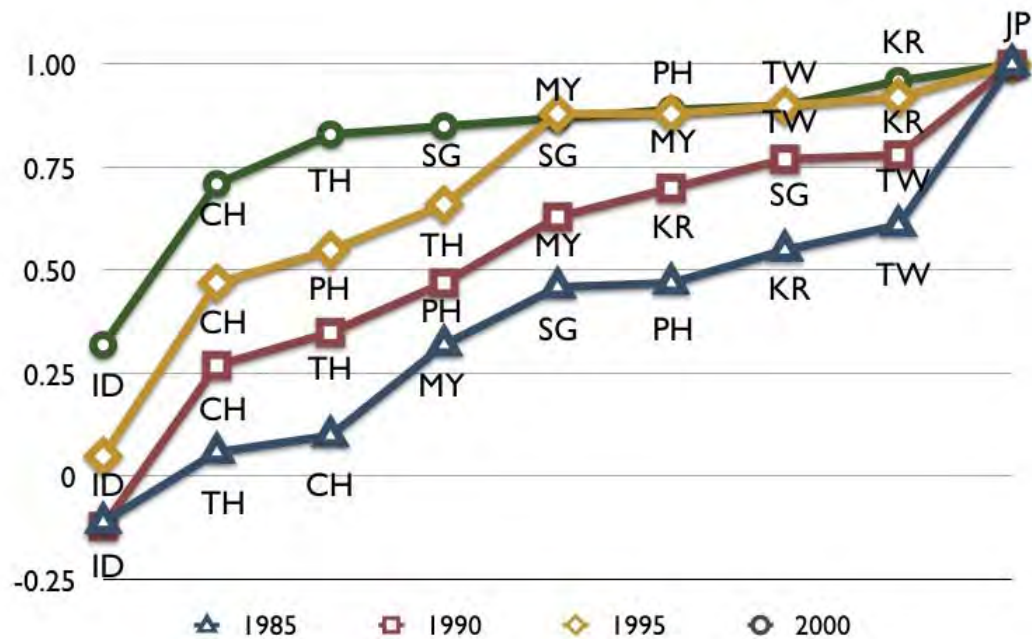
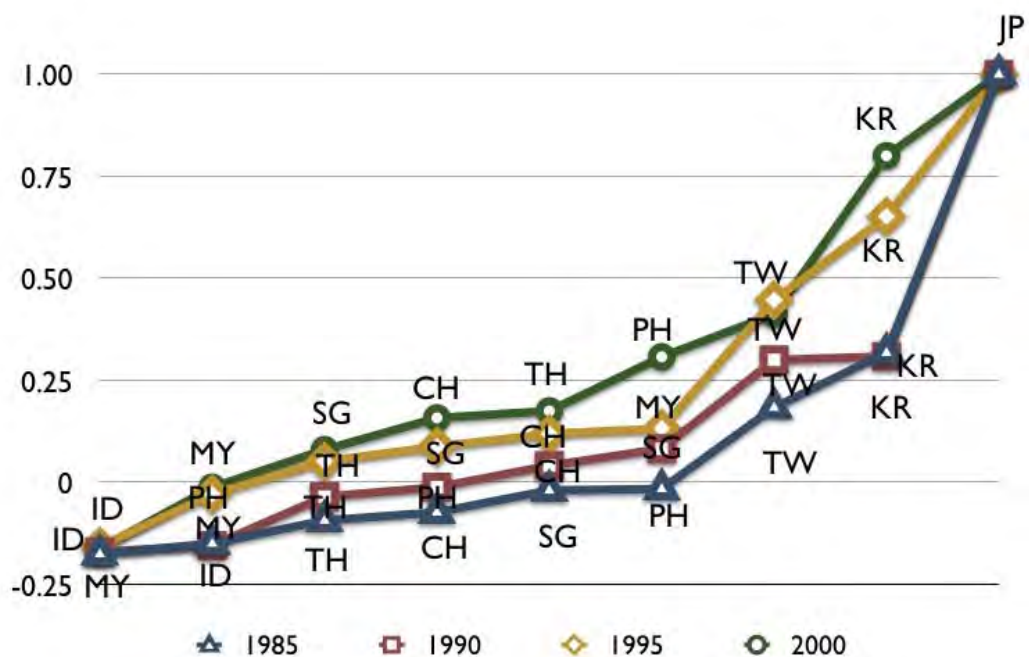


Figure 8: Correlation of Export Structure with Japan (Except for Machinery Sector)



4. Conclusions

More than 70 years ago, Akamatsu found a general pattern of industrial development and international trade based on Japan's case and call it the "Flying Geese" model. Now, this word is mostly used to depict the sequential development of a group of countries, and sometimes denied as "obsolete." However, Akamatsu himself clearly stated that "these countries, advanced and less advanced, do not necessarily go forward at the same speed in their development of a wild-geese-flying pattern, nor do they always make gradual progress, but they are at times dormant and at other times make leaping advances. (Akamatsu 1962, p18)"

It is regrettable for Akamatsu that he named various models all together as "Flying Geese" in his grand theory of the history of world economic development. However, as Figure 1 fits so well to the word of "Flying Geese", and so popular now, it is virtually impossible to rename this version of "Flying Geese." On the on the other hand, Figure 2 or Figure 3 version of the theory draws not much attention, although "fundamental" model of the flying geese contains a lot of research questions not yet answered. For instance:

- Why so many industries trace the "fundamental" flying geese pattern? What is the mechanism behind it?
- Why some products draw a "fundamental" flying geese pattern in a very short period, while other takes quite long?
- What affects the shape of the "fundamental" flying geese pattern, trade policy, market size or technological attributes?

The Flying Geese model has drawn too much attention on the "order" and the "slope" of the flying geese, for the last two decades. Now, we need to renew the interest in the "fundamental" Flying Geese pattern of industrial development, in the era of economic integration in East Asia. In order for it, we might need to change the name of the "fundamental" Flying Geese model to something other.

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