

Flying Geese in Asia : A Comparative Study of East Asian Economic Development Models

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The Asian economic development, especially those of East Asian countries, have long been praised and sometimes criticized by many economists. Generally, the Asian economies are deemed to be different from the Anglo-Saxon economies in several aspects such as rapid growth rates, government intervention, managed trade, and market structure. Also, countries in East Asia are regarded to achieve rapid economic growths by following a path that was taken by their precedents as if geese are flying in a certain order. First of all, this paper tries to find out determinant factors of long-run economic growth, using cross-country data of 77 countries. The result of this regression coincides with the hypotheses with strong statistical significance. Finding key factors that affect long-run economic growth rate, selected East Asian economies are compared to the world average in terms of these key factors. From this comparison, it was found that Asian economies had achieved rapid economic growth rates through high investment and export growth with relatively stable inflation and smaller government sizes. In particular, the educational achievement level of these selected Asian economies was higher than that of the world average. Secondly, it will try to calculate the time lag between the development levels of East Asian economies. In terms of real income, it is found that there still exists substantial time gap between economies. However, in terms of export structure, the time gap between economies is not that great.

I . Introduction

For the past three or four decades, economies in East Asia have achieved remarkable performances. Not only they achieved long-run sustainable growth, but also this growth was accompanied with relatively equal income distribution and stability as it was referred in the World Bank [16]. The East Asian economic development has been praised, or sometimes criticized as Krugman [6] did, for a long time. In particular, there have been heated debates whether the so-called "Asian development model" can be sustained after the 1997 Asian crises. Generally speaking, however, the achievement of rapid growth for a considerably long period of time in the East Asian economies has not been denied. The pattern of economic development in East Asia deemed to be different from the other economies. It was clearly different from the development strategy of other developing economies such as Latin American economies, which followed inward-oriented development strategy as Lin [9] clarified. Also, economic development of East Asian tigers was distinguished from the more advanced western economies in the area of industrial policy. In this paper, determinants of long-run economic growth have been studied using a cross-country regression, and the difference between East Asian economies and the other economies are studied in section two.

Not only East Asian economy as a whole is regarded different from the other economies, but also there exists a certain time lag among economies in East Asia in terms of their levels of economic development. They say that economies in East Asia have followed a path that was taken by their precedents as if geese are flying in a certain order. That is to say, Korea and Taiwan followed (or imitated) the economic development model of Japan with a certain time lag, and later Southeast Asian economies followed the Korean model. In order to see how much time lag exists between two economies in East Asia, calculation of the time lag in terms of real income and export structures is introduced in section three.

II . Determinants of Growth

1. The Empirical Design and Hypotheses

In order to find out the determinants of long-run economic growth, cross-country data of 77 economies from 1970 to 1992 are used to run a regression. The dependent variable of the regression was the average growth rate of each country during the given period, and the independent variables are explained in (Table 2). Similar empirical studies were tried by Barro [2] and Kormendi and Meguire [4]. In this paper, variables that used to be regarded as sources of economic growth in East Asia are selected in order to show differences between East Asian economies and the other economies.

The justification for the expected signs in Table 1, which shows relationship between each independent variable and economic growth, is based on the following hypothesis: First, the initial level of income measured by GDP per capita of each country in 1970 is selected. Barro and Sala-I-Martin [3] and various other literatures have shown that there is a tendency of convergence in terms of long-run economic growth between countries. Thus, countries whose initial income level were lower than the others can be expected to achieve higher economic growth rates. Secondly, it is generally believed that high inflation rate leads to lower economic growth as it tampers investment. Thirdly, as Solow [11] stated in his neo-classical growth theory, high investment will naturally lead to high growth. Fourthly, as World Bank [16] stated, export growth can be regarded as

(Table 1) Explanation of Independent Variables in the Regression

Variables	Explanation of Variables	Expected Sign
GDPR	average GDP growth rate (dependent variable)	
LGDP	GDP per capita in 1970	—
INFL	average rate of inflation	—
INVT	average ratio of investment/GDP	+
EXPORT	average growth rate of export	+
GOVT	average ratio of government expenditure/GDP	—
EDU	sum of average school enrollment ratios of secondary and tertiary schools	+

Source : World Bank [17], 1985,1987,1991,1994,1996,1997.

IMF [14].

〈Table 2〉 Regression without Asian Dummy

Variable	Expected Sign	Coefficient	Std. Error	T-Statistic
C		5.126805	1.250786	4.098867***
LGDPP	—	—0.885226	0.256776	—3.447465***
INFL	—	—0.003161	0.002813	—1.123608
INVT	+	0.126772	0.030853	4.108949***
EXPORT	+	0.155960	0.042673	3.654730***
GOVT	—	—0.038413	0.015855	—2.422793**
EDU	+	0.022388	0.007374	3.036052***
n(number of observation)		77		
R-squared		0.492652		
Durbin-Watson stat		1.684924		
F-statistic		11.32874		

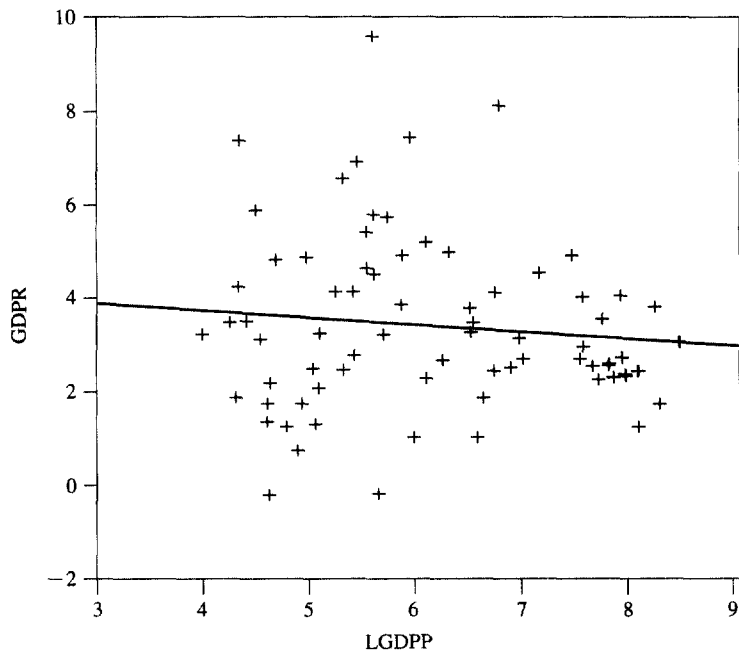
Note : Estimates with '**' are significant at 10% level, those '***' are significant at 5% level, and those '****' are significant at 1% level.

engine of economic growth. Fifthly, as Barro [1] showed, a high degree of government spending can be regarded as a deterring factor to economic growth as it crowds out more efficient private spending. Lastly, but not leastly, the educational level, which can be a proxy for human capital, will have a positive relation with economic growth as various literature such as Lee and Lee [8] and Lucas [10] showed.

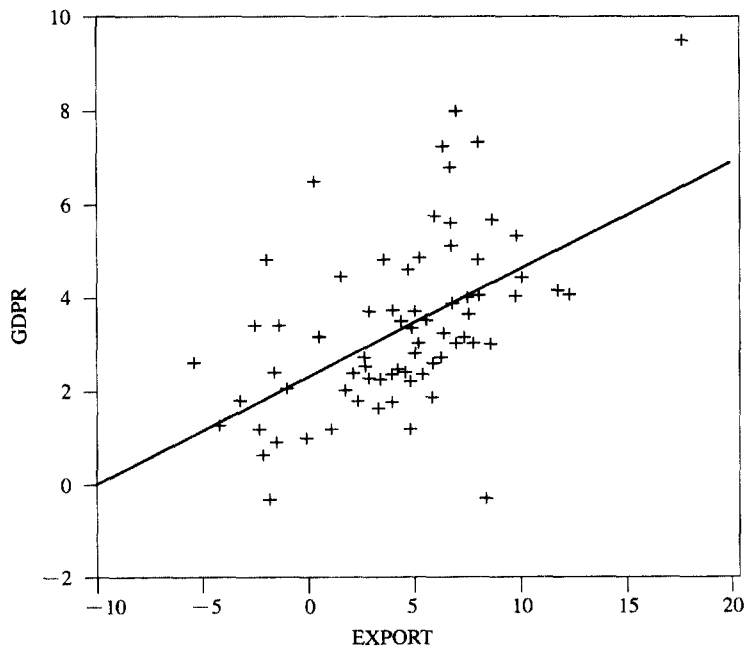
2. The Results

A regression was run with a dependence variable of average growth rate of each country during the given period and independent variables as shown in 〈Table 1〉, and the result is shown in 〈Table 2〉 and 〈Table 3〉. 〈Table 2〉 shows the result of a regression without the Asian dummy variable. As it is shown in 〈Table 2〉, all the signs of coefficients turn out to be consistent with the hypothesis made above. Moreover, most of the coefficient estimates except the one for inflation rate show strong significance at the level of 1%. From this regression, we can say that a country which had a lower income level in 1970 grew faster than the others, thus there exists a tendency of convergence among different economies. The sign of coefficient for inflation rate is negative as it was expected, but it is not significant statistically. The reason we have statistically insignificant coefficient estimate for inflation is because of

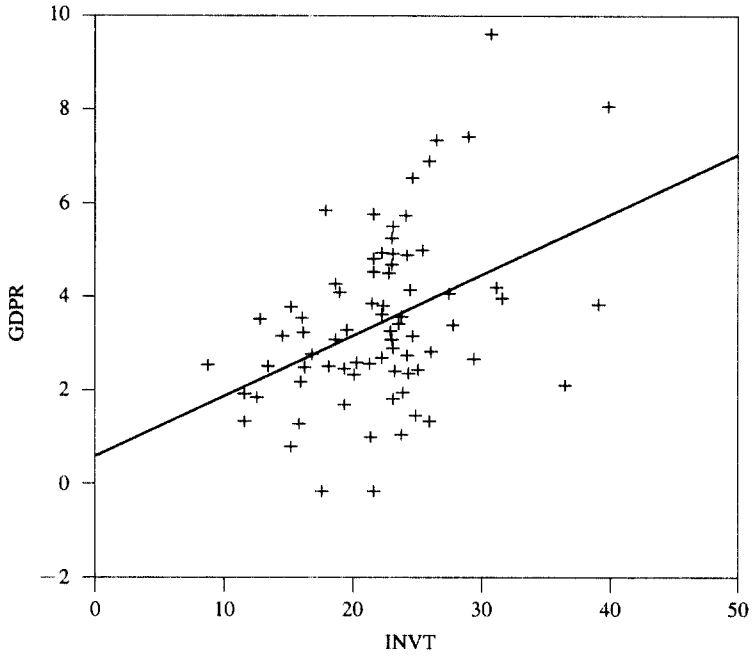
<Figure 1> Relation between Initial GDP per capita and GDP Growth Rates



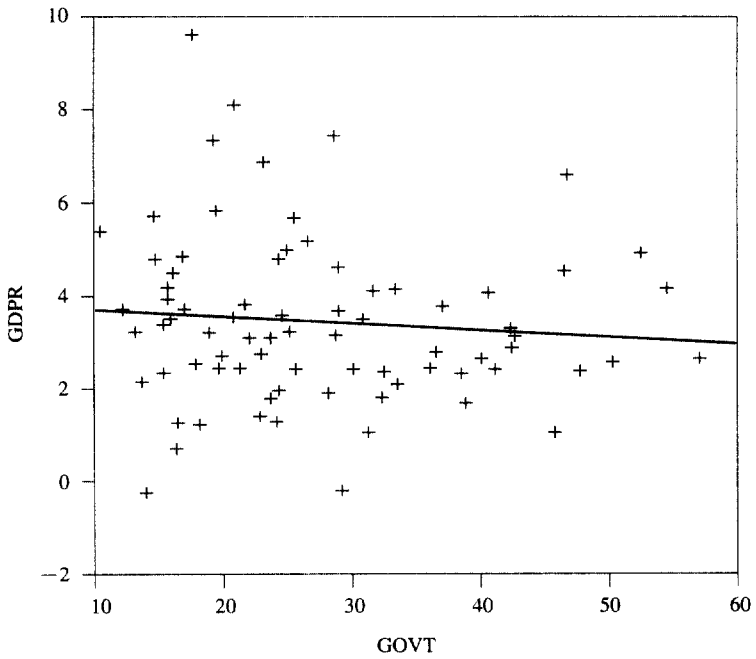
<Figure 2> Relation between Export Growth Rates and GDP Growth Rates



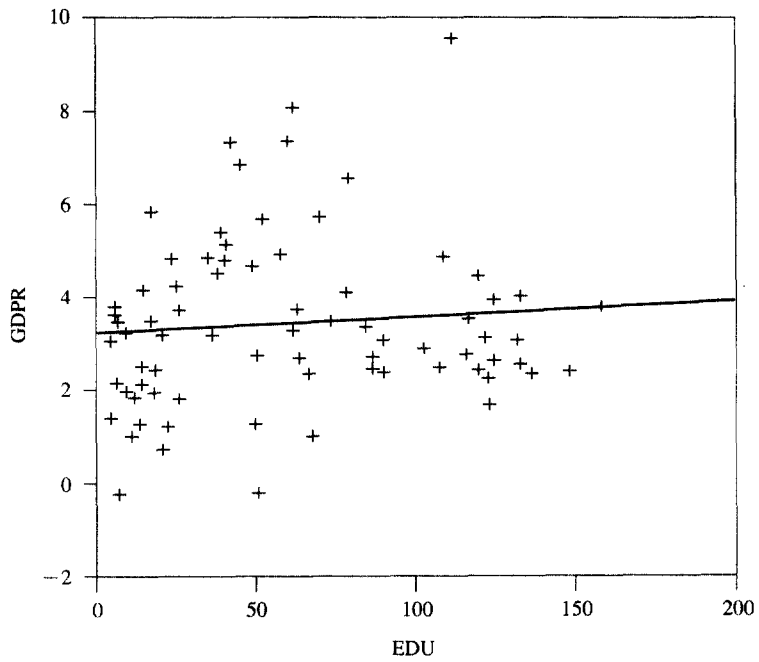
<Figure 3> Relation between Investment Ratios and GDP Growth Rates



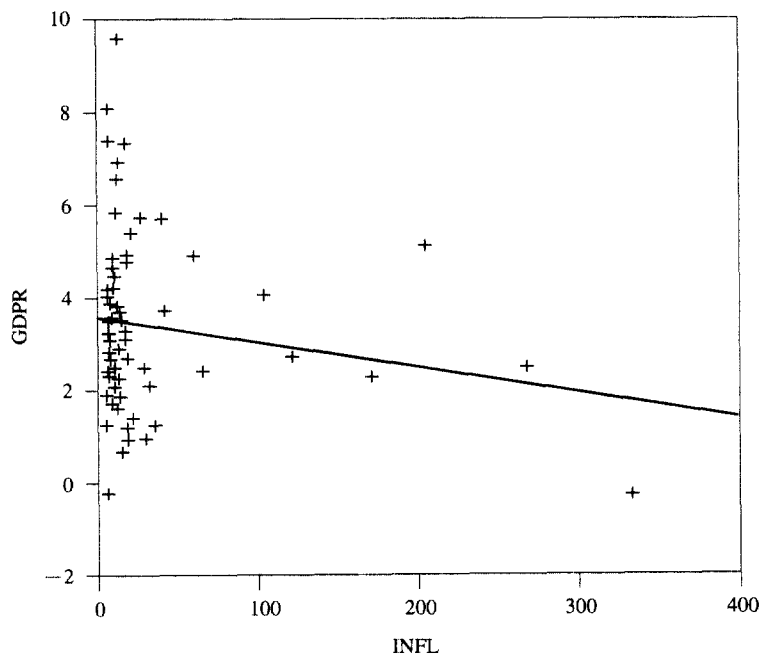
<Figure 4> Relation between Government Expenditure Ratios and GDP Growth Rates



<Figure 5> Relation between Education Levels and GDP Growth Rates



<Figure 6> Relation between Inflation Rates and GDP Growth Rates



〈Table 3〉 Regression with Asian Dummy

Variable	Expected Sign	Coefficient	Std. Error	T-Statistic
C		4.357023	1.329685	3.276733***
LGDP	—	−0.710885	0.276909	−2.567217**
INFL	—	−0.002559	0.002810	−0.910942
INVT	+	0.108617	0.032610	3.330763***
EXPORT	+	0.142850	0.043027	3.320029***
GOVT	—	−0.028659	0.016854	−1.700376
EDU	+	0.018267	0.007747	2.357966**
Asian Dummy	+	0.888663	0.561452	1.582794
n(number of observation)		77		
R-squared		0.510428		
Durbin-Watson stat		1.656685		
F-statistic		10.27705		

the existence of abnormally high inflation rates in several countries. For example, countries like Brazil, Argentina and Nicaragua have average inflation rates higher than 200% during the given period.

The same regression was run with an additional independent variable, the Asian dummy. This dummy takes the value of 1 if the country is located in Asia, and takes the value of 0 otherwise. The result of this regression is shown in 〈Table 3〉. Once again, all the signs of coefficients are consistent with the hypothesis, and most of them are statistically significant. Also, the coefficient for the Asian dummy has a positive value, which is consistent with our hypotheses. Therefore, it can tell us that countries in Asia grew faster than the other countries. The relationship between each variable and average growth rate is depicted in 〈Figure 1〉 to 〈Figure 6〉.

From the above two regressions, it has been found that variables such as investment ratio, export growth rate and education level are important in long-run economic growth. In order to understand rapid economic growth of Asian economies further, five Asian economies are selected to find out how these economies differed from the rest of the world. As it is shown in 〈Table 4〉, the initial level of income in Indonesia, Singapore, South Korea and Malaysia were lower than the world average in 1970, but their growth rates are far higher than the average. Furthermore, the investment ratios and export growth rates of these Asian economies are greater than the average. Also, the government sizes of the selected five Asian economies with an exception of Malaysia

〈Table 4〉 Comparison of Selective Asian Economies with the World Average

Variable	Indonesia	Singapore	Japan	South Korea	Malaysia	World Average
GDPR	7.4	8.1	3.9	9.7	7.4	3.4
LGDP	77.0	916.0	1952.6	272.0	382.2	942.8
INFL	15.0	4.0	5.0	13.0	4.7	28.2
INVT	26.5	40.0	31.8	30.8	28.9	22.2
EXPORT	6.4	7.1	6.8	17.7	8.1	4.4
GOVT	19.5	20.9	15.9	17.6	28.9	27.5
EDU	41.2	69.8	123.9	110.5	57.8	59.4

are smaller than the average. It tells us that smaller government spending helped the Asian economies grow faster than the others. Therefore, it can be said, without losing much generality, that East Asian economies have achieved rapid economic growth rates as they have maintained lower inflation rates, higher investment rates, faster export growth rates, and smaller government sizes than the other economies. However, the overall education level of East Asia is not higher than the world average. Particularly, the relatively low level of school enrollment in Singapore is surprising.

III . Time Lags between Asian Economies

1. The Time Lag in Real GDP per capita between East Asian Economies

Even though East Asian economies are often regarded as similar to each other, there exists significant differences in terms of their income level. In 〈Table 5〉, selected seven Asian economies' real GNP per capita calculated at 1990 US\$ are shown. It shows that the real GNP per capita of South Korea in 1995 is similar to that of Japan in 1976. Thus, it can be said that South Korea lags behind Japan in terms of its real income level almost by nineteen years as of 1995. Similarly, Singapore lags behind Japan by seven years as of 1994, and Taiwan lags behind Japan by 15 years as of 1995.

Based on these calculations, countries are positioned in the order to their real income levels, and the time lags between two countries are stated in 〈Figure 7〉. As it was expected, the diagram in 〈Figure 7〉 is led by Japan, and it is followed by Singapore and Hong Kong. It shows that there still exists considerable time lag between Japan and

〈Table 5〉 Real GNP per capita at 1990 US\$

Year	S. Korea	Japan	Singapore	Taiwan	Hong Kong	China	Malaysia
1972	3009.4	6354.9	3029.3				
1973	3272.7	7522.7	3724.9				
1974	3452.2	6832.5	3921.7				
1975	3015.2	6836.4	4227.5				
1976	3359.8	7069.5	4284.5				
1977	3601.4	8156.0	4572.1				
1978	4058.1	10903.6	5326.4	2756.2			
1979	3990.3	10791.1	6003.0	3006.4			
1980	3109.4	10800.2	6395.6	3164.4			
1981	2899.7	11304.1	6993.6	3212.8			
1982	2850.0	10278	7376.7	3085.6			
1983	2983.7	11008.8	8171.2	3221.0			
1984	3115.4	11386.6	8866.4	3583.8			
1985	3042.1	12044.7	8493.5	3709.1	9311.4	442.4	2201.9
1986	3330.7	17340.6	8480.7	4344.9			
1987	3972.8	20983.3	9387.8	5707.7			
1988	4971.1	24998.5	10671.9	6833.1	11171.5	382.4	2053.2
1989	5725.3	24250.5	12293.3	7913.6	11150.5	372.3	2201.6
1990	5883.0	24436.0	13906.0	8111.0	11540.0	370.0	2340.0
1991	6126.2	27189.8	15205.0	8649.7	12435.9	350.0	2449.0
1992	5982.9	29274.4	17155.8	9704.1	13113.5	432.0	2598.7
1993	6099.4		18524.8	9712.3	14623.1	384.0	2831.4
1994	6543.3		20794.1	10190.6	15497.5	332.9	3034.5
1995	7358.5			10695.3			

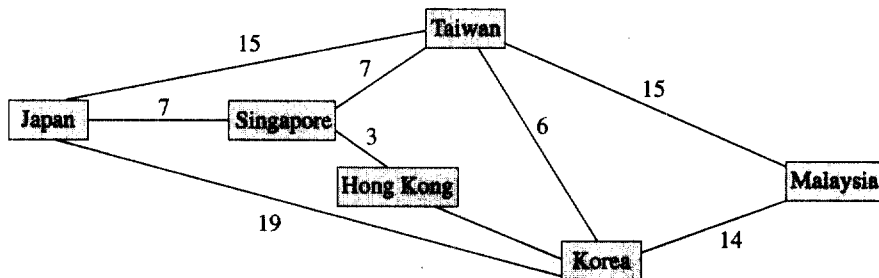
Source : Bank of Korea [13], April 1992, September 1997.

National Statistical Office of Korea [15].

Asian Development Bank [12].

Taiwan (or Korea). Also, country like Malaysia, which is regarded as the most industrialized one in South East Asia, is still lagging far behind Taiwan and Korea in terms of real income. Of course, the 19 year time lag between Japan and Korea does not imply that Korea's real income level will be identical to that of Japan 19 years after today. It simply implies that Korea's real income level of today is similar to that of Japan 19 years ago. Therefore, assuming that Korea can maintain a higher economic growth rate than Japan, it is very likely that Korea's real income level will catch up with Japan's within 19 years.

〈Figure 7〉 Real Income Gap between Asian Economies



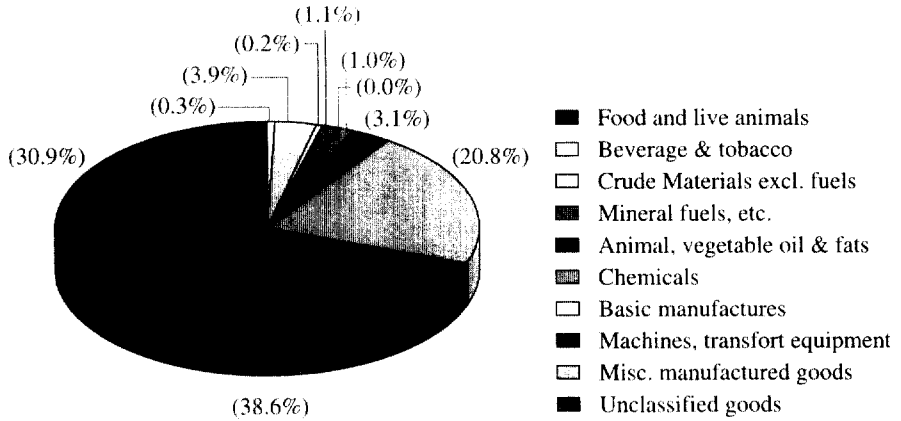
2. The Time Lag in Export Structure between East Asian Economies

Now, the export structures of East Asian economies are compared to each other in order to see how much difference it exists between two economies. Similar study has been tried by Lee and Kim [7], and it found that the trade structure of Korea as of 1990 resembled the trade structure of Japan around 1970, and thus concluded that Korea is lagging behind Japan by 20 years in terms of its trade structure.

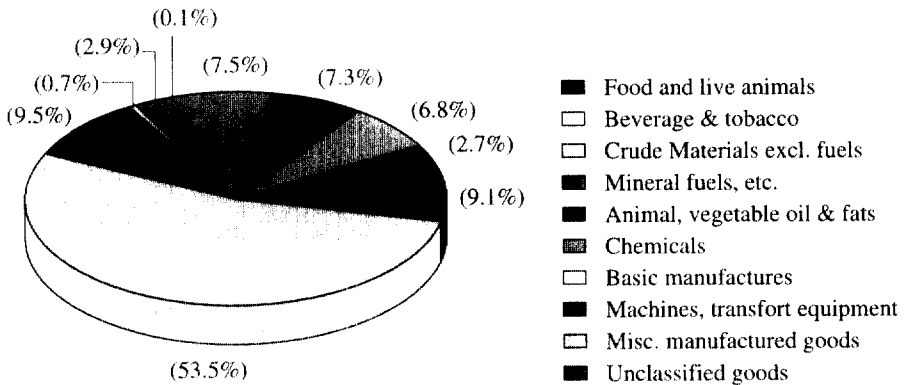
In this paper, South Korea was chosen as a normal country, and the export structure of South Korea was compared to those of Taiwan, China and Malaysia. Using the SITC one-digit data, each country's total export was divided into 10 industries. These 10 industries are food and live animals, beverage and tobacco, crude materials excluding fuels, mineral fuels, animal vegetable oil and fats, chemicals, basic manufactures, machines and transport equipment, miscellaneous manufactured goods, and unclassified goods. Afterward, each industry was ranked according to the magnitude of the export volume, and these ranks are compared between two countries. For example, in 1995, machines and transport equipment industry was ranked as 1, and basic manufactures industry was ranked as 2 in Korea. Comparing these ranks between two countries by calculating rank correlation, it was found that Korea's export structure as of 1995 resembles most to the Taiwanese export structure of 1995. Also, Malaysia's export structure of 1994 resembles most to the Korean export structure of 1988, and China's export structure of 1995 resembles most to the Korean export structure of 1979.

<Figure 8> Export Structure of Korea and Malaysia

S. Korea(1988)

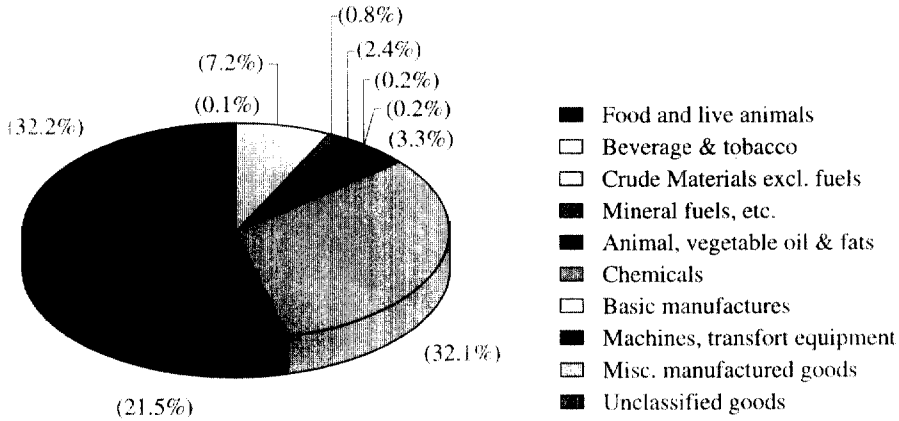


Malaysia(1994)

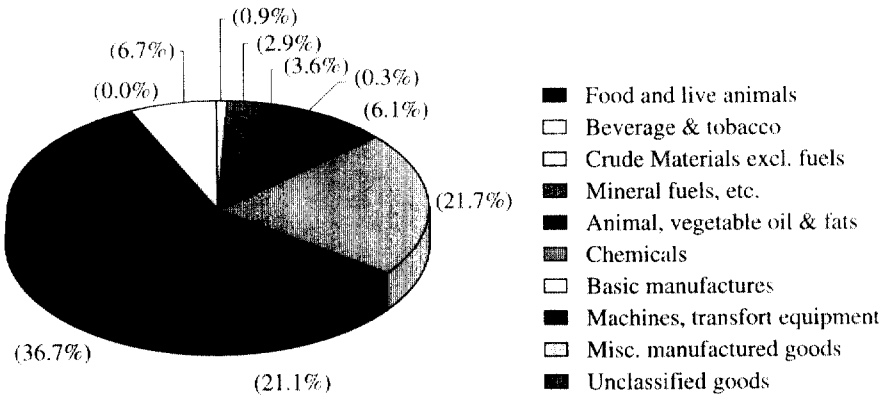


<Figure 9> Export Structure of Korea and China

S.Korea(1979)

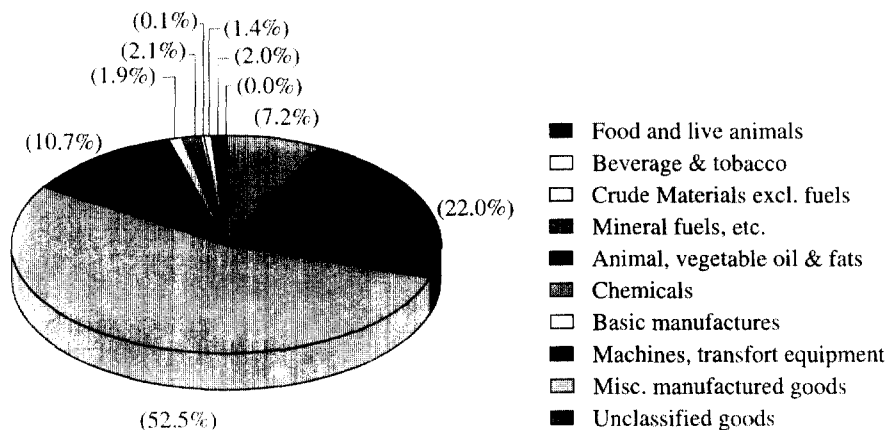


China(1995)

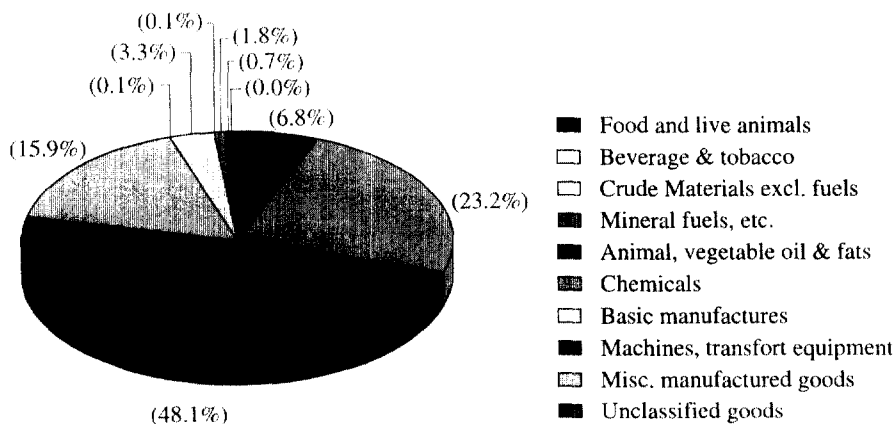


<Figure 10> Export Structure of Korea and Taipei

S.Korea(1995)



Taipei(1995)



Therefore, it can be said that Malaysia and China lag behind Korea in terms of their export structures by 6 years and 16 years respectively. Unlike the substantial time gap that exists between more advanced economies and less advanced economies in terms of real income, the difference of export structures between two economies in East Asia is not that great. This finding coincides with Lee and Kim [7], and also coincides with Krueger [5]. Graphical illustration of each country's export structure is shown in <Figure 8> to <Figure 10>.

IV. Concluding Remarks

This paper tries to explain the rapid economic growth of East Asian economies. In section two, a regression was run to find out the macroeconomic determinants of long run economic growth, using the cross-country data of 77 economies from 1970 to 1992. The result of this regression coincides with the hypotheses with strong statistical significance. Finding key factors that affect long-run economic growth rate, selected East Asian economies are compared to the world average in terms of these key factors. From this comparison, it was found that Asian economies had achieved rapid economic growth rates through high investment and export growth with relatively stable inflation and smaller government sizes. In particular, the educational achievement level of these selected Asian economies was higher than that of the world average. In section three, calculations of time gap between two economies in East Asia are tried. In terms of real income, it is found that there still exists substantial time gap between economies. However, in terms of export structure, the time gap between economies is not that great.

In order to elaborate the contents of this paper, the following future study can be suggested. If more cross-country data are available, the regression in section two can include more countries, and thus enhance its explanatory power. Also, a more detailed export data (for example, SITC two-digit level or three-digit level data) will enable the calculation of time lag between two economies in terms of their export structure more accurate.

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