# Korea and Japan: Some Crucial
# Structural Differences

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## I. Introduction

Korean economic growth is often compared to Japanese growth. Many even believe that Korea's recent economic success is not only patterened after Japan's, but Korea indeed appears to be the Japan of a decade or so ago (Kim and Roemer (1979), Kellman (1980), Song (1981), KDI (1975), Blumenthal and Lee (1983), Yamazawa and Kirata (1978)).

It is true that the two Far Eastern neighbors share similarities in many respects. Their economic growth rates were among the highest in the world in the 1960s and 1970s. Both have strong economic and political ties with the U.S. which are under the same umbrella of the U.S. Far East security policy. Both countries also benefited substantially from the wars that the U.S. was once involved in. Both elected to pursue the outward-looking, export-led economic growth, and both have been remarkably successful. Both chose a form of directed capitalism; that is, the role of government was important in economic growth, yet they are basically market-oriented capitalistic economies. The two are poorly endowed with natural resources, but due to their long Confucian tradition and their peoples' achievement-oriented traits, they both are endowed with an abundant supply of good-quality labor with sound workmanship, adaptability, and industry.

There are, however, as many differences as there are similarities between the two. Korea is divided into two parts, North and South, each exerting heavy military pressures on each other, which demands a tremendous defense burden; whereas Japan has long been a unified nation with no internal political turmoil or external threat in recent years. Therefore, Japan has spent little for its national defense. Korea's economic plans and

decision are made by its strong central government, while governmental economic interventions in Japan are somewhat indirect and concentrated on certain areas. Also the perception of success in the two societies are quite different: an individual's achievement is highly credited in the Korean society, whereas team-efforts are more important in Japan (Elliot and Yoo (1978)). Considering these differences and others that we will discuss later existing deep in the economic structures of the two countries, one could also make an argument that Korea's economic growth may have its roots in some different economic conditions which might not be seen in the history of the Japanese enonomic development.

This study has three-fold objectives; first, using Japan's and Korea's time series data, it attempts to identify both the similarities and dissimilarities in economic changes of the two countries over the past three decades. Second, it introduces into the macromodels some of those new important dissimilarity factors found from the time series comparisons.

Third, in addition to such dissimilarity factors, this study attempts to incorporate risk and uncertainty factors into the macromodel. The reason for this is that economic growth or the pattern of development should be characterized by a society's long run expectations which would depend, to a large extent, upon the externality conditions such as socio-political and institutional environments.

In Section II, various economic conditions are discussed first. The two countries began their economic growth in modern times with different initial conditions. Also, the two have their own social environment, that is, different risks and uncertainties prevailing in the economy. Their aggregate demands, international trade environments, and others are briefly discussed.

In Section III, this study then attempts to identify both similarities and differences between the two countries in terms of real GNP growth, savings, investment, exports, imports, agriculture, along with some policy aspects, that is, fiscal and monetary policies. For this purpose, time series data of the two countries will be used to estimate the annual average rate of change. Then, in Section IV, various macromodels of different sectors are estimated to investigate why some of these differences, if any, should have come about.

## II. Different Economic Conditions

### 1. Initial Conditions

Perhaps the most distinctive differences in economic conditions, among

others, is in that the two countries were different in their initial conditions at the beginning stage of development. After World War II, Japan was still left as one unified nation under a strong administrative control by General MacArthur, the Supreme Commander of the Allied Forces. Rapid democratization and economic reform were conducted by the new system that enabled the new government to stand strong on the autonomy and on the sovereignty of the people, granted with fundamental human rights. From the war-ridden, war-destroyed industrial structure, Japan still could mobilize the production resources effectively, such as the technological know-how which it had accumulated during the war. The human resources before the war were readily available again as it began the reconstructional programs.

While Japan was undergoing rapid reconstruction and development programs in the early 1950s, Korea was under a total disaster in the wake of the Korean War. In 1952, the United Nations formed an agency, called UNKRA (United Nations Korea Reconstruction Agency), to help with a postwar reconstruction program, and it laid out the so-called Nathan Five-Year Plan. This plan was poorly designed due to a lack of knowledge about Korean politics and the failure to receive cooperation from the Korean government. Rejecting the idea of the Nathan Program, the Rhee regime came up with its own independent national planning in 1955. This administrative conflict and disharmony made it extremely hard, if not impossible, to conduct a comprehensive, well-concerted development program.

A more fundamental problem was the uncertain security of the nation due to a confrontation between the South and the North. Even today there exists extremely acute military tension and hostility at the 155 mile-long Demilitarized Zone (DMZ) on the Korean Peninsula. In no time since World War II did Japan experience this tension, hostility, or uncertainty due to a conflict with other neighboring nations.

In addition to different administrative effectiveness and national security, the governments' roles were different at the early stage of development. The Japanese government was primarily responsible for planning various economic development programs and steering the private sector's economic activities toward the planned goals only by providing economic incentives such as low interest rate, a stable exchange rate, and other favorable price conditions. In contrast; the role of the Korean government during the early period of development was much more directive. That is, the government was willing to "get involved" in making some crucial managerial decisions which were supposedly made by private entrepreneurs. The government set the targets and pushed the private firms

to meet them within a given time frame. This approach was particularly salient during the Park regime. That is, the military government's administrative philosophy consisted of three elements: first, setting absolute targets and adjusting institutions to meet the targets; second, a quick replacement of inappropriate means with alternative ones whenever necessary; and third, a readiness to expand institutions to facilitate new business activities to meet the objectives. This strong "managerial approach" was fairly well accepted by the Korean people, because the most urgent task for the nation to undertake in the 1950s and early in the 1960s was to catch up quickly with North Korea in the areas of industrial development and national defense. So, one may say that Korea has never had a luxury of independence such as Japan had in the stability during the MacArthur period.

## 2. Risk and Uncertainties.

From the 1950s to the 1970s, Korea has undergone four revolutions; the student's revolution in 1960, the military coup d'etat in 1961, the Yushin Reformation in 1972, and the formation of the 5th Republic in 1980. In addition to the Korean War, these political and social turmoils built up enormous uncertainties and insecurities in the peoples' minds. While Japan benefited from the Korean War by exporting a huge amount of raw material to Korea, from the early 1960s the latter was suffering from social disruptions and fear about its uncertain future. Not to mention the war the hostile confrontation against the North, the socio-political instabilities created the fear in the Korean peoples' psychology which strongly influenced economic decision making in the private sector.

The unstable state of mind formed the following three distinctive characteristics in the Korean economy; first, having experienced unexpected socio-political or socio-economic changes so often, so many times, the nation's attitude toward the future is highly myopic in Korea. That is, the time preference factor is very large. This can be found in the fact that Korea's average propensity to save in the period of 1953-1981 is merely 0.09; whereas Japan's propensity to save is over 0.30 during the same period. Another factual finding which also witnesses Korea's myopic attitude is that financial intermediaries seldom make long-term commitments. The average length of time a consumer loan was made for in the period of 1953-1981 was seven years, whereas Japan's average loan period was about 20 years. Second, Korea's general national mood can also be described as "impetuous." In every sector of the economy, one may see the general sentiment such as "we must grow to survive." This impetuosity has apparently been the source of driving energy of the Korean economy.

However, it has often caused misjudgment of international market conditions, and thereby resulting in the bankruptcies of some large corporations.

In contrast, the Japanese did not have any compelling reason for hasty growth. Its technological level was not far behind the western countries after World War II and its social stability in the foreseeable future was virtually guaranteed by the Allied Forces.

Third, although it was initiated by the government, Korea attempted to diversify its risk and uncertainty by inviting foreign loans and foreign direct investment. In a model of optimizing the intertemporal utility and production, one can easily identify the behavior of Korean industries that, confronted with a risk-increasing situation, tried to diversify the sources of capital formation via attracting foreign savings. This is analogous to the case of group insurance in which the members of insurance "average out" risk and uncertainties among the members. On the other hand, the Japanese government regarded foreign sources of capital as foreigners' intrusion upon the domestic business opportunities, and thereby, Japan's foreign capital inflows were relatively small amounts. During the period of 1962-76, Korea invited an amount of US $954 million, whereas Japan received only US $696 million during the comparable period of 1955-65, the early stage of Japan's economic recovery.

## 3. Aggregate Demand

Japan and Korea are different in size. In 1954, Japan's population was 88 million, whereas South Korea had only 21 million, a little less than a quarter of Japan's. In 1981, Korea's population grew to a third of Japan's, but still remained as one of Japan's small neighbors. With the population of close to 100 million, Japan was able to achieve its industrial development directing toward the domestic market at the beginning stage of its economic growth. Korea's aggregate demand in the domestic economy, however, is extremely low partly because of its lower per-capita income level and partly because of its smaller population size. The lack of aggregate demand in the domestic economy in Korea was a constraint for many industries attempting to achieve economies of scale. It was therefore imperative for Korea to look outward for markets in the rest of the world much more aggressively than Japan did. This is demonstrated by the rate of change in exports. During the period of 1954-1981, Japan's exports grew at the annual rate of 14.9 percent, while Korea's rate of growth of exports was 29.9 percent. Taking the early stages of the two countries, Japan showed 10.7 percent in 1954-1963; whereas, Korea showed 33.8 percent in the period of 1964-1973. One study shows the relative contribution of domestic

demand and exports to growth in Japan and Korea (Aoki and Inada (1980)). During the period of 1960-1965, Japan's domestic demand accounted for 55.2 percent of economic growth and exports accounted for 23.5 percent. In sharp contrast, Korea's domestic demand contributed to economic growth by 17.8 percent and exports by 53.5 percent in the period of 1970-1975.

## 4. Defense Spending

As pointed out earlier, Korea inherited from World War II a vacuum of modern technologies and a divided country; whereas Japan was under the care of the Allied Forces with a rapid democratization and economic reform. Having its hostile neighbor, North Korea, and having had the experience of war, South Korea was destined to build up and maintain a strong defense. Data shows that Korea's defense spending during the post-Korean War period reached as high as 9.5 percent of GNP (in 1956) and 47 percent of total government expenditures (in 1954) and 16 percent (in 1974), respectively. Given a limited amount of resources large defense spendings of Korea made the efficient allocation of resources extremely difficult, leaving other industries under the heavy pressure of shortages of resources (Lim (1983)). Japan's defense spendings in the recent years (1960's to 1980's) have never exceeded one percent of GNP which appeared to be no significant deterring factor to economic growth.

## 5. International Trade Environment

Japan's exports to the rest of the world took off in the latter 1950's when there were only a handful of industrialized countries active in the international markets. There were neither protectionistic sentiments nor the world resource crisis of shortages. On the contrary, by the time Korea's exports started entering its take-off stage, that is, in the early 1970's, the international market conditions had already changed considerably. World's resource prices had gone up tremendously and some major trade partners began to use their protectionistic measures. The world trade index clearly shows that the rate of increase in trade volume had significantly declined from the early 1970s. In other words, Japan had already enjoyed very favorable world economic conditions in the 1950s and 1960s to become a superior figure in the international market; whereas Korea was facing tough competition as well as various trade barriers in spite of its hard efforts to expand economic relationships world wide.

# III.  Time-Series Comparisons

It is not easy to compare one country's time series data with another because the pattern of economic fluctuations could have been caused by different structural changes which are unique in each country. In this section, we analyze annual data of major macro variables of the two countries collected in the period of 1954-81. Before we present some "theoretical" macro relationships, an attempt was made to analyze the changing patterns of the macro variables over time, expecting that they will suggest roughly the speed of changes as well as various inflection points of economic activities.

In order to accomplish this comparability goal over time, the autoregressive integrated moving average (Box-Jenkins method) was

[Table 1] Rates of Change in Various Macro Variables

| Variables | Whole Period (1954-81) | | | Early Stage of Rapid Growth | | |
|---|---|---|---|---|---|---|
| | Japan | Korea | Difference (J-K) | Japan (1954-63) | Korea (1964-73) | Difference (J-K) |
| Real GNP Per capita | 0.078 | 0.059 | 0.019 | 0.089 | 0.093 | -0.004 |
| Real GNP | 0.068 | 0.052 | 0.016 | 0.079 | 0.065 | 0.014 |
| Real Consumption | 0.078 | 0.059 | 0.019 | 0.068 | 0.067 | 0.001 |
| Per capita real Consumption | 0.067 | 0.037 | 0.030 | 0.058 | 0.047 | 0.011 |
| Private Investment | 0.088 | 0.117 | -0.029 | 0.147 | 0.148 | -0.001 |
| Public Investment | 0.095 | 0.095 | 0.000 | 0.128 | 0.079 | 0.058 |
| Government Spending | 0.079 | 0.076 | 0.003 | 0.065 | 0.101 | -0.036 |
| *Exports | 0.149 | 0.299 | -0.150 | 0.107 | 0.338 | -0.231 |
| *Imports | 0.147 | 0.182 | -0.035 | 0.122 | 0.251 | -0.129 |
| Tax | 0.084 | 0.103 | -0.019 | 0.091 | 0.138 | -0.047 |
| Defense Spending | 0.053 | 0.078 | -0.025 | -0.017 | 0.106 | -0.123 |
| Capital Stock | 0.101 | 0.096 | -0.005 | 0.061 | 0.105 | -0.044 |
| GNP Deflator | 0.053 | 0.167 | -0.114 | 0.043 | 0.138 | -0.095 |

*The rates of change of these items were computed in current prices. Others are all in real terms.

[Table 2a] Structural Changes in the Two Economies: 1954-81

|  | Japan | | Korea | |
|  | 1954 | 1981 | 1954 | 1981 |
| --- | --- | --- | --- | --- |
| Export/GNP | 0.11 | 0.17 | 0.01 | 0.26 |
| Import/GNP | 0.11 | 0.16 | 0.08 | 0.41 |
| Agriculture/GNP | 0.18 | 0.04 | 0.49 | 0.17 |
| Pr. Inv/GNP | 0.14 | 0.21 | 0.10 | 0.26 |
| GNP/Pop. | $245.1 | $9694.9 | $149.6 | $1682.0 |
| (in log scale) | (7.8) | (9.2) | (5.0) | (7.43) |
| Wage Rate/Mo. | $77.6 | $1035.0 | $2.6 | $252.0 |
| (in log scale) | (4.35) | (6.94) | (0.96) | (5.53) |

[Table 2b] Structural Changes in the Two Economies: (In Early Stage of Rapid Growth)

|  | Japan | | Korea | |
|  | 1954 | 1963 | 1964 | 1973 |
| --- | --- | --- | --- | --- |
| Export/GNP | 0.11 | 0.09 | 0.04 | 0.24* |
| Agriculture/GNP | 0.15 | 0.09 | 0.47 | 0.25* |
| Pr. Inv/GNP | 0.14 | 0.27 | 0.14 | 0.25 |
| Import/GNP | 0.11 | 0.11 | 0.23 | 0.32* |
| Per Cap GNP | $245.8 | $735.3 | $100.2 | $397.5 |
| (in log scale) | (5.5) | (6.6) | (4.6) | (6.0) |
| Wage Rate/Mo. | $77.6 | $131.6 | $6.0 | $32.0 |
| (in log scale) | (4.4) | (4.9) | (1.8) | (3.5) |

employed. This method is often used before formulating forecasting models. However, it serves our purpose as well because it answers some of the questions raised above, that is, different (and often irregular and unnecessary) fluctuations in two countries are smoothed out so that they can be compared on the more comparable ground.

The following table shows the rates of change in various macro variables (in real terms in applicable) in the two countries in different periods.

During the whole observation period (1954-1981), the increases in real GNP and consumption spendings are much faster in Japan than in Korea. However, the rates of increase are higher in Korea in terms of private investment, taxes, defense spendings, exports and imports, and the general price level. Korea's inflation rate is more than three times higher than Japan's in all times during this period.

Characterizing the pattern of economic changes of Japan and Korea solely from the time-series analysis of the whole observation period, we may
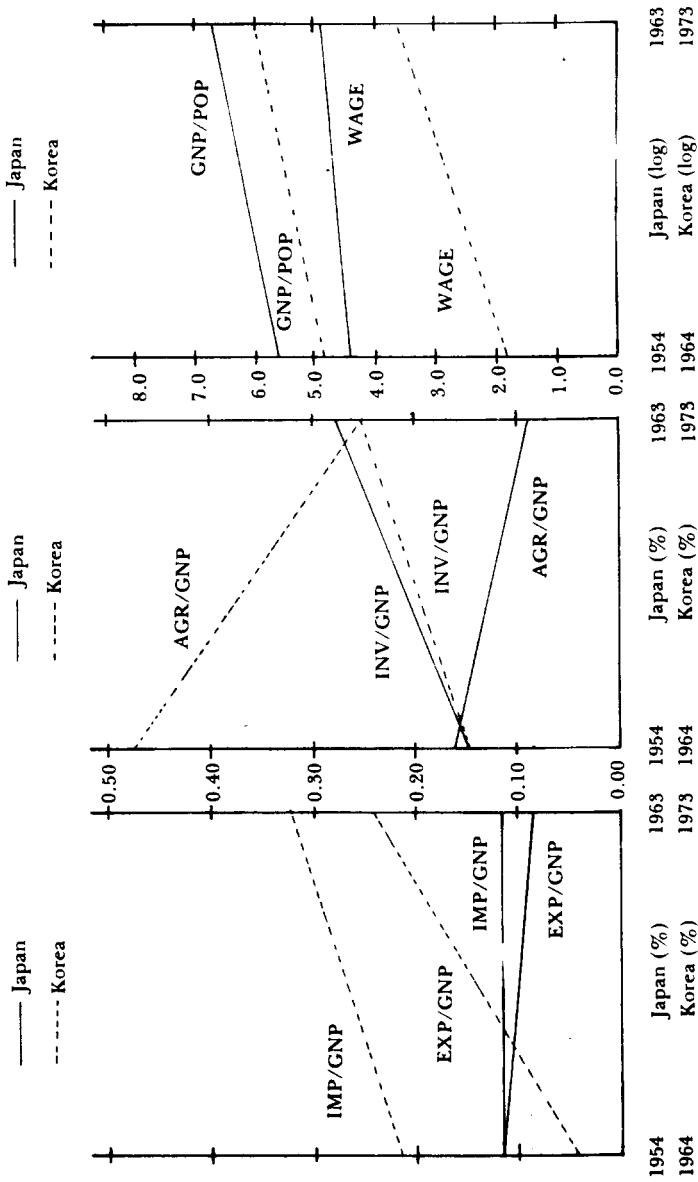
[Fig. 1] Changing Patterns of Major Macro Variables

conjecture that the Japanese economy had been led by strong consumption almost equally in both the demestic and the international economy; whereas the Korean economy has depended heavily upon the international demand. The rate of growth in defense spending is much higher in Korea than in Japan.

In order to compare the two economies during a comparable period of economic growth, we chose 1954-1963 for Japan and 1964-1973 for Korea. There are three reasons for selecting these periods in particular.

First, being much benefited from the Korean War, the Japanese economy started booming and adopted to the concept of a free-enterprise and competitive economy in the early 1950s. There was also a national consensus that government leadership was absolutely necessary for the economic recovery and thereby formal economic development planning by government was essential. From the early 1950s to the early 1960s, the Japanese economy laid its basic capitalistic foundation by forming a "Japanese" free market system which later connected to formation of Zaibutsu enterprises. The stronger role of government, together with the emergence of Zaibatsu enterprises characterized the basic structure for rapid growth of Japan (Morishima 1982)).

This foundation-building occurred in the early 1960s in Korea. Following the military coup d'etat in 1961, the Park regime launched the first five-year economic development program. Outward-looking, aggressive, and structural-reforming programs were begun. Three years later, Korea participated in the Vietnam War which enabled Korea to export a considerable amount of war-related materials to that country. Many companies grew into super business entities such as construction conglomerates, transportation enterprises, an heavy-chemical industries.

Another reason for juxtaposing Japan's 1954-1963 with Korea's 1964-1973 is that the portion of exports in GNP was very similar in the two countries during these periods. Taking the average annual percentage figure of export to GNP, Japan had 11.0 percent and Korea had 10.3 percent. They are indeed the periods in which the two countries began aggressive outward looking export promotions.

Per capita incomes in U.S. dollars are also comparable if not perfectly the same between the two in these periods. Figure I shows the time series patterns of per-capita GNP and other values of the two countries during these comparable periods.

From analyzing the time series data of some major macro variables, one may conjecture that (1) both countries have shown rapid growth rates of real GNP and other related expenditure variables, but Japan seems to exceed Korea except in Korea's early stage of growth (1964-1973); (2) The

dependency of growth on exports appears much higher in Korea than in Japan; (3) the government's influence in terms of the rates of increase in tax and spendings is heavier in Korea than in Japan; (4) defense spendings in particular are much heavier in Korea than in Japan, which is not difficult to understand; (5) Korea has grown in the midst of higher inflation; whereas Japan has grown in the stable price conditions.

The above comparisons only give us a rough sketch of where our analytical spotlight should be focused on. It is needless to say from the above "crude" comparison that the structural conditions in the two economies are very much contrasting. In the next section, some macromodels will be used to illuminate those structural differences and test the major hypothesis constructed earlier in various places of Sections II and III.

# IV. Macro–models

Since our analytical interest is focused on the structurally distinctive features of the two economies in order to test the hypothesis of whether or not one is modelled after another, as often believed, a simplified, annual and long-run model can be used to fulfill these comparative objectives. Klein-Shinkai's 1963 model[1] seems to fit our needs in that it specified five major macro-sectors (consumer, business, labor, money, international) and equations were estimated by annual data. It also attempted to isolate both the changing and the stable characteristics of the Japanese structure in the period 1930-1958 (29 years), which matches the analytical needs of this study fairly well. The model is also adequate for the Korean economy because it clearly picks up some of the special aspects in export-import activities and such relations as the capital-output ratio and the labor productivity.

For the estimation of various equations, we used time series data covering 1954-1981. Some equations were estimated by the Cochran-Orcutt Method to eliminate the autocorrelations. The data sources are specified in the attached list.

## 1. Consumption

Two specifications were tested for consumption: one equation without

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1. Klein-Shinkai (1963) is Kosobud & Minami ed. *Econometric Studies of Japan* (1977). The model specifications are modified especially for the export-import functions in the light of Yoo's (1982) *Preliminary Report of A Macro-model of the Korean Economy* to the National Science Foundation.

the non-wage income/wage income ratio, the other with it. From the first specification, Korea's short-run marginal propensity to consume in the logarithmic scale (0.466) is higher than Japan's (0.389), and the long run marginal propensity to consume is also larger in Korea (0.732) than in Japan (0.469). Using the second specification, the difference stays unchanged; that is, in the short run, Korea has 0.510 while Japan has 0.353. In the long run, Korea's MPC is 0.797, whereas Japan's is 0.549.

The effect of the ratio of non-wage income to wage income on consumption is negative and significant in Japan but not significant in Korea. This may imply that income distribution plays an important role in determining Japan's consumption, but not necessarily in Korea's. That is the Korean society appeared to be much more consumption oriented, rich or poor, than Japan.

## 2. Saving

The saving function is supposedly the other side of the coin of consumption. Thus, having estimated the consumption function, one does not have to estimate saving separately, if the model is based upon the Keynesian system. However, in order to capture the interest rate elasticity of saving and the consumer's view of the socio-economic stability, a neoclassical type of saving function was attempted. The estimation shows that, first, savings in both countries are highly inelastic with respect to the interest rate,[2] but elastic with respect to per capita income. One notable difference is that a risk and uncertainty factor plays a significantly negative role in Korea. As a surrogate index of risk and uncertainty, we used the Socio-Political Instability Index (SPI) estimated by some Yale University investigators.[3] In Korea, particularly, social instability exerts a negative impact on the per capita saving, implying that one of the reasons for a low average propensity to save in Korea is evidently the social (or economic) risk and uncertainty. In a year of major social disruptions, per capita saving went down on average by as much as 0.4 in the logarithmic scale. The energy crisis variable (dummy) appears to be highly significant in Japan's saving function.

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2. Japan's savings has been known to stay high regardless of the interest rate. Saving in Korea are also irresponsive to the interest rate, so the government at one time raised the deposit interest rate even above the loan rate in early 1960s, which showed some successful results.

3. For details of this data, see Taylor and Hudson (1972). This index was also used in other comparative studies, e.g. Venieris and Gupta (1983).

## 3. Investment

The estimation of the investment function was perhaps the most confusing in the model used here. Net private investment per unit of capital ($I_{pr}/K$) was regressed on to the capital income/capital stock ratio ($P_k/K$), the interest rate,[4] the defense spending/capital stock ratio (DEF/K), and a set of dummy variables. The estimation consistently showed a negative sign for $P_k/K$, and a positive sign for interest rate (i) in both countries. It was thereby conjectured that $P_k/K$ in the Klein-Shinkai Model seemed to be about the same as the opportunity cost of investment because $P_k = iK$. Adding the coefficients of $P_k/K$ and i together, however, an interesting result came about, that is, both countries' elasticities are less than one and Korea's elasticity was consistently much lower than that of Japan. The second significant finding is that the defense variable (DEF/K) influences private investment negatively in Korea, but the same is strongly positive in Japan. It is not intuitively clear how and why DEF/K has a positive sign in the Japanese investment function, but it seems obvious that Korea's resource allocation was very much constrained (or even distorted) due to its heavy defense spending burden. One more point is notable from the estimation of the investment function is that as in the saving case, Korea's socio-political index clearly shows a negative sign, whereas in Japan's case, the energy crisis significantly shifted down the private investment function, possibly indicating that industrial expansion was done much more cautiously since the first energy crisis.

## 4. Export and Import

The export function includes the world trade index and the relative price i.e., the index of world export prices divided by the index of Japanese (or Korean) export prices.[5] It has been discovered that Korea is elastic to changes in the world trade while Japan is inelastic. One may say from this that Korea's exports are much more vulnerable to a shift in the world's trade environments. This signals an extremely important constraint that Korea had to confront in the past, and will have to deal with in years to come. If exports have been highly responsive to the world's trade condi-

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4. We used as the interest rate data the loan rate of major city banks for Korea, and the government bond yield rate (estimated by the author for earlier years) for Japan.

5. In the estimation, the U.S. dollar exchange rates were used. It is well known that the exchange rate does not necessarily reflect the relative price, particularly in those countries where the rates are controlled by governments such as Korea and Japan. However, it is an important determinant for the exporters to quote their prices to foreign buyers. Though recognizing this biasedness in the process of the conversion to U.S. dollars, the official exchange rates were used as an approximation.

tions, then Korea's engine for growth would be severely damaged and thereby, the whole economy would have to experience a tremendous change.

On the import side, both Japan and Korea are equally inelastic to the world's trade index, and the income elasticities are also very low. This indicates that the two countries share similarities in import restrictions and strong export promotions.

## 5. Aggregate Production

The Cobb-Douglas Function was used to estimate the technical relationship between real GNP and factors of production. The summations of the coefficients for labor and capital are 3.247 and 1.175 in Japan and in Korea, respectively, which seems to indicate that the returns to scale of production factors are much higher in Japan than in Korea. The relative marginal productivity between labor and capital are also contrasting. In Japan, the ratio measured by labor's coefficient divided by capital's coefficient is 13.06 whereas in Korea it is over 25.0, about twice of Japan. This indicates that, relatively speaking, the marginal contribution of labor to output is more important in Korea than in Japan. In the period of 1954-81, Korea's economic growth depended very much upon the contribution of labor indeed, while Japan's growth was attributed much to the capital productivity. In no period was Japan's growth caused by the labor intensive industries compared to Korea. It is not surprising because Japan's domestic investment was constantly growing in this period, that is, the investment/GNP ratio was increasing from 10.3 percent (1955), 15.8 percent (1965), to 18.5 percent (1973). It was indeed much more capital-intensive than the Korean economy.

## 6. Agricultural Sector

No attempt was made in this study to estimate the production functions of the agricultural industry specifically because this sector still heavily depends upon natural conditions (weather, rainfalls, etc.) in the two countries, and both countries exercise heavy protectionistic measures against imports of agricultural goods. There are more similarities than differences between the two countries in this sector. For example, the share of agricultural output in real GNP was rapidly decreasing in both countries. As Table 2b and Figure 1 demonstrate, Japan's Agr/GNP fell from 0.15 in 1954 to 0.09 in 1963, and Korea's Agr/GNP also fell from 0.47 (1964) to 0.25 (1973). There is one significant difference between the two, however. As Anderson (1982) pointed out, agricultural protection has been much

greater in its degree in Japan than in Korea in the period of 1955-1979. Using the ratio of domestic prices to border prices of various agricultural products, Japan's ratio was significantly higher than the same of Korea. It is not so surprising to see that this analysis also confirms the well-recognized fact that Japan's agriculture is one of the most protected industries in the world.

## 7. Monetary Sector

The money demand and the money supply functions were estimated for both countries, and one of the most notable distinctions was that Korea's money demand equation kept on showing either an insignificant or a strange positive relationship with the interest rate while the Japanese money demand equation did show a negative and significant relationship. It seems that the Korean monetary sector experienced something similar to what Japan experienced in the pre-war period; due to rapidly changing economic conditions and uncertainties, the propensity to hold liquid assets was high regardless of its opportunity costs. The impact of inflation on the money demand is negative and significant in both countries, although Korea's elasticity appears to be somewhat greater.

It is also estimated that the rate of the money supply in Korea was substantially higher (13 percent) than in Japan (9 percent). The rate was much higher in Korea (22.2 percent) than in Japan (14 percent) during the comparable period of economic growth, that is, Korea's 1964-73 vis-a-vis Japan's 1954-63. It is confirmed once again that Japan's development strategy seemed to have been a rapid growth in the stable monetary and price conditions, whereas Korea has grown in the midst of high inflation which should have been at least partly caused by expansionary monetary policy.

## 8. Growth and Constraints

Finally, one more equation was estimated which is not a part of the aggregate model but an equation used for checking the relationships between the growth rate and the exogenous conditions, along with the availability of resources for economic growth. Numerous factors could explain the exogenous conditions of the two economies. However, in this comparative study, two representative factors were explicitly chosen to represent the domestic constraints and the international conditions. The former is a variable indicating the defense burden and the latter is a variable related to foreign capital flows.

The real GNP growth rate was regressed on to the ratio of defense spen-

dings to real GNP (DEF/$Y_R$) and to the ratio of foreign savings to real GNP (FS/$Y_R$). The incremental output-capital ratio was also included as an explanatory variable in the Harrod-Dommar's capital-augmented growth model (Lim (1983) and Benoit (1978)).

It turned out to be apparent that Korea's defense spendings are a very significant draw-back factor working against economic growth. Two variations (i.e., DEF/GS and DEF/$Y_R$) were used, but they invariably demonstrated a strong negative effect on growth. On the contrary, Japan's defense spendings showed either insignificant relationship to economic growth, or surprisingly showed a positive relationship, if significant. That is, defense spendings, though not very large, appear growth-complementing rather than input-consuming in the Japanese economy.

The ratio of foreign savings to real GNP showed the opposite signs both in Korea's growth equation and Japan's. Its sign was expected positive in Korea, considering that the contribution of foreign capital inflow to the Korean economic growth was significant. It was expected to be negative or insignificant in Japan because the Japanese industries have traditionally been reluctant to receive foreign capital investment. However, the estimation results showed that the former was negative and the latter positive. One possible explanation for this would be that (1) foreign savings (aids, loans) may be a contributing factor in the short run, but they become a burden in the long run because they may substitute domestic capital formation, and at the same time, create debtservicing problems, and (2) in the Japanese case, most of foreign savings are not aids or loans but foreigners' payables to Japanese exporters.

## V. Implications and Conclusions

What good does it do to compare the Japanese economy to the Korean? If they are different from (or similar to) each other, what economic lessons did we learn from that? We would like to see the development theorists make a correct and objective assessment on the experience and the achievements of Korea as to whether it is similar to Japan's experience or significantly different from that.

Korea's economic conditions are by no means common. It has also been noted before that Korea does not seem to have traced Japan's footsteps, despite the fact that it had to have long maintained close political or economic relationships, willingly or unwillingly, with the latter as its most proximate country. Korea had to and still has to find its own way to struggle out of many adverse circumstances, domestic and/or international.

Therefore, if this can be a model case of many developing nations, its history of development should be carefully recorded, instead of prototyping that it is similar to the Japanese development history.

From our analysis of time-series data and estimation of various macroeconomic function, we have discovered that (1) Japan and Korea achieved rapid economic growth in recent decades with completely different initial conditions; (2) while Japan was able to enjoy the long-run growth under the socio-political stability, Korea had to overcome numerous exogenous obstacles unfavorable to economic growth, which often created in the society a feeling of high risk and uncertainty; (3) defense spending turned out as an input-using factor in Korea, whereas they played some significant role as a growth-complementing factor in Japan; (4) the world's trade condition affects the Korean economy more significantly than the Japanese economy; (5) the risk and uncertainty factor is an important deterring factor of saving and investment in Korea, but no such adversity is detected in the Japanese economy; (6) the share of agriculture in GNP was rapidly decreasing both in Korea and in Japan, but agricultural protection has been greater in Japan than in Korea; (7) in the growth function, foreign savings show the opposite signs to what is expected both in Korea and in Japan. It seems apparent that Korea's foreign savings turn into a long-run economic burden, whereas Japan's foreign savings contribute somewhat to capital formations.

All in all, it has been found that the two countries' economic growth has demonstrated a strong outperformance in the recent decades, but the conditions, processes, and approaches were by no means the same. In this sense, it is recommended that the time has come for development economists to scrutinize the economic growth of Korea in order to identify the true factors that contributed to such an economic success. This will be a truly meaningful lesson for other less developed economies.

## REFERENCES

1. Anderson, Kym, "Korean Agricultural Protection in Historical Perspective,"*Journal of Economic Development*, December 1982.
2. Aoki, K. and Inada, Y., "Analysis of Factors in Korea's Industrialization," *Asia Keizai* (in Japanese), May 1980.
3. Benoit, E., "Growth and Defense in Developing Countries," *Economic Development and Cultural Change*, January 1978.
4. Blumenthal, T. and Lee, Chung H., "Development Strategies of Japan and the Republic of Korea: A Comparative Study," and unpublished manuscript, October 1983.
5. Chenery, Hollis B., "Interactions Between Industrialization and Exports," *American Economic Review*, May 1980, pp. 281-287.

6. Chung, William K., "Study of Economic Growth in Postwar Japan for the Period of 1952-1967: An Application of Total Productivity Analysis," unpublished Ph.D. dissertation, New School of Social Research, New York, 1971.
7. Denison, Edward F., *The Sources of Economic Growth in the United States and the Alternatives Before Us* (CED Supplementary Paper 13), Committee for Economic Development, 1962.
8. Denison, Edward F., *Why Growth Rates Differ: Postwar Experience in Nine Western Countries*, Brookings Institution 1967.
9. Denison, Edward F., *Accounting for United States Economic Growth*, 1929-1969, Brookings Institution, 1974.
10. Denison, Edward F. and Chung, William K., *How Japan's Economy Grew So Fast*, Brookings Institution, 1976.
11. Elliot, C. and Yoo, J., "U.S.-Japan Trade Dispute," *Atlanta Economic Review*, September/October 1978.
12. Kellman, M. and Yun, Y., "Interindustry Relationships and Export Success: Japan and Korea," *Journal of Economic Development*, December 1980, pp. 59-87.
13. Kim, Sookon, *Labor Force Behavior and Unemployment in Korea*, Council on East Asian Studies, Harvard University, 1980.
14. Kim, K. and Roemer, M., *Growth and Structural Transformation*, Cambridge, Mass., 1979.
15. Korea Development Institute (KDI), *Korea's Economy-Past and Present*, KDI Press, Seoul, Korea, 1975.
16. Kosobud, R. and Minami, R., *Econometric Studies of Japan*, University of Illinois Press, 1977.
17. Lim, David, "Another Look at Growth and Defense in Less Developed Countries," *Economic Development and Cultural Change*, Jan. 1983.
18. Mason, E.S., Kim, J.J., Perkins, D.H., Kim, K.S., Cole, D., *The Economic and Social Modernization of the Republic of Korea*, Council on East Asian Studies, Harvard University, 1980.
19. Morishima, Michio, *Why Has Japan Succeeded'?: Western Technology and the Japanese Ethos*, Cambridge University Press, 1982.
20. Park, Seung, *A study of Korean Economic Growth* (in Korean), Ilsimsa, Seoul, Korea, 1969.
21. Song, Byung N., *Hankook Kyungje Ron* (A Study of the Korean Economy), Bakyungsa, Seoul, Korea, 1981.
22. Taylor, C. and Hudson, M., *World Handbook of Political and Social Indicators*, Yale University Press, 1972.
23. Venieris, Y. and Gupta, D., "Sociopolitical and Economic Dimension of Development: A Cross-Section Model," *Economic Development and Cultural Change*, July, 1983.
24. Yamazawa, I. and Korata, Akira, "Industrialization and External Relations: Comparative Analysis of Japan's Historical Experience and Contemporary Developing Countries," *Hitotsubashi Journal of Economics*, February 1978.
25. Yoo, Jang H., *Preliminary Report of A Macro-Model of the Korean Economy*, to the National Science Foundation, 1982.

**Appendix: Comparisons of Various Macromodels**

# I. Name of the Variables

C    =  consumption (billions of 1975 yen or won)
N    =  population (thousands of persons)
$Y_D$  =  disposable income (billion of 1975 yen or won)
P    =  nonwage income (billion of 1975 yen or won)
W    =  wage income (billion of 1975 yen or won)
S    =  saving (billion of 1975 yen or won)
i    =  interest rate (Japan = government bond yields, Korea = banks' loan rate)
$Y_R$  =  GNP in 1975 (yen or won)
$I_{PR}$  =  net private domestic investment (billion of 1975 yen or won)
$I_{PU}$  =  net public domestic investment (billion of 1975 yen or won)
K    =  year end capital stock (Japan = trillion yen; Korean = billion won)
X    =  exports (billion of 1975 yen or won)
$T_W$  =  World Trade Index
$R_P$  =  index of world export prices divided by an index of Japanese or Korean export prices
IM   =  imports (billion of 1975 yen or won)
$P_K$  =  capital income index
t    =  time index (1954 = 1)
M    =  money stock (billion of 1975 yen or won)
$\pi$  =  inflation rate
$\dot{Y}_R$  =  real GNP growth rate
DEF  =  Defense spendings (billion of 1975 yen or won)
FS   =  Foreign savings (billion of 1975 yen or won)
GS   =  government spending (billion of 1975 yen or won)
SPI  =  Socio-political Instability Index
DJ   =  Japan's Dummy Variable ( = 0 during 1954-73, = 1 during 1974-81)

*Data Sources:*

**Japan:**  a. Various issues of *Economic Statistics of Japan,* Bank of Japan.
       b. *Annual Report on National Income Statistics,* Economic Planning Agency.
       c. *Report on the Labor Force Survey,* Prime Minister's Office
       d. *Census of Manufacturers,* Ministry of International Trade and Industry.

      e. *Annual Report on Family Income and Expenditure Survey,*
        Prime Minister's Office.

**Korea:** a. Various issues of *Annual Economic Statistics,* Bank of Korea.
      b. *Korea Statistical Yearbook,* Economic Planning Board.
      c. *Report on the Monetary Econometric Model of Korea,* Bank of
        Korea.
      d. *Census of Mining and Manufacturing Industries,* Economic
        Planning Board.

### *Common Data Sources:*

      a. Various issues of *International Financial Statistics,* Monetary
        Fund.
      b. Various issues of *Year Book,* International Monetary Fund.

## II.  Estimated Models (See Note below.)

### 1.  *Consumption Function*

**Japan:**

$$\ln \left(\frac{C}{N}\right)^{*} = -0.243 + 0.389 \ln \left(\frac{Y_D}{N}\right) + 0.292 \ln \left(\frac{C}{N}\right)_{-1}$$
$$\quad\quad (-4.062)\ (5.666) \quad\quad\quad (8.456)$$
$$R^2 = 0.999, \ \text{D.W.} = 2.104$$

$$\ln \left(\frac{C}{N}\right)^{*} = -0.48 + 0.353 \ln \left(\frac{Y_D}{N}\right) + 0.247 \ln \left(\frac{C}{N}\right) - 0.049 \ln \left(\frac{P}{W}\right)$$
$$\quad\quad (-2.965)\ (5.489) \quad\quad\quad (5.394) \quad\quad\quad (1.331)$$
$$R^2 = 0.999, \ \text{D.W.} = 1.961$$

**Korea:**

$$\ln \left(\frac{C}{N}\right) = -1.465 \ \ + 0.466 \ln \left(\frac{Y_D}{N}\right) + 0.364 \ln \left(\frac{C}{N}\right)_{-1}$$
$$\quad\quad (-2.673) \quad\ (3.379) \quad\quad\quad (2.028)$$
$$R^2 = 0.882, \ \text{D.M.} = 1.784.$$

Note:  a.  Values in the parentheses are t-statistics.
         b.  Dependent variables with asterisk(*) indicate the equation was run by the Cochrane-Orcutt
            method due to the presence of autocorrelations.

$$\ln\left(\frac{C}{N}\right) = -0.971 + 0.510 \ln\left(\frac{Y_D}{N}\right) + 0.360 \ln\left(\frac{C}{N}\right)_{-1} + 0.137 \ln\left(\frac{P}{W}\right)$$

$$(-1.203)\quad(3.054)\qquad\quad(1.992)\qquad\qquad(0.840)$$

$$R^2 = 0.886,\ \text{D.W.} = 1.806$$

## 2. Saving Function

**Japan:**

$$\ln\left(\frac{S}{N}\right)^* = -8.843 + 0.038 \ln i + 1.328 \ln\left(\frac{Y_R}{N}\right) - 0.262\ DJ$$

$$(-17.117)\quad(1.758)\qquad(29.328)\qquad\quad(-3.758)$$

$$R^2 = .986,\ \text{D.W.} = 1.796$$

**Korea:**

$$\ln\left(\frac{S}{N}\right)^* = -5.853 + 0.014 \ln i + 2.069 \ln\left(\frac{Y_R}{N}\right) - 0.395\ SPI$$

$$(-18.168)\quad(1.434)\qquad(16.591)\qquad\quad(-2.931)$$

$$R^2 = 0.955,\ \text{D.W.} = 1.825$$

## 3. Investment Function

**Japan:**

$$\ln\left(\frac{I_{PR}}{K}\right) = 3.457 + 0.092 \ln i - 0.628 \ln\left(\frac{P}{K}\right) + 1.027 \ln\left(\frac{DEF}{K}\right) - 0.543\ DJ$$

$$(11.333)\ (12.779)\ (-4.336)\qquad\quad(4.521)\qquad\qquad(-5.103)$$

$$R^2 = 0.690,\ \text{D.W.} = 1.915$$

**Korea:**

$$\ln\left(\frac{I_{PR}}{K}\right) = -2.598 + 0.017 \ln i - 0.072 \ln\left(\frac{P}{K}\right) - 0.214 \ln\left(\frac{DEF}{K}\right) - 0.166\ SPI$$

$$(-6.141)\ (1.666)\qquad(-3.795)\qquad\qquad(-2.433)\qquad\qquad(-1.960)$$

$$R^2 = 0.896,\ \text{D.W.} = 2.213$$

## 4. Export and Import Functions

A. *Export*

**Japan:**

$$\ln X^* = -4.939 + 0.854 \ln T_W + 0.808 \ln R_P$$
$$(-2.487) \quad (13.589) \qquad (2.741)$$
$$R^2 = 0.935, \text{ D.W.} = 1.854$$

**Korea:**

$$\ln X^* = -2.654 + 1.207 \ln T_W + 0.945 \ln R_P$$
$$(-4.447) \quad (6.270) \qquad (6.703)$$
$$R^2 = 0.938, \text{ D.W.} = 1.696$$

B. *Import*

**Japan:**

$$\ln IM^* = -8.821 + 0.592 \ln T_W + 0.886 \ln R_P + 0.433 \ln Y_R$$
$$(-6.446) \quad (6.984) \qquad (3.663) \qquad (5.006)$$
$$R^2 = 0.987, \text{ D.W.} = 2.015$$

**Korea:**

$$\ln IM^* = 2.820 + 0.563 \ln T_W - 0.490 \ln R_P + 0.073 \ln Y_R$$
$$(0.864) \quad (1.592) \qquad (-3.699) \qquad (2.113)$$

5. *Aggregte Production Function*

**Japan:**

$$\ln Y_R^* = -21.737 + 3.016 \ln N + 0.231 \ln K + 0.021 T$$
$$(-3.463) \quad (5.108) \qquad (4.402) \qquad (2.609)$$
$$R^2 = 0.991, \text{ D.W.} = 1.833$$

**Korea:**

$$\ln Y_R^* = -2.456 + 1.130 \ln N + 0.045 \ln K + 0.035 T$$
$$(-0.511) \quad (2.106) \qquad (0.568) \qquad (1.954)$$
$$R^2 = 0.958, \text{ D.W.} = 1.729$$

6. *Monetary Sector*

**Japan:**

(1) 1954-81

Money Demand:

$$\ln M^* = -6.821 + 1.177 \ln Y_R - 0.013 \ln i - 0.004 \ln \Pi$$
$$(-21.693)\ (46.071)\quad (-1.645)\qquad (-1.829)$$
$$R^2 = 0.992,\ \text{D.W.} = 1.897$$

Money Supply:

$$\ln M^* = 5.031 + 0.092\ T$$
$$(42.888)\ (14.898)$$
$$R^2 = 0.917,\ \text{D.W.} = 1.779$$

(2) 1954-63

Money Demand:

$$\ln M^* = -4.609 + 1.016 \ln Y_R - 0.077 \ln i - 0.026\ \ln \Pi$$
$$(-11.041)\ (26.418)\qquad (-1.215)\ (-1.430)$$
$$R^2 = 0.999,\ \text{D.W.} = 1.954$$

Money Supply:

$$\ln M = 4.578 + 0.140\ T$$
$$(122.79)\ (30.447)$$
$$R^2 = 0.997,\ \text{D.W.} = 2.263$$

## Korea:

(1) 1954-81

Money Demand:

$$\ln M = -11.330 + 1.596 \ln Y_R + 0.015 \ln i - 0.023 \ln \Pi$$
$$(-7.292)\ (9.221)\qquad (1.249)\quad (-1.981)$$
$$R^2 = 0.840,\ \text{D.W.} = 2.014$$

Money Supply:

$$\ln M = 0.741 + 0.131\ T$$
$$(2.262)\ (7.730)$$
$$R^2 = 0.759,\ \text{D.W.} = 2.112$$

(2) 1964-73

Money Demand:

$$\ln M = -16.145 + 2.187 \ln Y_R + 0.015 \ln i + 0.036 \ln \Pi$$
$$(-3.223)\ (4.351)\qquad (0.530)\qquad (0.789)$$
$$R^2 = 0.6960,\ \text{D.W.} = 2.195$$

Money Supply:

$$\ln M = -0.567 + 0.222\ T$$
$$(-1.234)\ (7.660)$$
$$R^2 = 0.893,\ D.W. = 2.015$$

### 7. *Growth Rate Function*

**Japan:**

(1) 1954-81

$$\dot{Y}^*_R = 7.246 - 0.008\ (\Delta \frac{Y_R}{K}) + 2.005\ (\frac{DEF}{GS}) + 0.062\ (\frac{FS}{Y_R})$$
$$(2.891)\ (-0.203)\qquad (1.978)\qquad\quad (2.066)$$
$$R^2 = 0.215,\ D.W. = 1.916$$

$$\dot{Y}^*_R = 7.565 - 0.005\ (\Delta \frac{Y_R}{K}) + 1.059\ (\frac{DEF}{Y_R}) + 0.057\ (\frac{FS}{Y_R})$$
$$(1.604)\ (-0.122)\qquad (1.112)\qquad\quad (1.680)$$
$$R^2 = 0.118,\ D.W. = 1.854$$

(2) 1954-63

$$\dot{Y}^*_R = -0.460 + 0.046\ (\Delta \frac{Y_R}{K}) - 1.099\ (\frac{DEF}{GS}) - 0.018\ (\frac{FS}{Y_R})$$
$$(-0.493)\ (2.707)\qquad (-3.817)\qquad\quad (-0.810)$$
$$R^2 = 0.876,\ D.W. = 1.815$$

$$\dot{Y}^*_R = -1.909 + 0.042\ (\Delta \frac{Y_R}{K}) - 0.848\ (\frac{DEF}{Y_R}) - 0.015\ (\frac{FS}{Y_R})$$
$$(-1.437)\ (2.396)\qquad (-3.719)\qquad\quad (-0.686)$$
$$R^2 = 0.871,\ D.W. = 1.617$$

**Korea:**

(1) 1954-81

$$\dot{Y}^*_R = -10.195 + 0.080\ (\Delta \frac{Y_R}{K}) - 9.588\ (\frac{DEF}{GS}) - 1.637\ (\frac{FS}{Y_R})$$
$$(-2.654)\ (0.612)\qquad (-3.332)\qquad\quad (-3.021)$$
$$R^2 = 0.471,\ D.W. = 2.045$$

$$\dot{Y}_R^* = -13.578 + 0.157 \ (\Delta\frac{Y_R}{K}) - 4.484 \ (\frac{DEF}{Y_R}) - 1.015 \ (\frac{FS}{Y_R})$$

$$(-2.551) \quad (1.166) \qquad (-2.976) \qquad (-2.119)$$

$$R^2 = 0.421, \ D.W. = 1.965$$

(2) 1964-73

$$\dot{Y}_R = -0.221 + 0.069 \ (\Delta\frac{Y_R}{K}) - 2.195 \ (\frac{DEF}{Y_R}) - 0.378 \ (\frac{FS}{Y_R})$$

$$(-0.039) \quad (0.998) \qquad (-0.474) \qquad (-0.548)$$

$$R^2 = 0.153, \ D.W. = 2.224$$

$$\dot{Y}_R^* = -3.6 \ (1 + 0.075 \ (\Delta\frac{Y_R}{K}) - 1.880 \ (\frac{DEF}{Y_R}) - 0.144 \ (\frac{FS}{Y_R})$$

$$(-0.644) \quad (1.167) \qquad (-1.090) \qquad (-0.365)$$

$$R^2 = 0.267, \ D.W. = 2.594$$