ECONOMIC GROWTH AND HUMAN DEVELOPMENT IN THE REPUBLIC OF KOREA, 1945-1992

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Abstract [2]

This paper investigates how Korea has achieved its remarkable record of economic growth and human development, and how economic growth and human capital have interacted in the Korean economy.

In turn, Korea's economic growth has benefitted from the education level of its human resources, which have played a key role in absorbing advanced technology from the developed countries.

I. Introduction

The Republic of Korea (henceforth, Korea) is well-known for its remarkable economic achievements. It has grown by more than 8 percent each year since the early 1960s, making it the fastest growing economy in the world. Korea's performance is considered particularly impressive because it has been achieved in spite of such obstacles as Japanese colonial rule, the devastation of the Korean War, political turmoil and heavy military expenditures under national partition.

There have been numerous studies on how Korea has achieved its remarkable record of high and sustained economic growth.[3] In these analyses a number of factors, including high savings and investment ratios, a well-educated labour force and well-directed export-oriented development strategies have been cited as primarily responsible for the Korean success. Despite the degree of international attention to Korea's fast economic growth, Korea's remarkable achievement in human development is little known.[4] One of the most surprising characteristics of Korean development is that the nation has accumulated a stock of educated work-force at an unprecedented rate. (See Section III.) And although many studies have emphasized the role of Korea's highly educated human capital in economic growth, there has been little investigation into how Korea achieved this.

The purpose of this paper is to investigate how Korea has achieved its rapid economic growth, while accelerating human development during the period from 1962 to 1992, and how economic growth and human development have interacted with each other in the Korean economy. This paper investigates how much Korea's successful economic growth has benefitted from the human resources that Korea inherited in the early 1960s and which it subsequently nourished during the last three decades. This paper also investigates the factors which have contributed to Korea's current high level of human capital.

The paper consists of five sections. Section II presents a brief history of Korean economic growth. Section III gives an overview of Korea's human development, and investigates its origins; Section IV discusses the contributions of human capital to economic growth since the early 1960s. Concluding remarks follow in Section V.

II. An overview of Korean economic growth 5

This chapter briefly describes the phases of Korea's economic growth during the period from 1945 to 1992.

Since its 1945 liberation, Korean economic growth can be roughly divided into four stages: the reconstruction period from 1945 to 1961, the export-oriented growth period from 1962 to 1973, the crisis and recovery period from 1974 to 1982 and the adjustment and growth period from 1983 to 1992. The Appendix Table provides annual data on main economic indicators from 1954 to 1992, and Table 1 shows their period averages.

1. Reconstruction, 1945-61

With the end of the Japanese occupation in 1945, Korea had to rebuild its economy. During the colonial period, 1910-45, the Japanese government attempted to integrate completely the Korean economy with Japan, and thus introduced many modern economic and social institutions, and invested heavily in infrastructure, including schools, railroads and utilities. Most of these physical facilities remained in Korea after the Liberation.6 But, under Japanese rule, all the Korean resources were utilized only for the Japanese. For instance, the ownership of physical capital was heavily concentrated among the Japanese who had lived in Korea. Few opportunities for development were given to Korean entrepreneurs and technicians.7 Hence, after the departure of the Japanese, the economy was in an extremely poor condition, and it never recovered its pre-liberation level because of a lack of managerial manpower, a shortage of raw materials, and instability of political and social environments. It was estimated that South Korean manufacturing in 1948 reached only 15 percent of its level in 1939 (Kim and Roemer, 1979).

The Korean War, which lasted from 1950 to 1953, severely damaged the economy. The war destroyed most production facilities and killed about one million soldiers and civilians. There were tremendous efforts to rebuild the economy following the end of the war. During the period 1954-61 the economy gradually improved. Gross domestic

product (GDP) growth rate was about 4.1 percent, although per capita income grew only by 0.8 percent each year due to the rapid population growth. The economic growth during this period was led largely by massive foreign aid that supplied most of the raw materials and capital goods to the Korean economy. It was estimated that during the 1953-60 period foreign aid financed more than 70 percent of total imports, and contributed approximately 95 percent of foreign savings (Collins and Park,1989, p.167; Kim and Roemer, 1979).

During the period 1954-61, the Korean economy pursued a rather protectionist trade regime and import substitution strategy. Domestic currency was persistently overvalued and imports were restricted by high tariffs and import licensing systems. Throughout this time, exports remained negligible, amounting to 3.3 percent of gross national product (GNP), and most of products exported were primary commodities, such as agricultural and fishery products, and mineral ores.

This period was also characterized by continuous inflation. For the three months after the 1945 Liberation, the Seoul wholesale price index soared 1600 percent due to extreme social and political unrest. And the price index increased again 1700 percent during the three-year Korean War due mainly to an expansion of the money supply. The inflation rate stemming from the high rate of monetary expansion continued throughout the post-war period. During the 1954-61 period, annual wholesale inflation rate averaged 14.3 percent.

2. Export-orientation, 1962-73

Korea's unprecedented record of economic growth started in the early 1960s when government policy shifted away from import substitution towards export orientation. The Park regime, which came into power in 1961 and committed itself to economic development, pursued active, comprehensive policies of trade reforms and export promotion.[8] Exporters were provided with extensive direct export subsidies and other incentives, including tax exemption, and export loans with preferential interest rates. In 1964 the government devalued the domestic currency by almost 100 percent against the US dollar, further eliminating the bias against export industries. The government also undertook a series of policies to encourage inflows of foreign capital to make up for the insufficiency of domestic savings.

The results of the comprehensive changes Korea undertook toward export orientation proved to be remarkable. The annual growth rate of GNP averaged 8.7 percent. The economy also went through a dramatic structural change: the share of the mining and manufacturing sector in GDP rose from 16 percent in 1962 to 26 percent in 1973, while the share of the agricultural sector dropped from 37 percent to 25 percent during the same period (see Appendix Table).

Korea's rapid growth and structural changes were largely an outcome of export-oriented industrialization. During the 1962-73 period, the real value of total exports increased by 30 percent per annum. Consequently, the share of exports in GNP soared

from 6.0 percent in 1962 to 30 percent in 1973 (see Appendix Table). This remarkable growth of export was also accompanied by a change in export structure. The share of industrial products in total exports increased dramatically from 27 percent in 1962 to 86 percent in 1973.

During this period the problem of price instability improved. Although inflation rates measured by the consumer price index recorded double-digit growth for most of the period, they were relatively low, averaging 12.3 percent during the period 1962-73. In fact, the inflation rate based on the wholesale price index remained in the single-digits throughout the period from 1965 to 1971.

A darker spot in the economy during this period came from Korea's external balance of payments. Although savings increased dramatically throughout the period, they were not sufficient to finance the soaring domestic desire to invest. The excess of investment over domestic savings was countered by deficits in current accounts that averaged 4.0 percent of GNP during this period. It was estimated that because of the persistent current account deficit, the foreign debt accumulation mounted to approximately 32 percent of GNP in 1973 (Collins and Park, 1989, p.171).9

3. Crisis and Recovery, 1974-82

In the early 1970s the Korean government was concerned with the country's decline in competitiveness in the world market, and focussed on the promotion of new strategic export industries and import substitution of intermediate inputs and capital goods. As a consequence, massive investment programs were introduced to promote heavy and chemical industries, such as shipbuilding, steel and petrochemicals. These programs were actively pursued through 1979. The "big push" of the heavy and chemical industries is considered a failure of inefficient government intervention policies.10 The massive investment brought about huge excess capacity in the heavy and chemical industries, and the financial sectors continued to accumulate nonperforming loans, as a result of lending to those industries.

Economic performance of the Korean economy deteriorated throughout the 1970s. As the economy was hit hard by price increases in oil and raw materials and the ensuing world recession, export growth slowed. Inflation rates measured by consumer price index jumped from 3.2 percent in 1973 to 20 percent in 1974, and remained in the double-digits throughout the 1970s. Because the government relied heavily on foreign borrowing for its large-scale investment projects, there was a persistent deficit in current account. As a result, the external debt grew rapidly throughout the 1970s, reaching $25 billion in 1980, or about 45 percent of GDP (Collins and Park, 1989).

The year 1980 marked a major crisis in the Korean economy. The second oil shock and a disastrous crop failure hit the frail, recovering economy. The problem was exacerbated by political and social instability following the assassination of President Park in October 1979. For the first time since 1957, Korea faced a negative GDP growth rate of -2.7 percent, and the inflation rate soared to 22.4 percent in 1980 (see Appendix Table).

Although these setbacks severely hurt the Korean economy in 1980, it quickly recovered due in part to an improved harvest and a stabilization policy launched by the newly established military government under General Chun. The GDP growth rate recovered to 6.2 percent in 1981. The balance of payments slowly improved: the current account deficit-GNP ratio declined from 8.5 percent in 1980 to 1.9 percent in 1983. The economy also stabilized rapidly, and the inflation rate dropped from 17.7 percent in 1981 to 6.6 percent in 1982.

4. Adjustment and Growth, 1983-1992

In 1983 the Korean economy was performing very well with GDP growing at 12 percent. The record of price stability was also impressive: the level of inflation was dropped dramatically to less than 4 percent for the five years subsequent to 1982, and Korea was regarded as an example of successful economic adjustment. In pursuit of price stability, the government introduced a series of tight monetary and fiscal measures. The overall government budget deficit as a ratio of GNP dropped from 4.7 percent in 1981 to 1.0 percent in 1985 (see Collins and Park, 1989). Money supply was also tightly controlled: the M2 growth rate slowed from 21.3 percent in 1982 to 7.2 percent in 1984 (see Appendix Table).

During this period, the government started a wide range of policies directed toward market liberalization in conjunction with its price stabilization program. Perhaps realizing the consequences of its previous industrial policy during the 1970s, the government now shifted from a strategy of direct intervention toward one of indirect guidance. All subsidized policy loans were reduced and eventually eliminated under the financial market liberalization program. The Ministry of Finance reduced its tight control over the management of commercial banks. Other elements of the liberalization program included partial deregulation of foreign investment and acceleration of import liberalization.11

The balance of payments steadily improved: the current account deficit dropped from 1.9 percent of GNP in 1983 to 0.9 percent of GNP in 1985. In 1986 the current account registered a surplus of $ 4.3 billion. As a consequence of the improvement in current accounts, total external debt was gradually reduced.

Since 1986, Korea has been experiencing a remarkable economic boom. During the period 1986-92, the growth rate has been 9.2 percent per year. The rate of inflation has been under control during this period, averaging 5.7 percent a year. As the current account has continuously improved, concerns about foreign debt eventually disappeared.

III. Human development in Korea

This section overviews the record of human-resources development in Korea during the period 1945 to 1992, and then investigates how Korea accomplished this development.

1. Trends of human development, 1945-1992

During the period from 1945 to 1961, before the economic boom, the available data indicate that Korea substantially expanded education. As Table 2 shows, school enrolments at all levels increased extremely rapidly from 1945 to 1965, except during the period of the Korean War.

One unique feature of Korea's educational expansion in this early period is that school enrolments increased not gradually but, rather through sporadic jumps. The first major increase occurred in 1946 just after the Liberation when primary school enrolments jumped from 1.4 million to 2.2 million, and secondary school enrolments increased from 8,000 to 13,000 (see Table 2). This high growth of enrolments was unparalleled in the history of Korea.

The erratic growth of enrolments at the lower levels of education brought, in turn, uneven increases in enrolments at the higher levels. Enrolments in secondary schools, as increasing numbers of students graduated from primary schools, rose from 267,000 in 1951 to 740,000 in 1952. Reflecting the earlier two jumps in enrolments in primary and secondary schools, colleges and universities also experienced two major increases in enrolments, first from 1953 to 1954, and then from 1959 to 1961.12

Thanks to the strong growth of school enrolments, the educational attainments of the labour force increased remarkably from 1945 to 1960. As shown in Table 3, in 1960 about 56 percent of the adult population had received some primary education, whereas 20 percent had even obtained some secondary schooling. In contrast, in 1945 about 87 percent of adults had never received any formal schooling.

By the early 1960s, as a result of its early investment in education, Korea already had a substantial stock of human resources. In 1960 the educational attainments of Koreans far exceeded those of the populations of developing countries, in which about only 26 percent of adults had primary school education and only 5 percent had some secondary schooling (see Table 3). Nonetheless, it should be noted that the Korea's educational attainment in 1960 was never near to that of the OECD countries, and no higher than that of many Latin American countries. For example, as shown in Table 4, in Argentina about 90 percent of adults had already received some primary education.

Thus, the advanced state of education in Korea during these initial years should not obscure the unprecedented human development that Korea has achieved since 1960. The country's share of adults with no formal schooling dropped from 36 percent in 1960 to 8 percent in 1990, whereas the percentage of adults who had received some secondary schooling soared from 20 percent in 1960 to 76 percent in 1990. As a result, the average years of schooling of the population aged 15 and above more than doubled from 4.2 years in 1960 to 9.9 years in 1990, exceeding the average of the OECD countries as a whole.

Korea has been outstanding in the world with respect to its rapid growth of both the economy and educational attainment. Figure 1 shows that Korea has achieved the largest increase in human capital stock -- in terms of absolute level of average years of schooling -- over the last three decades. Although a number of economies, such as Botswana, Hong

Kong, Singapore and Taiwan, have achieved income growth rates as high as that of Korea, none of them has achieved educational growth comparable to that of Korea. For instance, in 1960 Singaporean adults as a whole had 4.3 schooling years, just as many as Koreans had, but their mean years of schooling climbed to only 6.1 years in 1990, compared to 9.9 years in Korea.

The development of education in Korea shows another notable feature: a superb quality of education. Although it is very difficult to measure the quality of education and even more difficult to make cross-country comparisons, schooling quality is often measured by the scores of internationally comparable tests of pupils' achievement in cognitive skills such as numeracy, literacy and scientific reasoning. Evidence shows that test scores of cognitive achievement are highly correlated to future earnings of students. Judged from this measure of schooling quality, Korea seems to have accumulated well-educated human capital, at least at primary and secondary levels, compared to most of the countries in the world. Table 5 presents internationally-comparable test scores in the subjects of science and mathematics for 13 year old students in 19 countries, conducted by the International Association for the Evaluation of Educational Achievement (IEA) in 1991. Among the 19 countries participating in the IEA tests, Korean students were the best performers in the science test and second to Chinese students in the math test. For some, it is quite puzzling how Korean students perform better than others. Some literature argues that public spending is important in improving quality of education. There was no evidence, however, that Korean government has spent more than any other governments in order to promote quantity and quality of education. Government expenditure on education as a percentage of GDP has been relatively low in Korea, compared to other developing countries. Table 6 shows that throughout the period from 1970 to 1990 the share of GDP education expenditure has been just around 3 percent, though it has been a substantial portion of total government expenditure.13 Because of these limited public expenditures, the quality of educational inputs was not high in Korea. Table 7 compares regional averages of the variables that proxy for the quality of educational inputs in the OECD and in the developing countries to the averages in Korea. At the primary and secondary levels student-teacher ratios were much higher in Korea than in the OECD or in the developing countries: in 1960 the pupil-teacher ratios were 58 at primary schools and 34 at secondary schools in Korea, while the ratios were 30 at primary schools and 18 at secondary schools in the developing countries. Korea also had low public expenditures per pupil at primary and secondary schools: in 1960 the estimated public spending per pupil was US$152 (in PPP-adjusted 1985 price) in Korea, while it was US$157 in the developing countries. Despite the low public spending Korea seems to have had relatively high average salaries of primary school teachers: the estimated salary was US$7,236 and 8.2 times per capita GDP in Korea, while it was $US4,869 and 4.5 times GDP per capita for the overall group of developing countries. This high teacher salary may indicate that Korean teachers were relatively well-qualified.

Table 7 also shows data on repeater rates in primary and secondary schools, primary school drop-out rate and school days. Based on these measures, Korea seems to maintain better quality of education: repetition rates and drop-out rate were substantially lower, and school term was longer in Korea than in the OECD or in developing countries. Thus,

high quality of education in Korea can be thought of as an outcome of high quality of teachers, long school days and low repetition and drop-out rates, rather than of high public expenditures.

Because the government has only been able to make small expenditures in education during the period, a substantial part of educational costs was financed by private sources. Table 8 shows educational expenditures by types and sources. Expenditures on education comprises in-school and out-of-school expenditures. In-school expenditures are the expense for the operation and construction of schools, and are financed by students, central and local governments and private foundations. Out-of-school expenditures are the educational expenses for textbooks, transportation and room and board, which are borne by students.14 According to these statistics, total expenditures for education were estimated at 146 billion won, or 8.8 percent of GNP, in 1968 and increased to 18,126 billion won, or 10.8 percent of GNP, in 1990. The substantial part of this education spending is financed by private sources: for the period from 1968 to 1990 more than 63 percent of total education expenditures were paid by students.

2. Sources of Human development in Korea

In the previous section it was noted that Korea was quite special among the developing countries in terms of its achievement of rapid economic growth as well as human development. This section investigates how Koreans were able to achieve this remarkable growth of education.

Educational growth is usually accompanied by economic prosperity because demand for education responds positively to change in income. However, in Korea, although educational expansion was undoubtedly accelerated by economic growth, this growth factor alone cannot explain the unique features associated with the its educational expansion. Note that growth of education occurred first in Korea during the period from 1945 to 1961, even before the economic boom began, and that during the period of its economic prosperity since the early 1960s, Korea's achievement in human development went far beyond explanation of its growth by income alone.

Historical roots of human development, 1945-1961

How was it possible that school enrolments increased so rapidly in the early period, 1945-1961, before the economic boom started? We argue that there were several historical factors that encouraged strong demand for and supply of education during this time.

There had been a strong demand for education, which was attributable to strong social and economic motivations. As a consequence of the Liberation and the Korean War, Korea's traditional system of social classes was destroyed, and thereby necessitated erecting a new system. Because of the unusual homogeneity of Korean society in terms of race, culture and language, education seemed the key and, perhaps, the sole factor that

the people considered as a *modus operandi* to obtain higher social levels.15 Thus, the people's demand for education was high because of strong desire for social mobility.16 The desire for social mobility was also closely associated with economic motivation. Education was considered as a key factor for people to get into good occupations that often guaranteed both economic rewards and social status. It is common in Korean firms for workers' salaries to be largely determined by their educational level at the hiring stage, and then to steadily increase with seniority. The data shows that wage differentials by educational attainment have been substantial, though they have declined over time. 17

The virtual eruption of demand for education, though it is one of the key factors, is not sufficient to explain the extraordinary growth of education that Korea obtained during the period 1945 to 1961. Without expanding the supply of education, it would not have been possible for everyone to be educated.

There are several factors that might have helped expand the supply of education enough to meet the high demand for education in Korea. Some studies have mentioned the contribution of Japanese colonial rule to education in Korea, noting that Japan had introduced the modern educational system and also made serious efforts to expand primary education in Korea. However, there is little evidence of how successful the efforts had been. McGinn and others (1980, p.82) cite one source which states that enrolments in primary school already reached 45 percent of the Korean youth of school age in 1945. But without data on enrolments prior to 1945, it is difficult to judge how substantial the Japanese contribution was, considering that only 13 percent of adults had received a formal education in 1945, as shown in Table 3. There has also been strong criticism of the Japanese totalitarian colonial system, including its prohibition of use of the Korean language and the teaching of a much-revised Japanese version of Korean history. Furthermore, despite Japanese eagerness to provide Koreans with more primary education, very few Koreans were allowed to enrol in secondary school or to enter college. Thus, there were wide disparities of educational opportunities available to Koreans, as compared to Japanese living in Korea.18 Perhaps the most important contributions to education in Korea made by Japan were the construction of physical facilities (built for the Japanese living in Korea) and the large number of Japanese-educated Korean teachers. They, of course, remained in Korea after the Liberation and provided a basis for the new education system.19

Beyond the role played by Japan on education in Korea, there was a major effort made by the United States. The U.S. Army Military Government in South Korea during 1945-48 contributed to expansion of educational opportunities. According to an estimate by McGinn and others (1980), about two-thirds of the operating costs of running the primary schools were financed by the U.S. Army Military Government. In addition, foreign (mostly U.S.) aid to Korea accounted for as much as $100 million for the period between 1952 and 1966, which provided the resources for classroom construction and thereby facilitated the expansion of education.20

During this period the role of the Korean government was not considered significant, as its financial resources were limited. According to Y. Kim (1980, p.256), the share of

GNP of total central government expenditures on education was only 0.9 percent in 1954, although the share increased steadily to 2.5 percent in 1960. Despite its inability to contribute to the expansion of formal schooling, the government did contribute to the decline of illiteracy among adults by initiating a "national campaign for literacy". The movement very effectively raised the adult literacy rate from 22 percent in 1945 to approximately 80 percent in 1960.21

Growth of Education, 1962-1992

Considering that the achievement of human development in the Korean economy was exceptionally high even among the world's fast growing countries, the growth factor alone cannot explain all of Korea's performance in human development. Thus, it may not be just growth but special features of Korean growth that have really contributed to the growth of education: this section argues that the special features are the outward-oriented development strategy on one hand, and equal income distribution on the other hand.

Export-led Human Development

Rapid human development can be attributed to the fact that Korea has pursued an export-oriented growth policy as discussed in Section II. The outward-looking developments were implemented by use of Korea's abundant well-educated labour force. Korea's exports were concentrated in labour-intensive manufactured goods, in particular during the 1960s and early 1970s; this concentration has since shifted into more capital or skill-intensive products.22 Thus, the strong performance of labour and skill-intensive export industries insured growth of employment and real wages, which, in turn, increased emphasis on education in the society. In Korea, growth of employment and real wages was very high throughout the period. The unemployment rates were exceptionally low at only 4.4 percent on average for the period from 1963 to 1992 (see Appendix Table). Thus, the strong growth of employment and wages, which was generated by the development of the labour-intensive export industries, made a contribution to increase in demand for education.

There are other characteristics of development strategies that shaped the content and speed of human-resource development. In a stagnant inward-looking economy, there is little incentive to acquire education higher than the level needed for the jobs in prevailing industries because industrial structure and technology change only slowly. On the other hand, in an outward-oriented economy, which is under more pressure from global competition to change its industrial and employment structures, there is more incentive to invest in education. Without education, workers displaced by declining industries cannot easily move to more profitable sectors. Thus, the rewards from education are higher in a more export-oriented society, where investment in education is required to move to new technologically advanced areas.

It is well-known that educational investment is essential to increase workers' ability to adapt to changing job conditions in an environment of uncertain technological changes. Schultz (1963) argues: "Under widely different circumstances, it is true that individuals with 8 years of elementary schooling are better prepared to move and enter upon new

jobs than are those who had only 4 or less years of schooling. Likewise, those with a high school education are much better prepared to make such adjustments than those who have completed no more than the elementary grades. Economic growth, under modern conditions, brings about vast changes in job opportunities. Schooling in this connection is valuable because it is a source of flexibility in making these occupational and spatial adjustments."[23] In this regard, a rapid change of export, industry and employment structures in the Korean economy favourably influenced the increasing demand for education.

Moreover, the flexibility of the Korean labour market boosted the incentives of workers to obtain more training or education. Labour markets in an inward-looking economy tend to be distorted and inflexible.[24] Protectionist trade policies reduce competitive pressures on labour markets, and thereby often promote labour unions and government intervention to set wages above market equilibrium. By contrast, in an export-oriented economy, the labour market is more responsive to changing demand for skills. Real wages change with little struggle when labour productivity changes. As is well documented, in South Korea there were few institutional barriers to real wage adjustments: government interventions in wage setting were kept to a minimum and union activities were strongly controlled. Hence, as major exports have changed from less-skilled labour-intensive to high-skilled products over time in Korea, a well-functioning labour market assisted Korean workers in their desire to climb the ladder toward more technological sophistication.[25]

It is also believed that Korea's active export-oriented strategy strongly influenced public policy towards human-resource development. Because outward-oriented economies are subject to more pressures from global competition, the government and firms have strong demand for effective educational and training systems. In Korea, the government, by recognizing the future demand for a skilled work-force for export-oriented industrial development, launched various human resources management programs to meet demand for education. At the first stage of industrialization in the 1960s and 1970s, which necessitated less skilled workers, the government implemented an effort to expand vocational training, and the supply of secondary school technical graduates. Later in the 1980s in order to absorb more advanced technology, more support was given to two-year junior technical colleges, colleges and universities for a supply of skilled workers and technicians.

The extensive public vocational training system in Korea is notable.[26] Since the Vocational Training Law was enacted in 1967, the government established a total of 26 public vocational training institutes. By 1986, the number of workers who were trained in these institutes amounted to more than 350,000 - approximately 3 percent of the labour force in 1986. Also, by granting subsidies, the government encouraged private enterprises to provide their own workers with training programs that met vocational training standards. About 70,000 workers were trained by this type of in-plant vocational training. The vocational training system was in general considered an important vehicle that helped workers to develop a diversity of skills needed for export-oriented industrialization.

In conclusion, the export-oriented development strategy in Korea has encouraged workers to acquire more education and training. The presence of competitive labour markets brings efficient allocation of labour resources, and in turn provides more incentives for higher education during the successive transformation of the economy along with technological sophistication. Also, global competition imposed by outward orientation forced the government and firms to invest actively in the accumulation of human capital for the economy.

Income Distribution and Human Capital Accumulation

During the rapid economic growth period of the past three decades, Korea has proved to be one of the exceptional success stories in achieving "growth with equity" (World Bank, 1993). There is no evidence that Korea sacrificed equity as it strived towards growth, thus contradicting the Kuznets' inverted U hypothesis.

Available data sources from the World Bank show that in 1960 Korea inherited a relatively equal income distribution. This equality of income distribution originated from the historical conditions such as the two land reforms and the Korean War, which made distribution of productive factors relatively equal. In 1947 Korea undertook the first reform under the auspices of the U.S. military government, focusing on the redistribution of government-vested land. The second reform was carried out in 1949 by the newly established Korean government, which attempted to subdivide large landholding and eliminate absentee landlordship. As a result, the share of tenants in rural households declined substantially from 83 percent to 26 percent (Collins and Park , 1989, p.303). Also, the Korean War destroyed the majority of the physical capital stock that had been accumulated before the war.27 Thus, distribution of assets were relatively equal in Korea before its economic boom started in the early 1960s.

Table 8 presents trends of income distribution during the period from 1965 to 1990, based on Choo (1993). Choo's estimates, constructed from household income and expenditure surveys, indicate that there was no significant change in the size distribution of income during this period.28 In addition to equitable distribution initially inherited in 1960, Korea did not deteriorate its income distribution during its rapid growth period. This achievement of growth with equity is attributed to many factors, including strong growth of employment and low unemployment, as well as such government social welfare policies as the Livelihood Protection Programs and medical assistance program.29 As shown in Table 6, public expenditures on social security and welfare have continuously increased over the last two decades.

This relatively equal income distribution, which characterized Korean society throughout the period of economic boom, made a major contribution to the expansion of education, in particular at the secondary level, for which the enrolment ratio of school-aged children increased steadily from 27 percent in 1960 to 88 percent in 1990 (see Table 3).

The contribution of equal income distribution to human capital growth could be attributed to two factors. On one hand, in Korea most educational costs were levied on

parents, in particular, at the secondary school levels.30 Hence, financial burdens of parents were substantial (see Table 8). As is common in developing countries, poor households are unable to pay for education of their children, and often need income from their children's employment. This occurred relatively less in Korea, because the majority of Korean parents were able to pay the substantial costs of secondary education due to equal income distribution. On the other hand, equal distribution has strengthened social desire for higher education. In the Korean society, where all the assets were equally distributed, there was strong motivation for human capital accumulation in order to obtain a high level of social status.

Trade, Income Distribution, and Human Development in Cross-country Data

We use cross-country regressions to test the assertion of linkages from trade regime and income distribution to human development. The dependent variable (DH) is an estimate of human development, constructed by Barro and Lee (1996), measured by the change of average schooling years of the working-age population from 1960 to 1990. For an indicator of trade policy regime, we use an openness measure (OPENNESS) constructed by Sachs and Warner (1995). This measure is the fraction of years between 1965 and 1989 that the country was open to trade and integrated with the global economy (i.e. number of years of open trade divided by 25). The assessment of the country's openness is made on the basis of four dimensions of trade policy: tariffs, quotas and licensing, export taxes and black-market exchange-rate premium (see Sachs and Warner, 1995, for more details). Inequality of income distribution is measured by the Gini coefficient in 1960. In the regression we also control other important explanatory variables influencing human development, such as a log value of initial per capita GDP (GDP60L), initial human capital stock (H60) - the average years of schooling in 1960, and the ratio of public education expenditure to GDP, averaged over the period from 1960 to 1985 (EDUC/GDP). The estimated regression result is as follows:

*DH = 1.37 -0.50*H60 +0.58*GDP60L +0.99*OPENNESS -5.00*GINI60 +1.86*EDUC/GDP*
(0.81) (-5.48) (2.44) (2.56) (-2.64) (0.17)

R(2)= 0.40, No. of Obs.= 57

... where the figures in parentheses indicate t-statistics. The regression applies to a data set for 57 countries -- those with a complete data set for all variables. The estimated result indicates that trade regime and income distribution are important factors for human development. The openness measure turns out to have a strong positive effect on human development. Inequality of income distribution in 1960 is strongly inversely related to subsequent human capital accumulation. Thus, cross-country data proves that more equal income distribution and a more open trade regime stimulate human development. The regression also shows that public education expenditure does not have not any important effect on human development: the estimated coefficient on government education expenditure as a ratio to GDP enters only statistically insignificantly.

IV. Contribution of human development to growth

This section analyzes how much Korea's educational accumulation has contributed to its economic growth. First of all, we appraise the contribution of education to output growth on the basis of the conventional Solow-type growth accounting. The basic assumption of this approach is that the increase in educated workers raises output through the improvement of labour productivity. Based on this theory of human capital, more educated workers enjoy greater productivity, which is recognized by a higher earnings stream during their working lives.

One problem in the growth accounting approach is, however, that there are still left unexplained residuals of output growth, attributed to exogenous technological progress, which is referred to as total factor productivity (TFP) growth. We consider that the TFP growth is not just exogenously given to the economy, as vigorously argued by recent endogenous growth literature, such as Romer (1990) and Grossman and Helpman (1991). If the TFP growth is endogenously determined, we need to know further what causes it. Otherwise, the results from the growth accounting would provide misleading information about the sources of economic growth. If human capital plays a role in the total factor productivity growth, the contribution of human capital to economic growth should be more significant than what growth accounting evidences.

1. Sources of economic growth

There have been several attempts to investigate the ingredients of Korea's economic growth following the growth accounting approach. By decomposing the growth of output into a variety of inputs, the growth accounting procedure gives a measure of human capital's contribution to output growth.

Table 10 reports estimates of the sources of growth in Korea during 1963-72 and 1972-82, based on the work by K.S. Kim and J.K. Park (1985). According to the Table, about 64 percent of Korean output growth during 1963-83 is explained by increases in factor inputs, such as labour, human capital and physical capital, while the remaining 36 percent of output growth is attributed to total factor productivity growth. The contribution of factor inputs were larger in the second period: the factor inputs accounted for 51 percent of output growth in the first period, 1962-72, while they accounted for nearly 80 percent of output growth from 1972 to 1982. The importance of capital inputs also increased in absolute as well as relative terms from the first to the second period, reflecting development of capital-intensive industries during the 1970s.

The growth accounting approach shows that the contribution of human capital to economic growth had not been sizeable in the Korean economy: although the increase in human capital explains 0.7 percent of the annual growth rate during the period 1963-82, it accounts for only less than 10 percent of total growth. Thus, growth accounting implies that human capital was not a major factor of fast economic growth.

The argument for the large contribution of factor inputs, but a small contribution of human capital to Korean output growth has also been brought into discussion recently by Young (1995). According to his estimates, more than 84 percent of Korean output growth for the period from 1960 to 1990 was explained by factor accumulation, whereas the contribution of human capital was estimated at merely 7 percent of output growth.

In general, the growth accounting estimates show that the contribution to growth of human capital as a productive factor has been small in the Korean economy. However, the growth accounting method is thought to ignore the contribution of human capital to the growth of other inputs and technological progress. Because the growth accounting method provides only a mechanical decomposition of growth of output into a variety of inputs and total factor productivity, it does not explain where the growth of inputs and total factor productivity came from. For instance, more human capital may lead to faster physical capital accumulation. Because marginal productivity of physical capital becomes higher with more abundance of factors complementary to physical capital, accumulation of physical capital increases with more human capital stock. Benhabib and Spigel (1994) show that the level of initial human capital stock is positively correlated with a subsequent accumulation of the physical capital in cross-country data. Hence, we may conclude that in Korea human capital has made an additional contribution to income growth by encouraging physical capital investment, considered that rates of return to investment are high due to a well-educated labor force.

2. Human capital and technological progress

In addition to the stimulating effect of human capital on physical capital accumulation, there is another positive effect of human capital on technological progress. TFP growth may be an outcome of the efforts and capability of technological improvement in the economy. And, because the capability of technological improvement hinges on the human capital stock present in the economy, human capital significantly affects the growth of the total factor productivity.

Recent studies of endogenous economic growth, such as Romer (1987, 1990) and Grossman and Helpman (1991), emphasize the role of technological progress in the process of economic growth. This literature highlights the endogenous determination of technological progress, and considers technology diffusion one of the most important factors in explaining long-term growth, particularly of developing countries. In standard models of technology diffusion, the rate of growth of a developing country depends on the extent of the adoption and implementation of new technologies that are commonly used in advanced countries.31 However, the "catch-up" process requires both the new technology and a capacity of absorbing the new technology information, and the absorptive capacity is considered directly related to the human capital stock present in the country. Jamison and Lau (1982) show that farmer education strongly influences early adoption of new farm inputs. Benhabib and Spigel (1994) present cross-country evidence that the growth rate of total factor productivity depends on a nation's human capital stock. Borensztein, DeGregario and Lee (1995) show that human capital is a key factor

necessary to interact with the inflows of foreign direct investment and thereby increase technological progress in developing countries.

In the Republic of Korea, firms are, in general, encouraged to adopt the advanced technologies developed in high-income countries. Importation of high-technology products (in particular intermediate inputs) was subsidized by the government for a long period.32 The adaptation of the inflows of the advanced foreign technology was not an automatic process at all, but was only possible by a well-educated labour force that, fortunately, Korea had from the beginning of its export-oriented industrialization.

There is much evidence that Koreans know the importance of human capital in absorbing foreign technology. Since the early 1960s when Korea adopted an outward-looking strategy, many Korean workers and managers went abroad to learn about the foreign technology. Dahlman, et al. (1987) cite, as an example, 50 South Korean workers who were sent to a shipyard in Scotland when Korea launched the first large shipyard construction. Now South Korea is one of the leading shipmakers in the world. Koreans have shown remarkable speed in moving into new technology fields, now reaching world-class levels in areas of state-of-the-art technology, including semiconductors, telecommunications, aerospace and civilian nuclear energy.

During the period of export-oriented industrialization Korea had rapid expansion of secondary education, which was the cornerstone of its ability to learn and adopt Western technologies in order to develop new exports. Therefore, the adoption and application of new technology has been and continues to be more intense and broader in scope in Korea because of its well-educated labour force.

V. Concluding remarks

This paper has shown how Korea has achieved a remarkable record of high and sustained economic growth and human development. It is noted that economic growth and human development have been closely related and interacted with each other throughout periods of high economic growth.

First of all, human capital is considered one of the major factors in explaining Korea's remarkable economic growth. The contribution of human capital to growth goes beyond that indicated by conventional growth accounting because the abundant well-educated human resources have been playing a key role in the absorption of advanced technology from developed countries and thereby bringing about Korea's high levels of technological progress.

On the other hand, human development itself has undoubtedly benefited from the strong demand for education triggered by the growth of income. However, Korea's unprecedented growth of education indicates that the accomplishment in human development is not just an outcome of economic growth itself but, rather, can be

attributed to special features of the Korean growth strategies that were pursued with both equity and outward-orientation.

We show that outward-orientation was critically important to rapid growth of human capital. Because outward-oriented strategies generate ample opportunities for new employment and much higher compensation for human capital, they have encouraged the Korean people to invest more in accumulation of human capital. In addition, the Korean government, facing global competition in its outward orientation, has been actively involved in education and training of workers.

A combination of high growth and equitable income distribution is another key factor in Korea's achievement in human development. Throughout the period, Korea has demonstrated relatively equal income distribution, which has enabled the majority of the people to afford education, in particular, at the higher levels.

Future research will reveal more details about the characteristics of Korea's human development. In particular, some measures indicate that Korea has achieved outstanding quality of education as well as quantity of education for the last three decades. Further investigation of this issue will improve our understanding of Korea's economic success.

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3 For more recent contributions, see Dornbusch and Y.C. Park (1987), Collins and W.A. Park (1989), World Bank (1993), and Haggard, et al. (1994).

4 In this paper educational attainment is considered a main component of human development. However, human development should be thought of more broadly than either education attainment or human capital. Human Development Report (1990) emphasizes two sides of human development: the formation of human capabilities - such as improved health, knowledge, and skills - and people's use of these acquired capabilities for economic and social purposes.

5 For more detailed description of Korean economic development, see Collins and W.A. Park (1989), Haggard, et al. (1994), Suh (1992), and references therein.

6 It must be noted that most of the industrial plants, including those for power and chemicals, were left in the northern part of Korea. It was estimated that after the Liberation South Korea had 66 percent of the population, 60 percent of the agricultural production, but only 42 percent of the industrial production. (Kim and Roemer [1979]). However, many of the Japanese assets that were left in Korea were destroyed during the Korean War.

7 On the other hand, it should be noted that the Japanese created many Korean firms, and thereby transferred modern managerial technology to the Koreans. Thus, the role of the Japanese rule in subsequent Korean economic development remains controversial. See Suh(1978) for a detailed discussion of Korean economic development under the Japanese rule.

8 The policy makers of Park's government did not pursue export promotion policies because they believed in the advantages of export orientation over import substitution. Hong (1978, p.58) notes that "the adoption of an export promotion policy was a natural response to the declining grant-in aid and expanding demand for foreign exchange." However, the shift of development strategy from import substitution to export orientation was very much helped by the concentration of political power in the military government which prevented any interference from interest groups, the legislation, and bureaucratic force (see Haggard, Moon, and Kim [1991]).

9 A positive aspect of the debt accumulation in Korea is that most of external borrowings were used for a financing of current deficits which in turn reflected strong investments (particularly in the traded good sectors). In many other large debtor countries the debt was used to finance capital flights or investment in nontradeable sectors.

10 Lee(1995) presents empirical evidence that Korean government intervention policies had a negative impact on the productivity growth of the industries targeted. Thus, the government industrial policies were in general inefficient because they targeted premature industries. However, it should be noted that some of the promoted heavy industries in the 1970s performed well in the 1980s and 1990s,

11 For more details of the liberalization and stabilization programs during the early 1980s, see Collins and Park (1989), and Haggard and others (1994), and references therein.

12 In fact, the erratic increase in college enrollments raised many problems including unemployment of college graduates, and declines of quality of college education. Thus, in 1961 the Park military government

adopted a policy of curtailing college enrollments, but only unsuccessfully. See McGinn and others (1980, p.38).

13 The public education expenditures were lower in earlier years- only 2.0 percent of GDP in 1960 (UNDP, Human Development Report, 1990)

14 In-school expenditures are from the official statistical data, and out-of-school expenditures are estimates based on sample surveys (see Y.Kim [1980] for detailed explanation).

15 McGinn, et al. (1980) describes as follows: "In a society where the ruling class standard had been destroyed without being replaced by a new form of status distinction, educational and political positions became the most important criteria of vertical stratification." (p.246. note 7).

16 It can be argued that strong demand for education had been a tradition in Korea for more than six hundred years prior to the post-colonial period because Korea had been heavily influenced by the Confucianism. However, although the Confucian tradition emphasized education, respect for teachers, and prestige of public service, it might not contribute significantly to expansion of education for Korean people because, for most cases, only the ruling class (called *yangban*) were allowed to have formal education on a tutorial basis at private houses (*sodang*).

17 The average wage of male workers with college education peaked in a relative term at 2.1 times the average wage of those with high school education in 1976 and then gradually declined to 1.4 in 1993 (see Lee and Kim [1996]).

18 According to Suh (1978, p.153), in 1939 there were only 1.3 Korean students in high schools for every 1,000 Koreans, compared to 32.7 Japanese students for every 1,000 Japanese living in Korea.

19 There were also 1,100,000 Koreans who had lived in Japan, and then returned to Korea at the time of the Liberation. They were considered more educated that average Koreans. (McGinn, et al.[1980,p.83])

20 For more detailed analysis of the United States' role on education in Korea, see McGinn, et al, (1980) and references cited by them.

21 The statistics on literacy in Korea, like many other developing countries, may be considered somewhat inaccurate. The statistics count a person who can read and write simple sentences as literate. Because the Korean alphabet has only 24 characters, it can be learned in a relatively short time. But, without additional knowledge of the Chinese characters it is difficult for Korean people to read and understand Korean newspapers and books.

22 The share of machinery and transport equipment in total merchandise exports increased dramatically from 3 percent in 1965 to 37 percent in 1990 (World Bank, *World Development Report*, 1992).

23 This paragraph is cited from S. Kim and Y. Kim (1994, p.3), which provides an interesting theoretical model that formalizes a role of education in increasing the adaptability of workers facing uncertain technological changes.

24 Evidence shows that there is a strong correlation between trade regimes and factor market price distortions. See Krueger (1983).

25 Kim and Topel (1995) provide a detailed evidence that supply of skilled workers was very responsive to shifts in relative demand across Korean industries.

26 See S. Kim, J. Kim and C. Ihm (1992) for a detailed description and critical evaluation of the Korean vocational training system.

27 Over 20 percent of net capital stock and 40 percent of manufacturing facilities in 1953 were destroyed by the Korea war (Collins and Park [1989, p.304]).

28 There are other estimates which show more significant deterioration in income distribution in Korea during the 1970s and 1980s. Choo (1993)'s estimates are considered more or less consistent and provide the longest time series data.

29 The Livelihood Protection Program, which was established in 1961, was a main social welfare policy in Korea, and provided the poor with subsistence assistance, such as cash allowance, direct supply of food, and exemption of tuition fees for middle school students. Each year of the 1980s over 5.5 percents of the total population were benefitted by this program. The medical insurance program, which was enacted in 1977, has provided support of medical service for the poor who are the beneficiaries of the Livelihood Protection Program or other low income families. For more details, see Lee(1993) and Human Development Report (1990,p.46).

30 The majority of secondary schools has been private in Korea: the number of private schools was 1,556- amounting to 37 percent of total secondary schools in 1990. (Korean Educational Development Institute, *Educational Indicators in Korea*, 1993)

31 See Nelson and Phelps(1966), and Barro and Sala-I-Martin (1995, ch.8).

32 According to Collins and Park (1989) since 1965 the exemptions from indirect taxes and tariffs were the two most important export incentives given to imports of raw materials and capital equipment, and accounted for 10 to 20 percent of the official exchange rates.