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# Historical Statistics of Korea:
## A Survey*

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*Korea was forced to open itself to international trade in 1876 and it was annexed by Japan in 1910. Thirty-five years later, Korea regained independence, but the country was split into two separate regimes North and South Korea. During each of these periods, a different system for gathering statistics was used, which makes it difficult to compile a consistent series of annual figures over those periods. Territorial division creates another obstacle because statistics from the pre-liberation period cover the entire peninsula, but those of the period after are confined to the southern half. Compiling statistics according to international standards began in South Korea during the 1950s and 1960s, although there are differences depending on the area being explored.*

*Several attempts have been made to compile statistical data from those past periods and link them with current statistics. This article surveys such research, focusing on the population figures, per capita GDP, trade index, and consumer price index. Our purpose is to clarify how these century-long series of statistics were estimated, what new findings were gleaned from the series, and what tasks still remain.*

***Keywords:*** *Historical Statistics, Long-term Statistics, Population, National Accounts, Trade, Price, Korea.*

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# I. INTRODUCTION

The purpose of this article is to inform about the present situation in historical statistics of Korea—the extent to which the statistics have been compiled in each field, and to examine what problems remain. "Historical statistics" in this case includes—along with the statistics of the traditional period—the statistics of the Japanese colonial period and of a certain period after liberation. After World War II, most countries started to compile statistics according to a common standard, making it possible to compare data across countries. In South Korea, too, compiling statistics based on the international standard began in the 1950s and 1960s, although there were differences depending on the field. For this reason, it is difficult to link the statistics of the earlier period to current statistics or compare them with the statistics of other countries. Compiling statistics for each period to make long-term consistent series has become an important task.

However, the availability of statistics for each period differs, which leads to differences in the goals pursued and methods of approach. The state of the statistical data for the time in question can be briefly summarized as follows.

First let us examine the statistics of the traditional period. There were no modern statistical surveys at that time, so the available statistics are very limited. True, the household and land statistics, which formed the basis of government collection of taxes, were collected nationwide. However, non-relatives were often included in household data, making it difficult to assess the overall population. *Kŏlsu*, the measure for assessing land, was a taxation unit, and its grading differed so much from the original regulations that it is hard to estimate the actual land size. Therefore, the only way to approach the conditions of the time is to rely on microscopic and fragmented data. One example is genealogical records and records left by landowners, merchants, and Confucian academies (journals, harvest records, property division records, etc.). From these materials we can obtain information about prices—such as prices for purchasing or selling commodities, interest rates, and wages; information about size of land and its productivity—such as yield or rent acquired with it; about births and deaths in one family; and other data. Of course, these types of statistics are fragmentary and cover only certain

areas, so there is a limit to their ability to represent developments in the entire country. The task is to make up for this limitation by enlarging the sample size based on the newly found microscopic data.

Second is the the statistics of the colonial period. The first modern statistical surveys began during this period and the number of national surveys (which produced both comprehensive and field-specific statistical books) rapidly increased. One characteristic of these surveys is that Japan extended to its colonies, including Chosen (Chosŏn), the survey standards and methods utilized at home. The Japanese Government-General of Chosen received from local administration offices regular (annual, quarterly, monthly, etc.) reports on current conditions in several spheres, composed according to the "Chosen Government-General Report Forms"; organized the data of the reports; and published several types of statistical books such as the "Statistical Yearbook of the Chosen Government-General" (hereafter, "Yearbook"). Besides these administrative statistics, the Government-General carried out other kinds of nationwide surveys such as the "National Survey." Thus, the statistical data of the colonial period is comparatively large but there are certain limits. Firstly, the coverage area was small during the early colonial years until the administrative system for collecting statistics was established. Dealing with this problem is an important precondition for examining the conditions during the early colonial period. Secondly, the international standards were not used to compile statistical data at that time, so the data must be reorganized.

Next, let us examine the period from the 1940s and until statistics started to meet international standards after Liberation. Publication of statistical data at the end of the colonial period was constrained by the conditions of war. The representative statistical publication "Yearbook," for example, did not provide the statistical data for 1941 and after, although there were differences depending on the area of statistics. In addition, some of the statistics were classified and some were defined as "other." After Liberation, previous statistical books stopped publication and new ones to replace them did not start coming out until much later. For example, the "Korea Statistical Yearbook" was first published in 1952, but the amount of statistical data it provided was significantly reduced. Since no comprehensive statistics are available for the interim period, researchers must work with the fragmentary

statistics that remain in each field. Moreover, the compilation procedures at that time did not follow the international standards. Therefore, the main tasks for this period involve collecting and organizing data, and building a long-term series linking these data with the statistics for the previous and subsequent periods.

We refer to these series linking the historical statistics of each period as consistently as possible with the current statistics as "long-term statistics." Hereafter, we will examine the current situation in compiling long-term statistics in four selected areas—population, national accounts, trade, and consumer prices. Population and national accounts comprise the basic statistical data for investigating the social structure during a given period as well as making cross-country comparisons. Trade allows us to build the longest series going back to the period of the opening of Korea to the West, whereas consumer prices (specifically, the consumer price index) are chosen because they make possible a comparison of the statistics on nominal values in different periods. These are relatively advanced areas in terms of the compilation of long-term statistics. There are various types of statistics in each area, but in this article, considering the space limitations, we focus on the total population size, GDP per capita, trade index, and consumer price index.

The article has the following structure. In sections II to V, we will briefly examine how the long-term statistics for population, national accounts, trade, and consumer prices were estimated, what tasks remain, and what findings can be gleaned from these long-term statistical series. In the conclusion—section VI—we will discuss the significance of compiling such long-term statistical series.

## II. POPULATION

The population census (national census) was first conducted in Korea in 1925, and since then has generally been carried out every five years. The exceptions are the population censuses of 1944 and 1949, but from 1955 the census returned to the regular 5-year term. Among the two exceptions, in 1944, the number of surveyed items was smaller than in the previous

years; and in 1949, the census only covered the population figures for each gender in every administrative district. The population figures of this period demonstrate great fluctuations because of the return of Korean expatriates from overseas, the rapid increase of refugees from North Korea, and deaths during the Korean War. Scholars face two tasks in this respect: assessing population figures of the period before the beginning of the national census, and providing estimates of population figures for each year during the upheaval period of 1944-1955.

The first task is to address the population figures prior to the national census of 1925. Besides the national census, there are the population statistics of the administrative survey called the "Household Survey," which began in the early years of the colonial period. However, these figures show a very sharp increase in the population during the early colonial period, and this reflects not the actual conditions but the improvement in accuracy of the household survey as the colonial administration was building the administrative system. That is why several attempts have been made to estimate the population size from 1910-1925 without referring to the household survey. What follows is a brief examination of the results of such research and tasks for the future.

In Table 1, we summarized—along with the population figures of the household survey—the results of the studies that attempt to estimate the population size from 1910-1924, as well as characteristics of these assessments. If the results of the studies are compared based on the population size in 1910, all of them provide a larger figure than the household survey, but the figures vary from 14.77 million to 17.42 million people (an increase of 0.59% to 1.7% in the years 1910-1925), which is a substantial difference.

The first study, in order of publication, is by Ishi (1972). Using the data of the national census, he calculated the progress in survival rate for each (five-year) age group after 1925, and made projections on the earlier period based on the assumption that such a trend of increasing survival rate had been taking place before the national census began. Using this method, the scholar calculated the survival rate for each age group prior to 1925 and was therefore able to estimate the population size by age group. On the other hand, Kwon et al. (1975; 1-7, 12, 23) hypothesized that the annual rate of natural increase

**Table 1.** Results of the Population Assessments for 1910-1924

| | Population in 1910 (thousands) | Increase rate from 1910-1925 (%) | Population estimate by age group | Lowest limit (Park Yi Taek 2008) | Effect of Spanish Influenza in 1918 | Potential for future development | Characteristics of assessment method |
|---|---|---|---|---|---|---|---|
| Household Survey | 13,130 | 2.50 | | Failed | | | |
| Ishi (1972) | 15,470 | 1.39 | Present | Failed | | | Retroactive projection of survival rate obtained from national census |
| Kwon et al. (1975) | 17,420 | 0.59 | | | | | Assumption of population transition after 1900 |
| Suh (1978) | 14,770 | 1.70 | | Failed | | | Retroactive projection of population increase trend obtained from national census |
| Cha Myung Su (2006) | 16,270 | 1.05 | Present | | | Present | Usage of genealogical records |
| Park Yi Taek (2008) | 17,000 | 0.75 | Present | | Present | | Usage of death statistics |

(0.2%), calculated based on the household statistics of the Chosŏn period, remained the same until 1900, and then the crude birth rate rapidly increased while the crude death rate started to rapidly decrease. As a result, the rate of natural increase was 0.4% in 1910, 0.7% in 1915, 1.2% in 1920, and by 1925 it had risen to 1.87%. However, this research does not provide clear evidence to support the hypotheses that the population transition started from 1900, the rate of natural increase before that was at the level of 0.2%, and the increase was steady until 1925 (Park, Y. 2008: 335-6, 366). Also, since the population size was estimated based on the total population increase rate, it is impossible to obtain population figures for each age group. Suh (1978) calculated the

population size by retroactively applying to the earlier period the population increase rate of the period after the beginning of the national survey. The assumption is too simple to consider it a population estimate; nevertheless, it was used as the population statistics in the research by Angus Maddison described later.

Cha, Myung Soo (2006) criticized, as lacking empirical evidence, Ishi's hypothesis (1972) that the survival rate after 1925 was a long-term trend that had continued from the earlier period. Instead, Cha deduced the survival rate in each age group of the male *yangban* (aristocrat) population over the age of 20 using genealogical records of four families, which extended to the period before the beginning of the national census. He then compared the survival rates for each age group obtained from the national census and those obtained from the genealogical records for the period after 1925. Based on the relationship between the two sets of survival rates, he was able to correct the bias stemming from the fact that the genealogical records were restricted to the *yangban* class. He observed a certain pattern in each age group when the survival rate in the national census was on the rise, and applied it to estimate the survival rate that was impossible to obtain from the genealogical records—the survival rate of the population younger than 20 years of age. The genealogical records also omitted information on females, so Cha estimated the survival rate of the female population by projecting the relation between the survival rates of males and females in each age group reflected in the national census, to the survival rate of males of the period before the national census, as calculated with genealogical records.

Park, Yi Taek (2008) estimated the population size using the annual death statistics by age group that were published in the "Yearbook." For example, the male population N years old at the end of 1924 equaled "male population N+1 years old at the end of 1925 + number of male deaths N years old in 1925." By retroactively applying this method year by year, the researcher obtained the population figure for 1910. The key to this approach is estimating the number of the deaths not registered in the statistics and the number of immigrants. In his assessment of the population by age group for the period between 1910 and 1924, Park utilized the "Vital Statistics of Chosen," 1914 population statistics for each age group, and other sources to estimate the number of deaths omitted in records. For the size of the migrant

population, he used the estimates of other scholars.

One point deserving special attention in Park, Y. (2008) is that the population size in 1910 obtained through the method described above and calculated with the unregistered deaths assumed to be zero, becomes the lowest limit for any assessment. That is because the population in 1910 was underestimated by the number of unregistered deaths during the period from 1911 to 1925, so the actual population figure should at least attain this level. As is indicated in Table 1, the application of this standard demonstrates that not only the household survey, but also the estimates by Ishi (1972) and Suh (1978) do not satisfy the lowest limit. In other words, the results of these studies and the population figure in the household survey are not compatible with the death statistics published in the "Yearbook."[1] In addition, Park pointed out that the estimates by other scholars did not reflect the increase in the death rate in 1918, when the pandemic of Spanish Influenza reached the Korean Peninsula leaving a high death toll among the local population.

Cha, Myung Soo (2006) satisfied the lowest limit condition. However, the fact that he estimated the population increase rate for the period of 1921-1925 lower than that for the period of 1916-1920 when the death rate was high due to the Spanish Influenza epidemic is questionable. The problem can

[1] On the other hand, regarding the assessment of population by age group, Park, Y. (2008: 365-6) also used death statistics by age to suggest the highest limit for estimating the population increase rate during three periods. According to Park, if the population increase rate in each of the three periods—1911-1915, 1916-1920, and 1921-1925—is shown in a graph, it will display a V shape. The reason for this is the large number of deaths due to the Spanish Influenza epidemic during the period of 1916-1920. Evaluated against this argument, the population increase rate in 1916-1920 suggested by Ishi (1972) does not meet the standard. In the case of the research by Kwon, T. et al. (1975), their estimate of the population size in 1910 is high, so it fulfills the lowest limit condition, but the population increase rate in 1911-1915 is calculated lower than that in the other studies. As a result, the increase rate during each period in the study by Kwon, T. et al. does not take the V shape, but consistently increases; therefore, Park renders the estimates by Kwon et al. for the first half of the 1910s problematic. Nevertheless, since Kwon, T. et al. (1975) did not suggest the population figures by age group, it is difficult to apply this standard. As for Cha, M. (2006), he performed but did not publish the assessment of population size by age group. Calculations based on his statistics yield the conclusion that his research meets the highest limit condition for the population increase rate in all three periods.

be attributed to the very small—compared to the overall population size—sample of genealogical records that he used. However, the problem is likely to be resolved in the future if the genealogical record sample is enlarged. Moreover, the biggest strength of genealogical records is that despite providing microscopic data restricted to a number of families, the material is based on firsthand observation and can be extended from estimating the population during the early colonial years (1910-1924) to the Chosŏn Dynasty period. Therefore, this research, compared to other studies, has good potential for future development.

The estimates by Cha, M. (2006), with minor revisions,[2] were reintroduced in Cha and Kim (2012). Since the Korean population during the colonial period refers to the entire Korean Peninsula but after the liberation is restricted to South Korea, it is necessary to divide the population of the colonial period into that of the northern and southern parts. Kim, N. (2009a), attempted this by first, obtaining the population figures for each province. For the years of the national census, he calculated the ratio of the province population in that year; for the other years, he obtained the province population ratio from the household survey ("Yearbook"), and then divided the total population from Cha, M. (2006) into the population by province. The problem was to divide the population of Kyŏnggi-do and Kangwŏn-do (provinces), especially the eight *kun* (郡, districts; two in Kyŏnggi-do and six in Kangwŏn-do) that are located along the Military Demarcation Line. Kim, N. (2009a), following the approach of Moon, Ho-il (2006), calculated the ratio of *ri* (里, villages; those crossed by the Military Demarcation Line were calculated as ½) in the eight *kun* that belong to South Korea, and, based on this ratio, obtained the ratio of the South Korean population in each *kun*. By applying the ratio to the population of each gun as recorded in the "Yearbook,"

[2] The total population size in Cha, M (2006: 521) is the sum of the Korean people and foreigners, and the figure for the period prior to the national census (1910-1924) directly cites the foreign population figure recorded in the household surveys. However, the comparison of the household survey with the national census shows that the foreign population figure was also underestimated. Cha and Kim (2012) obtained the ratio of foreign population (i.e., the rate of omission) from the two surveys conducted in 1925, and applied this ratio to the population recorded in the household surveys of the earlier period to revise the number of the foreign population.

Kim was able to estimate the population of the southern part of the peninsula among the populations of Kyŏnggi-do and Kangwŏn-do, and to divide the total population figure into the population figures of the northern and southern parts.

The second task is to estimate the population size for each year during the period from 1944-1955. The National Statistical Office started to publish annual population figures in 1960, so there are no official statistics for the previous years. Even if we use the figures of the national censuses conducted in 1944, 1949, and 1955, they will not provide us with information on large annual changes in the population due to population shocks, such as the return of Korean expatriates from overseas and the inflow of refugees from the North after the liberation, as well as a rapid increase in deaths during the Korean War. Angus Maddison (1995; 2003; 2010) offers population figures for each year during this period, but the evidence supporting his research is not clear.[3] On the other hand, Kim, N. (2009b: 88-94) estimated the annual population size during this period using the following method. First, he used the estimated for the number of migrants from overseas, deaths due to the Korean War, and refugees from the North as suggested in Kwon, T. (1977: 177, 204). Next, he assessed the distribution of migration flows by year based on the immigration data of the U.S. Army Military Government in Korea (Kim, D. 1999) and other material. Subtracting the overseas migrant population from the figures recorded by the population censuses in 1949 and 1955 and adding the number of the war dead provides the population size without the effect of population shocks. These hypothetical population size changes (during the periods of 1945-1949 and 1949-1955) can be assumed to occur due to the natural population increase. He then obtained the size of yearly natural increase by assuming that the annual rate of natural increase remained constant. He subtracted from that figure the number of international migrants for each year and the number of the dead during the Korean War as calculated above, and then he estimated the population each

[3] The population figures for 1946-1948 have been confirmed to match with the estimates of the U.S. Army Military Government in Korea (Bank of Korea 1959: 10), but it is impossible to find the basis for his figures for the other years.

year during the period under scrutiny.[4]

The task for the future is to supplement the assumptions made during these assessments with newly discovered material. If we link the population estimates provided in the studies described above with the data of the National Statistical Office, we can obtain the total population size series for the period of 1910-2010.

## III. NATIONAL ACCOUNTS STATISTICS

GDP and the respective GDE are the aggregate statistics calculated according to the common international standard of the System of National Accounts (hereafter, SNA; UN 1953; 1968; 1993). In Mizoguchi and Umemura ed. (1988, hereafter "Mizoguchi's estimates"), the researchers estimated the GDP and GDE for the period of 1911-1938. Their work was part of the "Long-Term Economic Statistics" (LTES) project conducted by the Institute of Economic Research of Hitotsubashi University in Japan. Mizoguchi's estimates are used as the pre-liberation period series in the cross-country GDP per capita statistics compiled by A. Maddison, whose research we will describe in detail later.

Kim, N. ed. (2006) refined Mizoguchi's estimates in several respects (Mizoguchi 2006) and provided the national accounts statistics for the period of 1911-1940. The details of the assessment method can be found in the respective part of Kim, N. ed. (2006), so we will limit the discussion here to pointing out several characteristic features of the research. Firstly, the added value for each business sector was obtained by subtracting the intermediate consumption from the output. This method was used in the case of business sectors such as agriculture for which the intermediate consumption data were available. For the business sectors that lack such data, Kim, N. ed. (2006) estimated the added value by multiplying the output by the added value ratio

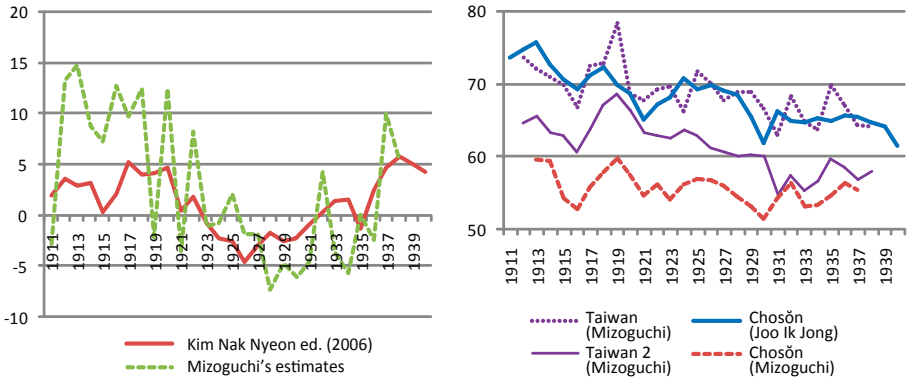
[4] However, if the population estimated using this method is compared to the mid-year population used by the Bank of Korea after 1953 to obtain the indexes per person, one can find that the two sets of figures are very close. This factor was taken into consideration when selecting the mid-year population figures of the Bank of Korea for the period of 1953-1959.

for each business sector code recorded in the input-output tables for 1966. Scholars supplemented data for the items that were omitted or insufficiently covered in the statistical surveys during the early colonial period and made adjustments for the discontinuities that occurred due to modifications in a survey method (for example, for rice yield in 1936).

In the case of the service industry, due to the scarcity of data, scholars often have to rely on estimations. When examining the wholesale and retail business, Park, Y. (2006), for example, reclassified the statistics for output and trade according to the business sector and estimated the value of the domestic supply (= output value – export value + import value) and distribution value for the wholesale and retail business. To examine prices, he used producer, wholesale, and retail price surveys for each product, and estimated the mark-up ratio at each distribution phase. By multiplying the distribution value and mark-up ratio, it is possible to obtain the total distribution margin. Then, by deducing from the figure the transport margin, it is possible to calculate the output value of the wholesale and retail business. The wholesale and retail mark-up ratio estimated this way can be used not only in assessing a wholesale and retail output, but also for converting producer prices to consumer prices when assessing expenditure. This approach, in contrast to the method used by Mizoguchi, improves the coherence and reduces any discrepancy between the GDP and its expenditure (GDE).

As for the assessment of expenditure (private consumption, government consumption, investment, etc.), which did not become a subject of surveys conducted during the period in scrutiny, Kim, N. ed. (2006) used the commodity flow method in the estimations. The method involves obtaining the amount (or volume) of domestic supply for each product from the production and trade statistics, and allocating it to the intermediate and final consumption (consumption or investment). Two types of information are required. Firstly, it is necessary to adjust the prices at each phase of distribution, which was achieved by utilizing the mark-up ratio described above. Second is the ratio of allocation of commodities to intermediate goods, consumption, investment, which was calculated when the data of the time was available. When that data was not available, the research cited the allocation ratio from the 1966 input-output tables.

The deflators by industry and type of expenditure were estimated with




a. Statistical Discrepancy/GDP (%) b. Trends in Engel's Coefficient (%)

Comment: Engel's coefficient = food expenditure/private consumption expenditure*100

**Figure 1.** Examination of Mizoguchi's Estimates

the price for each product (=production value/production volume) and the item's weight in the total production (or expenditure). For the formula, the research applied the Fisher chain price index methodology. The Fisher chain price index has many strengths compared to the traditional method in which the weight for the base year is fixed during a certain period of time (usually five years). The rate of change obtained with this deflator is not affected by base year shifts. What's more, it is possible to reflect in a deflator the price information even when the price data do not extend for a long period of time. In the 1993 SNA, the United Nations recommended adopting the chain weighted method, and the Bank of Korea moved to using this method during the recent shift of the base year to 2005.

Let's briefly compare Mizoguchi's estimates and the estimates suggested in Kim, N. ed. (2006). Firstly, both scholars provide the assessment of the GDP and corresponding expenditure (GDE), and theoretically, the GDP and GDE should be exactly equal. In reality, however, there is a gap between the two due to a measurement error. This gap is called the "statistical discrepancy." Figure 1a demonstrates the scale of the discrepancy against the GDP. We can see that, compared to the statistical discrepancy in Mizoguchi's estimates, the discrepancy in the statistics suggested by Kim, N. ed. (2006) is significantly

smaller.

Figure 1b points to a problem in Mizoguchi's estimates of expenditure. It displays the Engel's coefficient (=food expenditure/private consumption expenditure) for Chosŏn and Taiwan calculated based on Mizoguchi's estimates, on the new estimate by Mizoguchi (Mizoguchi ed. 2008) for Taiwan, and on the estimates of private consumption expenditure (Joo, I. 2006) as suggested in Kim, N. ed. (2006). As we can see in the graph, the Engel's coefficient for Chosŏn calculated based on Mizoguchi's estimates appears much lower than that for Taiwan, which is difficult to accept since the income per capita in Chosŏn was considerably smaller than in Taiwan. The fact that despite a trend of increase in income per capita in Chosŏn, the decline in the Engel's coefficient is modest, is also problematic. The contradiction and problem disappear if we compare the estimate for Chosŏn by Joo and the new estimate for Taiwan. Finally, in obtaining indicators per capita, Mizoguchi cited the estimate by Ishi (1972), but the latter estimate, as can be seen in its failure to meet the lowest limit condition suggested by Park Yi Taek, underestimates the population size for the period before the beginning of the national census.

Considering the points discussed above, we decided to use the estimates (for the period of 1911-1940) suggested in Kim, N. ed. (2006).[5] In order to compile a long-term statistics by linking these estimates with the current series provided by the Bank of Korea for the period after the liberation, it will be necessary to address the three issues described below.

Firstly, in order to link the statistics of the pre-liberation (both parts of Korea) and post-liberation (South Korea) periods in a consistent manner, the series of the pre-liberation period should be divided to cover the two parts of the peninsula separately. Luckily, the production statistics of the period before the liberation provide most data by province. In addition, the results of the research that used these statistics to divide the GDP estimated in Kim, N. ed. (2006) by province (and into the GDP corresponding to the southern and northern parts of the peninsula) have been published (Kim, N. 2008). When

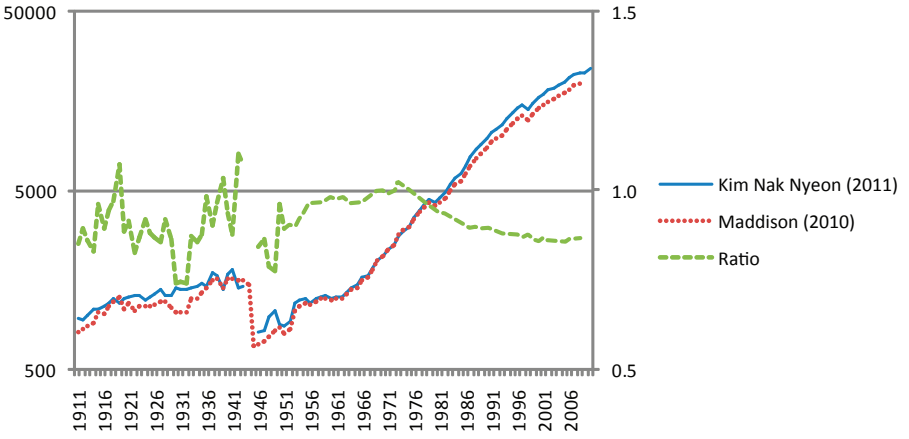
[5] Kim, N. ed. (2006) later revised the results to reflect corrections of errors in data input. The newest version of the long-term national accounts statistics can be found in Kim, N. ed. (2012) and Cha and Kim (2012).

allocating the GDP calculated by province into the parts corresponding to the north and south, there is a problem with two provinces—Kyŏnggi-do and Kangwŏn-do—which are located on the Military Demarcation Line, but the North-South division ratio calculated in the above-mentioned research can be applied in this case as well. The limitation is that such a division by province (and into the north and south) is possible only for GDP, and cannot be applied to GDE statistics.

Secondly, while the Bank of Korea has been publishing the GDP statistics since 1953, updating the data after each shift of the base year according to the standard of the current series (1993 SNA) has been done only in the series from 1970, while the earlier statistics (1953-1969) follow the 1953 SNA. Accordingly, it is necessary to adjust the old series of the Bank of Korea (1953-1969) so that it matches with the current series. Kim, N. (2009a) provided the adjusted results for the GDP by economic activity and corresponding GDE, as well as for the principal indicators.

The third task is to assess the actual conditions in production during the period of political turbulence when the publication of comprehensive statistics ceased from 1941 to 1952. Due to the shortage of data, it is difficult to estimate the GDP of this period. However, using the fragmentary available material, it is possible to restore a picture of developments in production for some industries. Kim, N. (2009b) attempted to make this kind of assessment for agriculture, forestry, and fishery. Park, K. and Ryu, S. (2010) organized the scattered statistics on the production volume in mining and manufacturing during that period and made estimates of the production index. Following these studies, Kim, N. (2011) suggested a long-term GDP series (prices of 2005) for the period of 1911-2010 (excluding 1944-1945). Moreover, his study presents principal indicators—which include the rate of change and distribution ratio for each item in the GDP and GDE—as a long-term, 1911-2010 series (with the exclusion of 1941-1952; for the period before the liberation—northern and southern parts, after the liberation—South Korea).

Figure 2 demonstrates the estimates of the GDP per capita from 1911 by Kim, N. (2011) and Maddison (2010). In the case of Maddison's study, for the period of 1911-1938, he uses Mizoguchi's estimates, for 1939-1940—he cites Suh (1978), and for the period of 1941-1952, he seems to have made his own assessment yet no clear basis for the assessment is provided. For the periods




Comments: 1) Ratio (scale on the right side) is Maddison/Kim Nak Nyeon. 2) GDP per capita (scale on the left side) unit is the 1990 Geary-Khamis dollar.

**Figure 2.** Long-term Trends in GDP per Capita (Maddison vs. Kim Nak Nyeon)

of 1953-1969 and after 1970, both scholars rely on the data of the Bank of Korea, and each of the two series is linked and calculated in the 1990 Geary-Khamis dollars. To compare the two series, their values for 1970 have been matched, and for Kim, N. (2011), the series were extended with values for the periods before and after 1970 using the rate of change of the GDP per capita suggested in Kim, N. (2011).

In order to discern the discrepancy in GDP per capita between the two series, the figure also provides the ratio between them (scale on the right side). At its maximum (the early 1930s), the gap reaches 28%. The discrepancy in the period after 1953, despite the fact that both scholars used the material of the Bank of Korea for that period, is caused by the difference in the adopted versions of the series. Kim, N. (2011) based his research for the period after 1970 on the recent series (2005 prices), which uses the chain weighted method, and for the period of 1953-1969, he cited the 1975 constant prices series (Bank of Korea 1982; both series are currently available on the homepage of the Bank). In contrast, Maddison combined several versions of constant price series published earlier. The discrepancy between the series of estimates for the period prior to 1953 is also large. It results from a complex

set of factors: problems in Mizoguchi's estimates described earlier, the problem of dividing the GDP of the colonial period into that of the northern and southern parts of the peninsula,[6] and the above-mentioned problem of the population figures used by Maddison. At present, Maddison's research is widely cited around the world, but in our view, it is necessary to revise his estimates and replace them with the estimates suggested in Kim, N. ed. (2012), which provided clear evidence for the assessment.

Let's look closely at the long-term trend in GDP per capita (left side scale) suggested by Kim, N. (2011), as shown in Figure 2. The trend is marked by a logarithmic scale, so its inclinations stand for the rate of change. We can see that prior to the liberation, the GDP per capita increased annually by 2.3%, whereas during the period of high growth after the liberation, the rate of change accelerated. The peak during the pre-liberation period was in 1941, after which, in 1946, a year after the liberation, the production fell to 43.4% of that level. The subsequent recovery was aborted by the Korean War, and the GDP per capita returned to the pre-liberation level in 1969. Currently (2010), it is 12.9 times higher than at its peak during the pre-liberation period.

There are several reasons for the delayed recovery after the liberation, wherein it is important to note that, prior to the liberation, the GDP figures included the income of the Japanese. Moreover, the population surged after the liberation due to the return of Korean expatriates from abroad, inflow of refugees from North Korea, and the baby boom of the 1950s (Kim, N. 2009b). If we look not at the GDP per capita, but at the total GDP, the point of recovery to the pre-liberation period level will move up by 11 years, to 1958. Therefore, a rapid growth of the population in the 1950s was putting off the recovery of the GDP per capita. This point illustrates what kind of findings can be made using the long-term statistics of the national accounts. Information about long-term trends in a variety of other areas is provided in Kim, N. ed. (2012).

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[6] In order to divide Mizoguchi's estimate for GDP into the GDP of the north and south, Maddison applied the ratio of South Korea in the 1940s to the entire period. However, if we consider that the production ratio of the northern part during the colonial period rapidly increased, especially from the 1930s, applying this method leads to a serious distortion of the actual situation. Regarding this and other problems in Maddison's statistics see Kim, N. (2009a).

## IV. TRADE

For trade statistics, since the data are collected through the customs clearance, it is possible to obtain long-term series going back to the time when the Chosŏn Dynasty first opened its ports to trade (1876). However, there is a big deviation with the data during that period. From 1876 and until maritime customs were established in the treaty ports, there was no institution to compile trade statistics. However,we can get a sense of the circumstances of the time through the statistics gathered by Japan regarding its trade with Chosen ("Annual Returns of the Foreign Trade of the Empire of Japan"). After the maritime customs were built, they were operated by China, so the trade statistics for Chosen during this period were provided in an appendix[7] of the reports published by the Chinese maritime customs. After the Sino-Japanese War, this publication also ceased, and the trade statistics of Chosen maritime customs for the period can be found only in fragments—for example, in "Opisanie Korei [Description of Korea]." After the annexation (1910), the Japanese Government-General took control over the custom procedures and compiled the trade statistics ("Yearbook of Overseas Trade of Chosen") relatively systematically. The statistics for trade with Japan from 1942 to 1944, however, remain in a limited form. After the liberation, the Ministry of Commerce and Industry and the Customs Bureau (later renamed the Korea Customs Service) compiled the trade statistics—each according to its own standard—but until the "Statistical Yearbook of Foreign Trade" started to come out, the data was dispersed in a number of documents published by several agencies.

Several attempts have been made to organize the trade statistics of the period after the opening of ports to obtain the trade price index (Kang, D. 1962; Choe, Y. 1972; 1974; Kim, N. 2001), yet none of them have succeeded

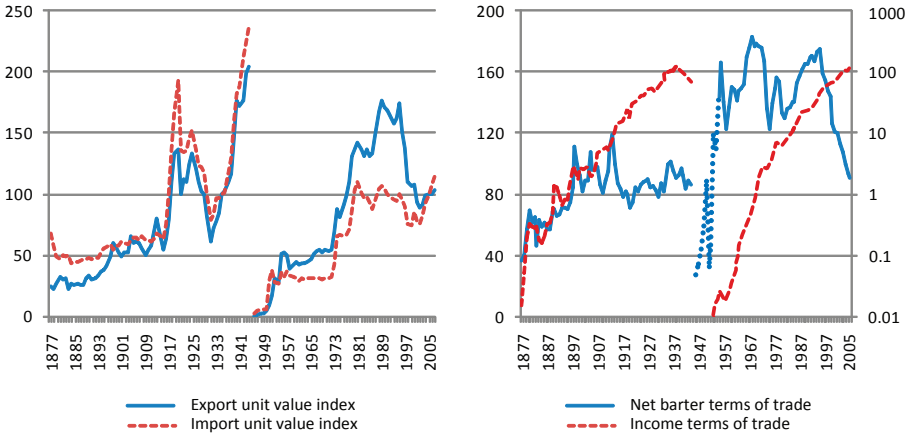
[7] This document is the "Report on Trade of Korea and Abstract of Statistics" of the Chosŏn maritime customs, which was an appendix of the "Returns of Trade at the Treaty Ports and Trade Reports" published by the Chinese maritime customs (Imperial Maritime Customs). The trade statistics in the report covered the period from 1885 to 1893. The appendix was later published in Korea under the name of "朝鮮海關年報 [Annual Returns of Chosŏn Maritime Customs]."

in building an undisrupted index because the scholars have not been able to gather data for certain years. The trade price index of the colonial period was estimated in Mizoguchi and Umemura (1988) and Hori et al. (2006). Both studies used the data from the "Yearbook of Overseas Trade of Chosen." The second of the two studies estimates the trade price index for the entire colonial period, and follows the SITC (Standard International Trade Classification) of trade items, which makes a cross-country comparison possible. Park, K. and Kim, N. (2009) discovered and added to the index the trade statistics of the period after the opening of ports and the period immediately after the liberation and then linked it with the current trade statistics (and Comtrade DB of the UN), which started in 1964. The result created long-term trade statistics for the period of 130 years beginning from 1877.

Different periods used different currencies and units of quantity. Moreover the classification method for trade items also varied but researchers adjusted them to achieve consistency. However, the coverage area for the period before the liberation (both parts of Korea) and after the liberation (South Korea) is not the same, which is unavoidable since the trade statistics of the former period cannot be divided into that of the north and south.

Figure 3a illustrates long-term trends in import and export unit value indices and terms of trade based on Park, K. and Kim, N. (2009). The year 1945 is omitted due to the shortage of data. In the pre-liberation period, the index reaches 100 in 1935; in the post-liberation period, it is 100 in 2005. If the export unit value index is divided by the import unit value index, we can obtain the net barter terms of trade, which trends are presented in Figure 3b. The rupture in the currency of unit price—*won* in the period of 1946-1954 and dollar in the following period—is marked with the dotted line. The net barter terms of trade rapidly rose after the opening of ports, dropped during WWI, and after that were showing a slight trend toward improvement. During the post-liberation period, the fluctuations were severe due to oil shocks and other factors; whereas in the recent period, with the decrease in export unit prices for Korea's main export products—semiconductors and information technology equipment—the terms of trade have been continuously worsening.

On the other hand, the net barter terms of trade show export and

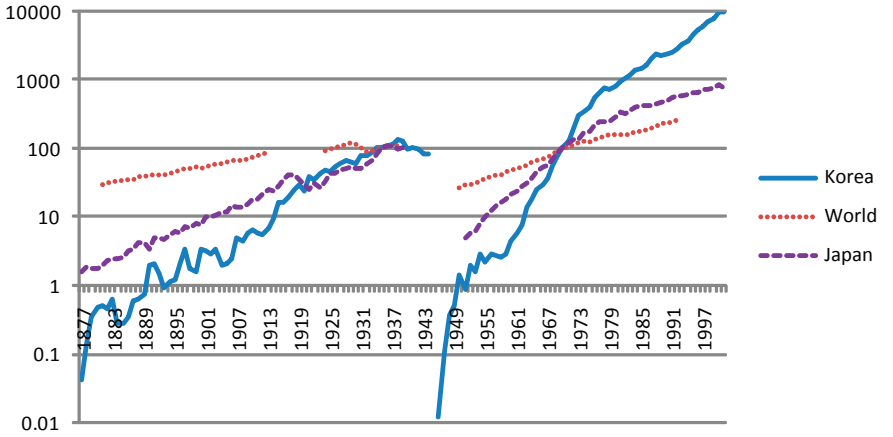



a. Export and Import Unit Value Indices b. Net Barter and Income Terms of Trade

Comments: 1) In pre-liberation index, 1935=100; in post-liberation index, 2005=100.
2) In Figure 3b, the scale for net barter terms of trade is on the left side, the scale for income terms of trade is on the right side.
Data: Park, K. and Kim, N. (2009).

**Figure 3.** Long-term Trends in Trade Index

import price fluctuations only and do not reflect changes in the volume of commodities. In order to assess the actual profit from trade, one needs to consider the income terms of trade. The latter is calculated by multiplying net barter terms of trade by export volume index. The trends in the income terms of trade are shown in Figure 3b. As can be inferred from the formula, the income terms of trade stand for the quantity of imports that a country can obtain with the total export earnings. For instance, a relative decline in the price of an export product makes the net commodity terms of trade unfavorable, but at the same time has the effect of increasing the export volume. What's more, if the latter effect is greater than the former, the income terms of trade improve, even if the net barter terms of trade are disadvantageous. From the figure, we can see that the income terms of trade developed in the favorable to Korea direction in most periods, including the time when the net barter terms of trade were disadvantageous (an exception is the wartime of the 1940s).




Data: Park, K. and Kim, N. (2009); Maddison (1995); Statistics Bureau of Japan (http://www.stat.go.jp/data/chouki).

**Figure 4.** Comparison of Export Volume Indices (1935=100, 1970=100).

Figure 4 is limited to exports. It shows long-term trends in the export volume index (=export value/export unit value index) and allows for a comparison with the trends in Japan and the world average. The fast growth trend of Korean exports stands out not only against the world average, but also against Japan. One more noticeable point is that the export-led growth, commonly known as a major characteristic of the period of rapid growth in the 1960s, was also present after Korea's opening and during the colonial period.

## V. CONSUMER PRICES

Although some fragmentary information about commodity prices still remains from the traditional period,[8] it was not until the colonial period that

[8] For example, information on the prices of rice was collected in each region of Korea in the 18th-19th centuries (Jun, S. 1998; Rhee, Y. and Jun, S. 2000; Rhee, Y. and Park, Y. 2001); and, along with prices for some other commodities, was compiled into the

commodity price surveys started to be carried out systematically. The survey institutions included the Japanese Government-General, Bank of Chosen, and the Chamber of Commerce and Industry. They examined prices for major products in large cities once a month (or quarterly) and published yearbooks, monthly reviews, and other related reports. In the beginning, the surveys focused mainly on wholesale prices, but from the 1920's they also gathered data on retail prices. In the 1930s, a retail price index started to appear in the "Monthly Returns of the Chosen Government-General" and other reports. However, the prices in this index were not weighted but calculated as simple arithmetic averages, and no information on services, but only on goods, was included, so it is difficult to link it with a modern consumer price index.

After the liberation, the consumer price survey became the responsibility of the Bank of Chosen (later renamed the Bank of Korea), which published the wholesale and retail consumer price indices, but the statistics still had the same problems as the above-mentioned problems of the pre-liberation index. The first full-scale consumer price index that can be linked with the current index was compiled by the Bank of Korea in 1955. However, it covered only the Seoul area. In 1965, the responsibility for consumer price surveys was transferred to the Bureau of Statistics of the Economic Planning Board (later renamed the National Statistical Office). From this time onward, the consumer price index of major cities and combined consumer price index of all major cities have been compiled up to the present. Currently, the webpage of the National Statistical Office provides a long-term, retroacted to 1965, series of the consumer price index by city and of all cities (total); and a detailed series of the index, divided into 12 categories, for the period from 1985.

Therefore, there are two issues to be resolved in order to obtain a long-term series of the consumer price index.[9] The first one is estimating the

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commodity price statistics (Park, K. and Lee, W. 2001; Park, K. 2004).

[9] The Bank of Korea (2008) provides the producer price index (base year 2005) as a long-term series retroacted until 1910. To achieve this purpose, the researchers of the Bank linked three wholesale price index series (in reference prices of July 1910: 1936; and 1947) compiled by the Bank of Chosen; but the index has the following limitations. Firstly, not only is the number of surveyed items small and restricted to the Seoul area, but the first two indices are calculated using the formula for

consumer price index of the pre-liberation period. Some of the studies that attempted to fulfill this task are: Mizoguchi (1975), Huh, S. (1981), Joo, I. (2006), Park, K. and Kim, N. (2011). Joo, I. (2006), using the unit price of each item, obtained the deflator for the private consumption expenditure based on the Fisher chain index; whereas all other studies used the data of the prices by city surveys published in the "Yearbook." Although a unit price can give us information on many items, its weakness is that it cannot sufficiently reflect the actual price paid by a consumer as compared to retail prices surveyed throughout a year. The limitations of the research by Huh, S. (1981) are that the "Annual Average Price Table" published by the city of Keijo (Kyŏngsŏng, as Seoul was called during the colonial period), on which he based the price index for Seoul, is in wholesale prices. Moreover, for the national consumer price index, instead of assigning a weight to each city, the study used a simple average price. In contrast, Park, K. and Kim, N. (2011) added service rates, etc. to the prices by city published in the "Yearbook" and estimated the consumer prices (1907-1939) in eight cities and nationwide, using as weights the composition of private consumption expenditure by item (assessed with the commodity flow method).

The second task is to estimate the consumer price index of the years immediately before and after the liberation. The prices by city surveys of the "Yearbook" stopped in 1939, and from that time the only institution that continued price surveys until the period after the liberation was the Bank of Chosen. However, the coverage of the Bank of Chosen surveys was limited to Seoul, and, until the liberation, it examined only the wholesale prices, whereas the retail prices were added to it after the liberation. Kim, N. and

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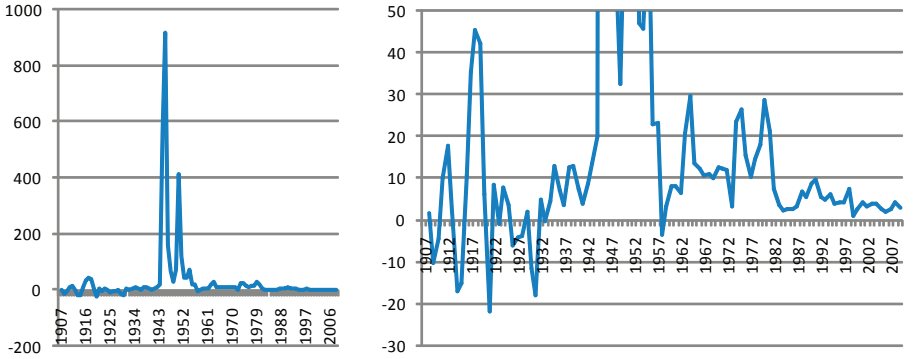
simple (or geometric) average, without considering the weight of each item. Only the wholesale price index compiled by the Bank of Korea from 1955 can be linked to current producer price index. The data for extending the series retroactively are confined to the data yielded by surveys of the Bank of Chosen, but abundant material on wholesale prices during the pre-liberation period is available from other sources, including the surveys of wholesale prices for a much wider range of items, conducted nationwide in major cities by the Japanese Government-General (Finance Bureau) from 1907 to 1941. The task for the future is to retroactively extend the current producer price index to the pre-liberation period, using this abundant data and a more coherent methodology.




a. Total

b. Rate of change restricted to less than 50%

Data: Park, K. and Kim, N. (2011).

**Figure 5.** Fluctuation Rate of the Consumer Price Index of Seoul (1907-2009, %)

Park, K. (2007) supplemented these data with the information about service rates and provided an assessment of the consumer price index of Seoul for the period of 1936-1955.

With the results of the above-described estimates it is possible to compile a long-term series of the consumer price index of Seoul based on the following method.[10] If we connect (1) estimates in Park, K. and Kim, N. (2011) for the period of 1907-1939; (2) estimates in Kim, N. and Park, K. (2007) for the period of 1939-1955; (3) the series of the Bank of Korea for the period of 1955-1965; and (4) the series from the website of the National Statistical Office for the period of 1965-2009, we can obtain the index extending from 1907 to 2009. In each of the suggested series one year overlaps with another series, so that it is possible to link the entire period using the ratio between the two indices of the overlapping years as a linking coefficient.[11] Figure 5

[10] The National Statistical Office (2004), in the process of organizing the consumer price index that uses 2000 as the base year, suggested a long-term series of the total index retroacted until 1945. However, the data used and the assessment procedures were questionable. A detailed analysis can be found in Kim, N. (2010: 142).

[11] The webpage of the National Statistical Office also provides the index classified in 12 categories (base year 2005) but the latter index only goes back until 1985. In the case

demonstrates a century-long annual fluctuation rate of the consumer price index of Seoul obtained in the way described above. In Figure 5a, due to the hyperinflation of the period immediately after the liberation and during the Korean War, the fluctuation rate of the other periods cannot be seen clearly; to discern the trends more easily, in Figure 5b the fluctuation rate is restricted to that of less than 50 percent.

As it appears in Figure 5, the turning points in the long-term consumer price development are the following. The first turning point was the beginning of price control (price freezing on September 18, 1939) during the transition to the wartime economy. After the freeze, the prices appear stable until the liberation because the price index was calculated with controlled prices. However, during this period the amount of issued currency rapidly increased while the production of consumer goods shrank, so the pressure of inflation was high but suppressed by the government, which led to the emergence of a black market. The pressure blew out at once when Korea was liberated; therefore, the starting point of the wartime inflation should be regarded as 1939.

The second turning point is 1958, when prices fell for the first time during the post-liberation period. Immediately after the liberation, the collapse of the economic system and the Korean War triggered intensified inflation, and at the request of the United States, which considered stabilization more important than economic growth, from the late 1950s onward, the Korean government fiercely pushed forward economic stabilization reforms. Owing to this factor, the hyperinflation of the turbulent period started to settle.

The third point is 1982, after which the inflation rate entered the so-called "one-digit stage." We can say that the high growth, which was accompanied by comparatively high inflation, gave way to stability.

If we calculate the average inflation rate during the four periods of time using the three points described above as boundaries, for the period of 1908-1939, it will be 4.1%; for the period of 1939-1957, 138.2%; for the period of 1958-1981, 13.7%; and for 1982-2009, 4.4%. Although the figures for the

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of five of the index categories (prices of food, housing, lighting and heating, clothing, and incidental expenses), it is possible to make a long-term series for the period of 1907-1985 (Park, K. and Kim, N. 2011: 165-7).

first and fourth periods look similar, there is an important difference. As is reflected in Figure 5, during the pre-liberation period, there was a repeating, regular pattern of ups and downs in consumer prices; after the liberation, with the exception of a decline in prices in 1958, inflation—however inconsistent, rapid or slow—became a common condition. During the first period, fluctuations in prices were severe due to the shocks of World War I and the Great Depression, but the inflation of the fourth period was gradual. Behind this phenomenon is the difference in the currency system. Prior to the liberation, Chosen banknotes were issued on the basis of the Japanese currency reserve, so that the former could be exchanged for Japanese banknotes at a 1:1 rate. Therefore, the government could not regulate the supply of currency at its discretion as was done in the managed currency system after the liberation. As a consequence, business cycles often entailed rises and declines in prices. In comparison, the relatively large issuance of currency during the third period was accompanied by relatively high inflation—along with high growth; and, as it is widely known, constraining the amount of issued currency during the fourth period, led to the stabilization of prices. In addition, during the wartime in the second period, prices were controlled, but the black market emerged also.

The discussion above demonstrates that the history of Korean consumer prices, in general, has gone through four different phases, and by examining it as a whole, we can relativize and grasp each period. Along with changes in the economic system, in each period Korea has experienced a unique situation in the consumer prices; and the long-term statistics can serve as evidence of the effect that the transformation in the system and policies at different periods had on consumer prices. Without a doubt, this century-long consumer price index can also be utilized for converting into current value and comparing the nominal amounts of income and expenditure across the periods.

## VI. CONCLUSION

The long-term statistics described in this study demonstrate that the transition from the traditional society after Korea opened its ports to trade was swift. We can see that from the colonial period the population and GDP

rose simultaneously (see Table 1 and Figure 2), which means that it was a period of modern economic growth. Although it is impossible to examine the trends prior to 1910, it can be inferred that modern economic growth started before the colonization, during the period of the opening. That is because, as mentioned above, the rapid expansion of trade and corresponding relative price changes must have exercised a profound influence on the production of the time and the contact with western systems and modern health technologies was increasing. From this perspective, discovering the micro data of the opening period and bringing light to the actual circumstances of social change during that period constitutes an exciting area of research.[12] The long-term statistics in each field discussed above also indicate how great the impact of the system change was after the liberation, and how different the mode of economic growth was before and after the liberation. For example, a comparison between the periods of high growth during the colonial time and after the liberation shows an acceleration of the economic growth rate in the latter period; explaining the reasons for this difference becomes an important task. To do so, it is necessary to expand the perspective to studying not only economic, but also social and institutional factors. This is also a reason why compiling long-term statistics should be extended to the realm of social statistics. There have been attempts to compare the Korean case of high economic growth with other countries' cases; it is meaningful to make similar attempts to expand the research timeframe.

As we have seen, long-term statistics allow for examining a particular time period amidst the long-term trends as well as comparing it with other periods in order to find out where the differences among them are rooted. This is the first point illustrating the importance of compiling long-term statistics.

The second point is that compiling historical statistics expands the sample period used to support a hypothesis about a given phenomena. Let's take consumer price trends as an example—although these days prices are relatively stable, soon after the liberation and during the Korean War, Korea experienced hyperinflation, but there was also a time when a drop in prices was a problem. During the period of high growth, there was a time when

[12] For example, Cha, M. (2001) considers the starting point of the modern economic growth to be around 1900, and the impulse for it to have come from the outside.

economic growth and inflation occurred side by side, and a time when price controls led to the emergence of a black market. These diverse experiences almost appear as if Korea unintentionally conducted various experiments on phenomena related to consumer prices, and can be used to investigate the effects of system and policy changes on consumer prices.

Thirdly, it is important to note the uniqueness of Korea in historical statistics. The regime changes that Korea experienced several times throughout its modern history are comparable with very few countries around the world. As is widely known, during the traditional period, Korea was forced to adopt an open economic system through an unfair treaty. Then, it had a colonial system (controlled economy during the wartime). After the liberation, due to the division, it experienced both the socialist system (North Korea) and the market economy (South Korea). As was described earlier, these profound transitions brought about discontinuities in the statistical data and make it difficult to compile coherent long-term statistics. The difference between the coverage areas before and after the liberation—a consequence of the division of the country—further aggravates the situation. However, if we look at it from another angle, Korea's historical experience provides ample material for studying the relationship between the institution (or system) and economic growth (and social changes). Compiling long-term statistics can help bringing light to this relationship.

In conclusion, we would like to emphasize the role that long-term statistics can link economics and economic history. Currently, studies of the traditional period, colonial period, early post-liberation period, and period of high growth are conducted separately—almost without any cross-disciplinary approaches. Economists do not look at the time prior to the beginning of the high growth, whereas the scholars of economic history each examine their own time interval and rarely communicate with those who major in other periods. Along with differences in research interests and methodology, such a division among scholars is probably due to a difficulty in approaching another period, stemming from the data barrier. Long-term statistics not only lowers this barrier but can also expand the space for communication between researchers with different majors. The three points above that stress the significance of long-term statistics can also serve as examples demonstrating this possibility.

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