

## Asian Historical Statistics: Korea (Abstracts)

### Introductory Chapter The Aims and Contents of the Present Volume<sup>1)</sup>

Konosuke ODAKA and Osamu SAITO

This volume presents a compilation of long-term macroeconomic statistics for the nation(s) on the Korean Peninsula in an accessible manner. The annual time series statistics in this volume, focusing on the 1911–2010 period, resulted from a data collection project and the subsequent assessment, correction, integration, and interpolation of the data collected. The authors have attempted to make the statistical information in this volume inter-regionally and inter-temporally comparable by adopting internationally accepted methods and standards, such as the System of National Accounts (SNA).

The statistical information presented here covers population and labor force; production estimates in the primary, secondary, and tertiary industries (in both nominal and real terms); education; foreign trade; capital stock and capital formation; and gross domestic product (GDP). The statistics are drawn from four major political eras: the final decades of the Korean kingdom, colonized Korea, the Republic of Korea (South Korea), and the Democratic People's Republic of Korea (North Korea). And, as much as possible, population and production statistics cover data pertaining to regional divisions within the national boundaries.

Information concerning national expenditures is not covered in the present volume, partly because colonial statistics have already been estimated in Umemura and Mizoguchi's 1988 volume.

The statistical figures in the volume have been subjected to careful examination as to the validity of original information and the conceptual consistency over time (especially with respect to the definition and classification of industry and/or product). The original source of information is mostly the statistical bureau of the central government on both federal and regional levels. In cases where statistical figures fail to agree from one source to another (or from one year to another), the newest version of the figures has been adopted. With regard to missing values, effort has been made to distinguish (a) the case where the data are nonexistent, from (b) the case where the data are for some reason missing; and, in the case of (b), the missing information has been filled either (b-1) by assuming that the true value followed closely the movements of data of similar kind, or (b-2) by interpolation (or extrapolation).

In using the statistical tables in the present volume as well as the attached CD-ROM, the reader should know that (i) a blank space means that the original datum is nonexistent, and (ii) the value zero (0) indicates that the (original or estimated) value is so small that it fails to reach the decimal point.

---

1) The subsequent section of this introductory chapter contains Japanese summaries of the respective chapters (and sections) of the present volume.

## Part 1 Korea under Colonial Rule

### Chapter 1 Historical Records and the Statistical System

#### (1.1) Korean Economy before Colonization: Historical Records and Economic Performance

Hun-Chang LEE

This chapter sets out quantitative estimates of major economic variables and their narrative interpretations for Korea before its colonization in 1910, based on a considerable amount of economic and statistical records of the Chosŏn (Joseon) dynasty (1392–1897) and the short-lived Korean Empire (1897–1910). The population in Korea was roughly estimated as 5.5 million in the year 1392, and accurately estimated as 17 million in the year 1910. During the dynastic period of 1392 to 1910, agricultural production increased about threefold, the market and industry grew, institutions developed, and human capital accumulated. Based on these facts, it is estimated that GDP increased roughly threefold. The average annual growth rate for both population and economy was 0.2%, and average Korean living standards did not change significantly, remaining at the absolute poverty level during this time.

The relation between population and food basically determined the economic cycles during the Chosŏn dynasty, as in other preindustrial countries. In the 15th century, population and agricultural production grew quickly. The newly established Chosŏn dynasty had restored peace on the borders and developed an institutional infrastructure, which led to increases in the amount of land under cultivation. In the 16th century, a time of economic depression, living standards fell and population growth slowed; land reclamation had reached its limit, and population pressure appeared. After suffering wars in 1592–1598 and 1636 and a decline in population, the economy and population grew quickly again in the 17th century, owing to a number of factors: recovery from the wars, a boom in international trade, reform of the tax system, an increase in land productivity, and the use of copper coins as currency. Population growth and the economy slowed in the 18th century, and living standards fell again because of population pressure and a breakdown in the tax system in the early and middle 19th century. These financial fluctuations correspond to the dynastic economic cycles.

Among Asian countries in the 18th century, Korea had a high population density and periodic markets, and a low urbanization ratio. This high population density meant a high level of agricultural technology. Korea also had high levels of institutional development, including property rights, and human capital accumulation in terms of education and records. While Korea's market development fell behind that of Japan and China, the three East Asian countries' agricultural technology, institutional development, and human capital accumulation do not seem to have been significantly different.

Korea's economy in the 19th century reached its limits in terms of preindustrial growth, which led in 1876 to the opening of trade with industrialized nations. With the exception of Japan, no other Asian country experienced the expansion of international trade, the economic growth rate, and the diffusion of modern culture more rapidly than Korea after the opening of the ports. However, a low level of market development and weak government finance became serious obstacles to an independent pursuit of modernization. Although Korea did not accumulate economic and social capabilities to begin modern

economic growth before colonization, the modest level of capabilities helped Korea to begin sustained growth of about 3% per annum in the early years of the colonial period. The achievements in the dynastic period, the period immediately after the opening of the ports, the colonial period, and the period after liberation from colonial rule had gradually built the foundation for the high economic growth after the 1960s.

## (1.2) The Statistical System of the Colonial Period

Yoon Seock LEE

The pre-colonial Chosŏn Dynasty had a well-established statistics-gathering system, especially on population and cultivated land, which by the end of the 1870s was further developed into an administrative institutional structure that included the Bureau of Statistics, working under the direction of the cabinet. In 1911, under the colonial government of Korea, this structure was replaced by a highly centralized bureaucratic system, which made frequent use of *Hōkoku rei*, a practical guide on statistical reporting to the government. This guide explained in practical terms to bureaucrats in charge of data collection and statistics tabulation the method for gathering as much correct statistical information as feasible of socioeconomic activities, which were considered highly essential to encourage the colony's economic development (or industrialization). Included, therefore, were not only statistics on population and cultivated land, but also those on employment; production activities of agriculture, forestry, fishery, mining, and manufacturing; those extending to industry-supporting sectors (e.g., construction and social overhead capitals); and other relevant statistics such as wages and prices.

### Appendix: Note on Statistical Reporting to the Colonial Government: A Guide (*Hōkoku rei*)

Masuyo TAKAHASHI

The present appendix explains the background, history, and contents of *Hōkoku rei* (hereafter, HR), a practical guide on statistical reporting to the colonial government in Korea (Chōsen Sōtokufu). From November 1912 to June 1945, this important document was used whenever a survey was either newly introduced or revised to explain the objectives and the method of governmental statistical surveys. Japan's colonies and protectorates—including Taiwan, Korea, Manchuria, South Sakhalin, and South Pacific Mandate—all made use of HR when they instituted their official statistical surveys. Taiwan was the earliest, and Korea followed. Content-wise, however, Korean HR was not simply a copy of Taiwan's, since it had adopted editorial principles and styles of its own. Characteristically, the Korean colonial government never established an administrative section that specialized in the management of statistical reporting; all matters related to the design, surveying, record making, and publishing of official statistics were handled during most of the colonial period by the general document section of the Governor's Office. Frequent revisions of HR contents were precipitated not only by organizational restructuring but also by frequent changes in political as well as economic conditions, which necessitated the expansion of survey areas and/or revisions of the contents.

Modern surveys of population, vital statistics, and households were introduced by the household survey regulation of 1896 and were conducted and reported by the police. This was replaced in 1909 by the Korean registration law, with a survey managed by the police security section of the government.

Accordingly, all population-related statistics were placed under the jurisdiction of the police security officer until 1919, when a new law came into effect, making regional governors responsible for the population statistical surveys in their respective provinces (*dō*). Note that the population census of 1919 was substituted with the household survey of the same year, thus administered by the Korean registration law and not as part of the census of Japan proper.

HR served as the major means of collecting statistical data for the government, on which most tables in the government's statistical yearbook (*Sōtokufu tōkei nempō*) were based, arranged roughly in the order of land and population, internal administrative affairs, industries, economy, railroad, police, education, prices (inclusive of wages), sanitation, government finance, and others, having been grouped into three major areas: (1) internal administration, (2) industries, and (3) police affairs.

New types of official and other surveys were added in line with the introduction of new statistical regulations in Japan proper, such as a survey on manufacturing resources in Korea (*Chōsen kōjō shigen chōsa*) of 1939, and a statistical survey on labor and industrial technology (*Chōsen rōdō gijutsu tōkei chōsa*) of 1941, which, however, added a new source of minor discrepancies in statistical figures. The quality of official statistics seems to have been a matter of some concern for government officers.

## Chapter 2 Population, Labor Force, and Wages

### (2.1) Population

Yi-Taek PARK

This section begins with a review of problems inherent in the existing population estimates. In the colonial period, the population census was first conducted in 1925, and the results were evaluated as reliable. Before 1924, residential population surveys were taken. Since there was evidence of under-enumeration, attempts were made to estimate the pre-1924 population, most notably by Yoshikuni Ishi, Tai Hwan Kwon, and Myung Soo Cha. The validity of these estimates was tested by analyzing statistics on deaths by age, which were not used by previous estimates, with reference to the impact of the 1918 Spanish influenza epidemic on mortality. The three existing estimates were rejected since they failed to capture the effect of this level-shifting event on population size.

Our estimates of population size and age composition—having used the statistics on deaths by age and sex (vital statistics), 1914 population statistics by age and sex (residential population survey), and 1925 population statistics by age and sex (population census)—are somewhat different from the previous ones. These new population estimates have the following implications on the demographic transition and economic growth.

First, mortality transition started before the 1910s, since population growth rates in this decade were not negligible. Second, the finding that the 1910 population in our estimate was larger and the rate of its increase from 1910 to 1940 lower than what Ishi and Cha found implies a lower rate of GDP per capita growth if the output estimates remained unchanged. Third, in the colonial period the child-population ratio was increasing in contrast with the decreasing dependency ratio during the post-liberation high-growth period.

## (2.2) Labor Force

Yi-Taek PARK

This section explains how to compile labor force statistics by industrial sector. Residential population surveys, published every year from 1912 to 1943, included a table of population by principal occupation of the household head. The first population census was conducted in 1925, and the first occupational census was taken in 1930 as part of the population census for that year. A similar occupational census was taken in 1940 and 1944. Our estimates are based on these residential and census data. We have adopted a six-category industrial classification system consisting of (1) agriculture, stock farming, and sericulture; (2) fishery; (3) mining and manufacturing; (4) commerce, transport, and communications; (5) public service and professions; and (6) other gainful workers. The labor force statistics by industry were compiled for each ethnic group by province, and summed up for the entire country. The statistics reflect the division between the South and the North.

To compile the labor force statistics by industry using the residential population surveys in the colonial period, the following three problems need to be solved. The first is associated with the underenumeration of population in these surveys. For this we have population estimates before 1925 from the author's earlier work, which solved this problem.

Second, before 1915, only the number of gainful workers within the households was provided, but from 1917 on, those engaged in the same principal occupation as the household head's were separately tabulated from those engaged in other occupations. It was in the 1916 residential population survey that information was collected about the principal and subsidiary occupations of all individuals within the household. On the basis of this information, together with the same information from the 1930 and 1940 population censuses, the labor force statistics by industry can be estimated.

Third, attention must be paid to dual occupations. The 1916 residential population survey and the 1930 population census showed individuals' principal and subsidiary occupations, from which intersectoral patterns by employment are reconstructed. The labor force statistics thus compiled are presented by industrial sector adjusted for dual occupation.

## (2.3) Wages

Ho Il MOON

Wage estimates for the colonial period have been made by using the original data reported in the *Annual Statistical Yearbooks (Chōsen sōtokufu tōkei nempō)* as well as in the guide on statistical reporting (*Hōkoku rei*), resulting in two independent annual time series A (skilled artisan wages) and B (factory worker wages). Series A wages were formulated on the basis of monthly surveys conducted by merchants' trade associations in eight major cities and towns, being composed of skilled and unskilled wages of Koreans and Japanese, classified respectively by males and females. By contrast, series B wages were based on annual factory surveys conducted by the governor's office.

The estimation method for series A wages was basically that adopted by Odaka's earlier work, though revised in five respects: (1) data were collected in eight, instead of seven, cities and towns; (2) missing data were filled by interpolation and other methods; (3) a broad two-way classification was used of skilled versus unskilled work (rather than manufacturing industrial classifications); (4) classification

was done regionally; and (5) the numbers of gainfully occupied population by province were used as weights in calculating the total average of both nominal and daily real wages.

## Chapter 3 Primary Industry

### (3.1) Agriculture

Yasuhiro HARA and Seung Mi KIM

Volumes of agricultural products for 1911–1941, during the colonial period—including sown crops, livestock and poultry, and sericulture—have been constructed from their respective provincial figures. Nominal output values are then estimated as respective volume estimates multiplied by their corresponding effective unit values. (In addition, agricultural output by province for 1945–1962 are set out in this volume, on the basis of the Korean Ministry of Agriculture and Forestry's yearbook.)

Output volume data of sown crops have been taken from the Ishikawa estimates and the *Annual Statistical Tables of Agriculture (Nōgyō tōkei hyō)*. Note, however, that output data prior to the cadastral survey of 1918 are believed to have been underestimated; they are substituted by respective figures estimated from those reported in the studies by the Naksungdae Institute. Those either unreported by Naksungdae Institute or failing to cover the entire period of 1911–1940 are newly estimated for this volume.

Effective unit values of the products have been estimated as product values divided by product volumes, by using data from the *Annual Statistical Tables* as well as those of the Naksungdae estimates. Time series of real product values are obtained by multiplying respective product volumes by corresponding 1935 effective unit prices. Finally, gross value-added for each product are estimated by borrowing the corresponding Naksungdae estimates.

Production volumes as well as output values for livestock and sericulture in each province are calculated by using the same methodology as that adopted by the Naksungdae Institute. Value-added ratios for both livestock and sericulture are also obtained by following the Institute's estimation procedure.

### (3.2) Forestry

Toshiyuki MIZOGUCHI

Forestry production in the Korean Peninsula during the 17th century was low. The Chosŏn dynasty attempted forest restoration with limited success. Bare mountain areas thus became widespread from the late dynastic period on.

The low level of forestry production is reflected in the underdeveloped state of forestry production statistics, which consisted of both growing stock and timber products, including the latter's monetary values. The forestry statistics in Korea are made up mostly of production flow statistics inclusive of their monetary values. To gather long-term statistics for the forestry industry, it is necessary to conduct years-long field surveys of standing trees, a process that even in advanced nations is not fully developed.

### (3.3) Fishery

Yoon Seock LEE, Ho Il MOON, and Toshiyuki MIZOGUCHI

The data for marine products are taken from the *Annual Statistical Yearbooks* and the *Fishery Statistics (Chōsen suisan tōkei)*. In the records for output, only fishery catches and farmed marine products are counted, since processed marine goods such as canned fish should be considered manufactured products so as to avoid double counting. The figures for farmed marine products for the period 1911–1917, which were unavailable, are estimated by multiplying the fresh fishery outputs for these years by the ratio of farmed-to-fresh marine products for 1918.

The above-cited statistical sources provide data in both nominal values and physical quantities of marine goods. The deflators needed for estimating real-term outputs have been estimated for fish whose output accounted for more than 10% of the total marine products in both quantity and value (such as mackerel, sardines, and pollack). The value-added ratios needed for estimating marine GDP are taken from Mizoguchi's earlier work. Effort has been made to record provincial marine outputs. While the *Annual Statistical Yearbooks* fully report provincial marine catches, they fail to record farmed fishery products before 1936. For this reason, farmed outputs for 1918–1935 are taken from the *Fishery Statistics*, and for the years before 1917 are estimated by dividing the respective annual totals by the average provincial share for 1918–1920.

## Chapter 4 Secondary Industry

A characteristic of the present estimates of the mining and manufacturing industrial outputs of colonial Korea is that the effective unit value of each of their products in every province was carefully fact-checked for and corrected, if necessary, before formulating a time series. In addition, a concerted effort has been made to fill missing values by way of interpolation.

### (4.1) Mining Industry

Yasuhiro HARA

Both nominal and real outputs of the mining time series for 1911–1941 are formulated by using the *Annual Statistical Yearbooks* as the main data source, while adding (1) pebbles, (2) open salt from *Yearbooks of the Salt Monopoly Authority (Senbai kyoku nempō)*, and (3) additional mining products from the *Long-Run Trends in the Korean Mining Industry (Chōsen kōgyō no sūsei)*, respectively.

Data cleaning has been attempted whenever judged necessary. Note that the real output values of the colonial time series have been connected with the corresponding output values of the post-independence decades. Gross value-added of the mining industry is estimated by adopting the mining gross-value ratios estimated by the Naksungdae Institute.

### (4.2) Manufacturing Industry

Yasuhiro HARA

A revised manufacturing time series was constructed after a critical evaluation of past manufacturing estimates of colonial Korea. That is to say, both nominal and real output values of manufacturing enterprises of all kinds in every province have been added together: domestic, medium-

and small-scale, and government-operated. The International Standard Industrial Classification of All Industrial Activities (ISIC, Revision 3, 1990) is employed throughout.

The final manufacturing output values obtained here are found to have been much higher than any of the previous estimates (but substantially lower than those of Naksungdae Institute's). The major reason for the difference may be ascribed to our decision to include rice refining as a manufacturing output (though it cannot account for the difference with Naksungdae's values as the value-added ratio for rice milling is comparatively small). In addition, following information released by the Naksungdae Institute, the output values of Korean miso, Korean soy sauce, and fishery products have been adjusted for underestimation, printed products and manufactured salt have been added, and some minor items contained in the mining statistics have also been transferred to manufacturing.

Note also that during the 1910s and 1920s, the industrial classification of the original manufacturing data became much more rudimentary, resulting in substantially less statistical information. To overcome this data deficiency, supplementary information was sought from the government's monthly public gazettes (*kanpō*) and the *Korean Economic Journal* (*Chōsen keizai zasshi*).

It was discovered, moreover, that some portions of original provincial data contained inaccuracies, since several measures had been used in the original data collection. The data were therefore reanalyzed, employing the standard measure throughout.

After 1940, as wartime conditions continued, the original data were deemed classified and ceased to be released. This section deals with this lack of information, attempting to bridge the colonial and post-liberation South Korean periods by using the censuses of manufacturing.

Finally, the value-added time series are estimated by using the manufacturing value-added ratios of the Bank of Korea's *1960 Input-Output Table*.

#### (4.3) Gas, Water, and Electricity

Yasuhiro HARA

The original data for the public supplies of gas, water, and electricity in colonial Korea are taken from the *Annual Statistical Yearbooks*. In addition, the *Twenty-Year History of Seoul Electric Stock Company* (*Keijō denki kabushiki kaisha 20-nen enkakushi*, 1929) and the *History of the Development of Seoul Gas and Electric Stock Company* (*Chōsen gasu denki kabushiki kaisha hattatsushi*, 1938) are used to supplement the data for gas generation. *Summary Reports of the Electricity Generation Industry* (*Denki jigyō yōran*) of the Bureau of Telecommunication of the Governor General are additionally referred to for the supply data of electricity. (During the process of data compilation, a few of the original figures were slightly recalculated either to correct arithmetic errors or to make them calendar-year based whenever they had been fiscal-year based.<sup>2)</sup>

The time series for 1910-1940 of these three industries are formulated by closely following the estimation methodology adopted by the Naksungdae Institute; gas data available for 1910-1940, water for 1911-1940, and electricity for 1911-1940. The value-added series of these three outputs are constructed by borrowing the value-added ratios estimated by the same institute.

---

2) Current calendar-year value =  $1/4 \cdot$  previous fiscal year value +  $3/4 \cdot$  current fiscal year value.



With regard to electricity generation in this volume, it should be noted that the final consumption (*not* generation) of both publicly and privately generated electricity are taken to be equal to the total supply of electricity, excluding, however, electricity consumption by railroads (the latter is interpreted as part of value-added of the transportation industry).

## Chapter 5 Tertiary Industry

Ho Il MOON and Yasuhiro HARA

The tertiary sector GDP has been estimated using an income approach—i.e., by dividing personal income (estimated as average wage multiplied by gainfully occupied population) by the estimated labor share of national income. For this estimation, the labor share of the tertiary sector is needed. Given the limited data from colonial Korea, however, labor share estimates by Ryoshin Minami and Akira Ono for the tertiary sector in early 20th-century Japan are used as reference information, anticipating the fully fledged research on factor income share in colonial Korea in the near future.

Comparing the final results of our estimates of tertiary-sector output using the income approach with the counterparts in the Naksungdae Institute, which adopted a production approach, reveals that for the 1912–1915 period our estimate of output is higher than that of Naksungdae, but the rate of growth in the 1930s turns out to be much lower in the former than in the latter series.

## Chapter 6 Foreign Trade

### (6.1–6.2) Trade Statistics

Kazuo HORI

Foreign trade statistics are important in presenting a nation's macroeconomic aspects, just as the government's financial statistics are. Especially in the case of Korea, foreign trade statistics provide precious information regarding economic changes over the roughly 140 years from 1877 to the present—information that cannot be provided by any other data source.

It should be noted, however, that three serious problems exist regarding the trade statistics of modern Korea, having been temporarily integrated as a Japanese colony. First, its statistical survey method was transformed from the long-observed, conventional Chinese style to a newly introduced Japanese style. Second, as Korea became a part of Imperial Japan, it became difficult statistically to grasp Korea as an independent, national economy. Third, statistical materials were dissipated due to the political turmoil following the collapse of the Japanese empire and the north-south division of the nation that followed.

In the present chapter, therefore, an effort has been made to collect as many residual data as possible, and to build the continuous time series statistics of Korean foreign trade from 1877 to 1944 by estimating complementary data, whenever needed, to amend the information deficit.

### (6.3) Imports and Exports

Kazuo HORI

After the opening of the trading ports on the peninsula, Korea was first connected with the world economy by exporting primary goods such as rice and soybeans, and importing British cotton goods.

Soon afterwards, imports of Japanese products began as the industrial revolution progressed in Japan, gradually replacing British goods. Whereas Korea's trade balance had been mostly stable before 1903, it shifted increasingly to reflect the excess of imports over exports as a result of the colonial policy of Japan.

Korean trade after annexation expanded quickly. If measured over the period 1913–1938, exports grew 11.8%, while import growth was 7.7%, exceeding corresponding rates globally, inclusive those of Japan. The proportion of Korean goods exported to Japan proper was already as high as 70.7% in 1911, and rose gradually to reach its peak of 95.1% in 1931. Rice exports to Japan proper continued to grow, and at their peak accounted for 55% of all goods exported to Japan, contributing greatly in maintaining foreign currency reserves in Japan.

By the 1930s, as industrialization expanded, Korea began to export large quantities of intermediate materials (pig iron, other metals, chemical products, etc.) to Japan. The export ratio of Korean agricultural products to Japan fell dramatically in the 1930s, simply because the relative importance of exports of mining and manufacturing products increased; that is, the absolute quantity of rice exported to Japan never decreased. Practically speaking, Japan and China were the only export partners for Korea during this period. Whereas imports of products from Western nations once occupied about 30% of the goods traded in the Korean market before annexation, they were rapidly substituted by Japanese products, making Korea a monopolistic sale market of Japanese industrial commodities.

During the roughly seventy years after the opening of trading ports, the export and import markets of Korea came to be completely swallowed by the Japanese empire, making the economic unification of Korea and Japan complete, as if they had been a single, unified national economy. The extent of this economic fusion between an imperial nation and its colony appears to be unique in world history.

## Part 2 The Republic of Korea

### Chapter 7 Systems of Official Statistics

#### (7.1) U.S.-Controlled Korea

Kywon KIM

South Korea was under U.S. military control from August 15, 1945, to August 15, 1948, when the Republic of Korea was established. Relevant statistics during the period were compiled in part by the statistics section of the U.S. Army, except for population and statistics on vital events and employment, since the relevant surveys were transferred to an official Korean organization after 1947.

Immediately after the end of World War II and the dissolution of the colonial regime, the population increased rapidly, mainly because of the return to Korea of military personnel and former residents of China, Japan, and North Korea; the population increased from 15,879,000 in May 1, 1944, to 20,027,000 in December 31, 1948.

In 1948 a full 81% of the labor force was employed in agriculture and fishing (as compared to 77% in 1943), 4% in mining and manufacturing (7% in 1943), and 15% in commerce and services (17% in 1943). The collapse of the mining and manufacturing industries led to a significant increase in unemployment.

In the farming sector, small-scale tenants (approximately 49%) accounted for the largest proportion of farmers in this period, leading to strong demand from them for land reform.

Agriculture was relatively unaffected by war damage. Nonetheless, the sudden population increase at the time resulted in food shortages, forcing the temporary government to introduce a supply control of agricultural products in 1946. In sharp contrast to agriculture, organized sectors in mining and manufacturing were quite slow in restoring their supply capabilities, which then were supplemented by the mushrooming of domestic industries and of small- and medium-sized enterprises.

Immediately after independence, a decline in prices occurred, as merchandise that had been colonially controlled was released. This, however, was soon replaced by super-inflation, with prices increasing by about 25.7 times between 1945 and 1948—a consequence of food shortages, rapid increases in money supply, and increases in the government deficit.

As for international trade relations, the period was characterized by the domination of government-controlled international assistance, such as Government Appropriation for Relief in Occupied Areas (GARIOA), expended by the U.S. Army, and grants-in-aid from the U.S. government's Office of the Foreign Liquidation Commission (OFLC). Regarding private foreign dealings, a marked increase in trade relations with China and the United States was observed, in contrast to the sharp decline in trade with Japan.

## (7.2) The Republic of Korea

Jae Hyung LEE

The government's function as a producer of statistics is very important. Private markets alone cannot supply statistics, because statistics have characteristics of public goods and exert economic externalities. The government's statistical system refers to the system of national statistical activities; a well-designed public statistical system will make efficient social contributions from national statistics. Korea has adopted a decentralized statistical system, which, in effect, is more centralized than those of the United States or Japan. *Statistics Korea* (KOSTAT) is a government organization that produces almost all the country's core national statistics. Three-quarters of the government's statistical workforce belong to KOSTAT.

Korea's national statistical system, when it started, had a weak foundation with little infrastructure in terms of organization, human resources, and budget. To improve the statistical system and its activities, the Korean government introduced several measures, such as Strategy on National Statistics Improvement (2009), First General Plan for National Statistics Improvement (2013–2017) and Second General Plan for National Statistics Improvement (2018–2022). By these measures, Korea's statistical system, as well as the government's statistical activities, were substantially improved. A broad consensus has also been reached for how to further improve the statistical system in Korea. With the aim of creating an efficient statistical system that will satisfy social demand for the timely supply of high-quality statistics, the Korean government will attempt to supply statistics that meet national demand for adequate information, while improving their accuracy and reliability. To accomplish these targets, however, further reforms to the current system of national statistics may be necessary.

## Chapter 8 Population, Labor Force, Employment, and Wages

### (8.1) Population

Chul-Hee LEE

This chapter introduces primary data sources for population statistics in Korea, including population censuses, population projections, and vital statistics drawn from the registrations of births, deaths, marriages, and divorces. Key population indices are explained, including total and age-specific population, crude birth rates, age-specific birth rates, total fertility rates, crude death rates, and age-specific death rates.

Based on these indices, this section presents an overview of long-term changes in the size and structure of the Korean population. The total population increased from about 20 million in 1949 to nearly 51.5 million in the 2010s. Thanks to the rise in the standard of living and improved public health and medicine, mortality rates sharply declined over approximately six decades after 1949. For instance, the female life expectancy increased from 56 years in the early 1960s to over 85 years in the 2010s. After the baby boom in the late 1950s and early 1960s, fertility rates kept falling, reaching an extremely low level by the early 2000s. The total fertility rate fell from about 6 in the early 1960s to 1.1 in 2005, and has remained below 1.3 since then. As a consequence of prolonged life expectancy and lowered fertility, the population in the Republic of Korea has been rapidly aging.

### (8.2) Labor Force, Employment, and Wages

Keun Hee RHEE and Seung-Yeol YEE

This section presents the time series data for employment, unemployment, and wages in the Republic of Korea for the working population age 15 and over. The data sources include (a) population censuses as well as household surveys of the economically active population, conducted by the Bureau of Statistics; (b) establishment surveys on employment and unemployment conducted by the same Bureau as well as by the Industrial Bank of Korea; (c) surveys on wages in selected mining and manufacturing sectors for 1957–1971, conducted by the Bank of Korea and others; and (d) establishment surveys by the Ministry of Labor of total wages and salaries since 1968, inclusive of overtime payments and bonuses.<sup>3)</sup> Note, however, that these surveys did not necessarily take place annually, especially in the years immediately after the end of the Korean War; the authors were required to estimate the missing values in the statistical data sources.

Accordingly, estimation procedures have been conducted (1) for the time series on the population age 15 and over for 1956–1959 and 1961–1962 using linear interpolation; (2) for the series on the economically active population for 1955–1962 by running an ordinary least-squares regression, which took as the independent variable the population of age 15 and over for 1963–1997; (3) for the series on total employment for 1955–1962 by running an ordinary least-squares regression, which took as the independent variable the economically active population for 1963–1997; and (4) for the series on unemployment for 1955–1962 by subtracting the total employment from the economically active

---

3) In the beginning of the survey, occupational, not industrial, wages were being reported.

population of the same period.

Regarding wage statistics, we note, first, that the data mentioned in (c) above lack a corresponding price index, thus making it impossible to calculate real wage series for 1957–1971, and, second, that the wage data reported in (d) were collected from reports generated by business establishments and were tabulated in terms of either occupational or industrial categories. These shifts in industrial classification sometimes create difficulties in data utilization. Readers may be interested to learn that the indices of nominal daily wages in Seoul have been preserved for 10 manufacturing and construction industries for 1946–1956 (with the 1936 data taken as 100).<sup>4)</sup> However, the corresponding price index for this series must be estimated to calculate the real wage version of the series.

## Chapter 9 Human Capital

Yoshihisa GODO

This chapter presents a new dataset for Korea's education stock, measured by the average number of years of schooling. Existing datasets such as the Barro-Lee Educational Attainment Dataset use self-reporting on education level derived from national censuses. However, the classification of this type of data varies across survey years, and the accuracy of the self-reports is uncertain.

Thus, instead of using educational attainment data, this chapter estimates education stock by gathering information on total student enrollment in the corresponding years as well as the present age of these students after adjusting for changes in the size of population due to immigration and mortality. By this method, this chapter provides not only time-consistent but also accurate estimates on the educational human stock. The paper's dataset contains detailed relevant information such as the average number of years of schooling by gender, age group, and level of education for the Korean Peninsula from 1920 to 1942, and for the Republic of Korea from 1955 to 2010.

Based on the new estimates, this chapter examines the accuracy of educational attainment data from national censuses, finding a tendency among survey participants to over-report their educational attainment.

## Chapter 10 Capital Formation and Capital Stock

Hak Kil PYO

The basic source of data on capital formation is *National Income Accounts* by the Bank of Korea, published since 1953 in both current and constant prices. The classification of capital by type of asset in the 1993 SNA (System of National Accounts) includes tangible fixed assets such as residential buildings; nonresidential buildings and structures; machinery and equipment; animals and plants; and intellectual property products such as mineral exploration, computer software, film and television, cultural products, and other intangible fixed assets. In the 2008 SNA, military equipment and systems were added to tangible fixed assets, and R&D was added to intangible fixed assets. Also adopted in the 2008 SNA was the 21-industry classification from agriculture, forestry, and fishery to international and foreign organizations.

---

4) The Seoul data were substituted by the Busan data for 1950–1953 because of the Korean War.

Since the Bank of Korea did not publish data on intangible capital formation before 1970, we have estimated the time series (1953–1969) for it indirectly by adopting a regression method using data on R&D and intellectual property rights (IPR). The basic sources of data for estimation of capital stocks are the *National Wealth Survey* (1968, 1977, 1987, and 1997) conducted by the National Statistical Office of Korea, and data on capital formation by the Bank of Korea.

The basic method of estimation for capital stocks is the modified benchmark-year estimation, which combines the perpetual inventory method (PIM) and polynomial benchmark-year estimation method. We have used estimates from the *National Wealth Survey* of 1968, 1977, 1987, and 1997 as benchmark-year estimates and linked them with the capital formation data using estimated depreciation rates by asset type. To reflect the usage pattern of information, computer, and technology (ICT) assets in earlier periods and to avoid the underestimation of productive ICT assets, we have adopted lower depreciation rates for them than those found in EU KLEMS: for computer equipment, 9.2% vs. 31.5%; communications equipment, 9.2% vs. 11.5%; and software, 24.7% vs. 31.5%.

For the period 1953–2013, the rate of capital formation by asset type in 2010 constant prices is as follows: for intellectual property products, 22.8%; R&D, 19.7%; and machinery and equipment, 16.9%. The rate of capital formation by sub-periods is as follows: for 1953–1961, 27.7%; 1962–1973, 28.1%; and 1974–1997, 11.7%. The rate of capital formation by industry for mining and manufacturing is 16.5%; services, 11.3%; and agriculture, forestry, and fishery, 10.2%. The estimates of capital stock in 2010 constant prices indicate an average growth rate of 8.5% for the period (1953–2013). The average growth rates by asset type are as follows: for intellectual property products, 18.1%; R&D, 17.9%; machinery and equipment, 9.4%; and civil engineering, 9.0%—all of which are higher than the growth rate of total assets.

We have also estimated the capital-income ratio ( $K/Y$ ) in the Republic of Korea for the entire period of our estimation and have observed an increasing trend from 1.55 in 1962 to 3.12 in 1997 and 3.83 in 2013, consistent with the findings by Thomas Piketty, who observed a rising trend in the capital-income ratio in major developed nations. Since capital-income ratio is the reciprocal of capital productivity, the increasing capital-income ratio implies that capital productivity in both advanced nations and the Republic of Korea shows a downward trend. We have also estimated the growth rate of the capital-labor ratio ( $K/N$ ) as  $-1.8\%$  for 1953–1961,  $6.5\%$  for 1962–1973,  $8.6\%$  for 1974–1997,  $4.5\%$  for 1998–2013, and  $5.6\%$  for 1953–2013. The speed of capital deepening is shown to have decelerated significantly after the financial crisis of 1997.

## Chapter 11 Foreign Trade

Kazuo HORI

South Korea lost foreign trade statistics, owing to political turmoil, such as the governmental collapse with the 1945 defeat of Japan, the occupational division of the country between south and north by the U.S. and Soviet Union, and the outbreak of the Korean War in 1950. Furthermore, government offices were so frequently reorganized that comprehensive compilation of foreign trade statistics could not take place until 1963. Thus, compiling foreign trade statistics was a highly complicated process until the beginning of the 1960s. Moreover, there were following three rather serious technical problems.

Firstly, no quantitative records exist on trade assistance for the very years when economic

assistance accounted for approximately three-quarters of the country's total importation during the period.

Secondly, in the early years after the country's independence, foreign trade operations were rather disorganized and certainly not unified. While the custom house existed throughout this period, the Bank of Korea was put in charge of data collection of the vast amount of trade assistance. In this way a sort of dualism was born, though temporarily, where the Bank of Korea tracked foreign trade statistics rather than the custom house. Only since 1963 has the custom house resumed the overall management of international trade operations, including the compilation of foreign trade statistics.

Thirdly, there were frequent changes in the methodology for compiling foreign trade statistics. The international trade classification, which had been adopted by the Japanese government agency, was used up to 1952, but in 1955 was converted to the Standard International Trade Classification (SITC). As another example, foreign trade prices were recorded in FOB (free on board) for exports and in CIF (cost, insurance, and freight) for imports, but were based on local pricing as of March 1951. The pricing principle of export and import goods, however, was returned back to FOB-based for the former and CIF-based for the latter in April 1958.

Foreign trade activities of South Korea during 1946–2015 may be divided into the following three sub-periods by their respective socio-economic characteristics.

(1) *The age of socio-economic restoration* (1945–1957). The most remarkable characteristic of South Korean foreign trade during this period was the enormous imbalance of the current trade account—i.e., the huge excess of imports over exports. This could be ascribed to the strong nationalism that had led the government to adopt an infant-industry protection policy, feasible thanks to the country's infrastructure, which had already been established to some extent. In other words, South Korea realized its industrial development in the 1950s by way of its import substitution policy, while depending heavily at the same time on economic assistance from the U.S.

(2) *The age of the Pacific Ocean triangle* (1958–1985). As South Korea strove to export its industrial commodities, its exports increased dramatically, of which industrial commodities accounted for some 80% of total exports. As for export partners, the United States held the dominant position, followed by Western Europe and Japan. South Korea transformed during this period from a country that exported primary goods to one that overwhelmingly exported manufactured goods: importing capital goods and intermediate materials from Japan, and building light manufactured products that were then exported to the U.S. The international division of labor, which was thus developed over the Pacific Ocean, may be termed the "Pacific Ocean trade triangle."

(3) *The age of East Asian dominance* (1986–2015). South Korea's international trade structure was transformed as the cost of domestic production increased and its economy experienced high growth, making it increasingly difficult to maintain its global competitiveness. In other words, the country's foreign trade relations departed from the old trade relationship with the U.S. and Japan, and moved toward a new style of close links with other East Asian nations (including China and the nations of Southeast Asia). Exported commodities shifted away from textiles toward machinery goods, inclusive of transportation, electronic, and information devices and their parts and components, raising the added-value ratio of South Korea's exported goods. After the middle of the 1980s, added to the country's Pacific

Ocean triangle was a newly developed, division-of-work partnership with East Asian countries.

## Chapter 12 Postwar Korean Economic Growth in National Accounting

Hak Kil PYO

In 1957, the Bank of Korea was designated to compile national income statistics for the Republic of Korea. It has revised the statistical base year every five years since 1955, and thus the 11th revision of the base year occurred in 2010. In 2005 the Bank of Korea changed its methodology of statistical compilation from fixed-weighting to chain-weighting. It followed the UN System of National Accounts (SNA) from the 1953 SNA to the 1968 SNA, and for the 1993 SNA and 2008 SNA. The major revisions of the 2008 SNA can be found in the treatment of R&D and military arms expenditures: they were treated as intermediate consumption in the 1993 SNA but now are treated as part of capital formation. The 2008 SNA officially adopted the concept of capital services. National Accounts in the Republic of Korea consist of five main tables: National Income Statistics, Input-Output Table, Flow of Funds Table, Balance of Payments Table, and National Balance Sheet Table.

According to the estimates of economy-wide real value-added in 2010 constant prices, the Korean economy grew at an average annual rate of 7.3% during the post-independence period (1953–2013). Broken down by sub-periods, the rate was 5.4% for 1953–1961, 9.8% for 1962–1973, 8.7% for 1974–1997, and 4.3% for 1998–2013. The breakdown of value-added by industry shows that around 1965–1969 the Korean economy entered Rostow's "take-off stage", and around 1974–1975 was passing through the Lewisian "turning point" when the period of unlimited labor supplies came to an end.

The breakdown of real national income by distribution indicates that the growth rate of depreciation (9.0%) was the fastest, followed by wages and salaries (8.5%), and operating surplus and capital income (5.9%). During the period 1953–1979, the share of operating surplus and capital income was higher than the share of wages and salaries. Since 2000, however, the share of wages and salaries moved beyond 40% while the share of operating surplus and capital income declined to below 30%. This is the outcome of two changes in the structure of the Korean economy: the first is the switch from heavy and chemical industries to the technology sector, in which technology and human capital is more highly valued; and the second is the switch from profit-led growth to wage-led growth, owing to rampant demand for social welfare by organized labor groups.

The breakdown of real national income by expenditure indicates the following annual growth rates during the period 1953–2013: for exports, 15.2%; imports, 10.7%; gross capital formation, 11.1%; and final consumption expenditure, 6.1%. Economic growth in South Korea was basically export-led, as well as investment-led. The growth accounting of the Korean economy during 1953–2013 reaffirms this proposition with the following breakdown of value-added growth: value-added, 7.0%; capital input, 3.9%; labor input, 1.3%; and TFP (total factor productivity), 1.8%, meaning that the relative contribution of capital input (55.7%) was dominant compared to that of labor input (18.3%) or TFP (26.0%). Our estimates can be compared with the Penn World Table database (version 9.0) from which we have estimated the growth rates of value-added for the period 1953–2013 for Taiwan (7.5%), Korea (7.1%), China (6.1%), and India (5.1%). The estimated growth rates of capital input are as follows: Taiwan, 8.1%; Korea, 8.8%; China, 8.3%; and India, 4.5%. Characteristically, Korea's economic progress has been led by capital growth, the



same as some other notable Asian economies.

## Part 3 The Democratic People's Republic of Korea

### Chapter 13 Statistical System and Official Statistics

Ho Il MOON

Since the founding of the Democratic People's Republic of Korea (North Korea), the publication of official statistics has been handled by the National Bureau of Statistics, whose major concern has always been the collection and control of information about the government's administrative activities rather than statistical survey and research. Moreover, since 1960 the government has become increasingly unwilling to release statistical information to the public.

National income statistics for North Korea have been framed within the so-called Material Product System (MPS), which takes the view that services create no economic value. After the nation's affiliation with the United Nations in 1991, however, the government began to calculate and release GDP (or GNP) figures. Moreover, it decided in 2016 to adopt the System of National Accounts (SNA), a method endorsed by the United Nations Statistics Division for computing GDP statistics.

Public finance is by far the most abundant source of official statistical information on North Korea. Its main sources of revenues come from (1) profits and depreciation funds collected from national enterprises and cooperative associations, (2) service charges paid on public real estate, (3) service charges on social insurance, (4) sales from public assets, and (5) gains obtained from price differences.

### Chapter 14 Estimates

#### (14.1) Population

Ho Il MOON

The first population census of North Korea was conducted in 1993 with the cooperation of the United Nations. The government's population registration prior to the census, on the other hand, contains male undercounting and female double counting, requiring an adjustment of the population life tables to upgrade the male and downgrade the female registration figures. This new computation yields a 3.8% increase in the male population and a 3.1% decrease in the female.

The next attempt is to measure the impact of the great famine of 1994-2000, which has not been made public to date. Estimated death tolls by starvation are 1994, 6,588; 1995, 13,953; 1996, 12,093; 1997, 77,442; 1998, 84,908; 1999, 77,414; 2000, 64,048, totaling 336,446 deaths. This calculation was made, first, by determining the population in the 1994-2000 period based on the results of the 1993 census cited above, and, second, by comparing the estimated results with the officially released population figures for the same period, leading to the estimated number of deaths due to the famine.

After the nation's founding in 1948, the mortality level kept decreasing while the birth rate started declining rapidly during the 1970s. We may conclude, therefore, that the demographic transition in North Korea was completed by the end of the 1970s.

## (14.2) Food Production: Reliability of Official Statistics, 1946–1957

Mitsuhiko KIMURA

The North Korean government released statistical data to the outside world in the late 1940s and the 1950s relatively freely as compared to the periods thereafter. Specialists in the North Korean economy have used the data on sectors of the economy without raising questions about their reliability. Here we focus on the data on food production and investigate how accurate they are.

In Table 14.2.1 of the main text, which is cited from the book of official statistics from the North Korean government, the total size of the planted area in grain of all kinds increased during the Korean War period, 1950–1953. This is at odds with both general observation that the war devastated agricultural activities over all North Korea and the remark by Kim Il Sung at the end of 1952 that the planted land areas had not yet returned to the level recorded before the Korean War.

Comparing the series of data compiled by the Japanese colonial government before 1945 with those by the North Korean government after 1945, we find a large gap between the two in the output of rice and millet.

Studies of internal documents produced by local officials in the interim government of North Korea during the Soviet Occupation period, 1945–1948, reveal confusion in the process of measuring outputs of agricultural products. In the meantime, a Soviet agricultural expert dispatched to North Korea in 1956 reported that the North Korean government had no precise statistical information on grain output in the country.

We conclude from these observations that reliability of the statistical data on agricultural production in North Korea in 1946–1957 is not high, and hence that rapid growth in agricultural outputs appearing in the official statistics in this period may be an illusion.

## (14.3) Foreign Trade

Mitsuhiko KIMURA and Nozomi KAWANOBE

North Korea has not released statistics on its trade with other countries. Relevant information, however, may be collected from partner countries. The major sources of collected data here are the following (with editors in parentheses): *United Nations Trade Yearbook*, *Perspectives of North Korean Economy and Foreign Trade* (Japan External Trade Organization), *Soviet Foreign Trade Yearbook* (Ministry of Foreign Trade of the Soviet Union), *Movements of North Korean Foreign Trade* (Korea Trade-Investment Promotion Agency), *Collected Statistics of North Korea* (Ministry of Land Unification of Korea), and *Japanese Customs Statistics* (Ministry of Finance of Japan).

From the founding of DPRK in 1948 until the early 1960s, the Soviet Union was a major trade partner. After the mid-1960s North Korea increased imports of industrial machinery and equipment from Western Europe. However, North Korea failed to pay readily for those imported goods; as a result, this trend discontinued soon afterwards.

From the mid-1970s, trade with Japan increased rapidly. It peaked in 1980 and thereafter fell sharply. In 2001, imports from Japan increased abruptly when Japan provided a large amount of rice to North Korea as food aid. In 2006, the Japanese government imposed trade sanctions on North Korea in response to North Korea's continuing nuclear and missile development. As a result, North Korean

imports from Japan fell to zero.

North Korea imported manufactured products such as machinery, metal products, plastic products, and textiles from Japan and exported metals (zinc, lead, coal, magnesia clinker, and pig iron), fish, and vegetables to Japan. In short, North Korea's trade with Japan showed a typical pattern of trade between non-industrialized and industrialized economies.

After 2000, China and South Korea dramatically increased trade with North Korea. This reflects the emergence of China as a powerful economy in the region and a significant change in international relations with North Korea.

#### (14.4) Estimates of GDP

Suk Jin KIM and Byung-Yeon KIM

After reviewing past attempts to estimate North Korea's GDP (or GNP), and after computing the weighted averages, in 1989 product values, of physical growth rates for agricultural and manufacturing production, the authors present a new calculation of real growth rates of the nation's GDP for 1954–1989. This computation is based on a bold assumption that (1) agriculture and manufacturing represent the entire primary and secondary sectors, respectively; and (2) the growth rates of the tertiary (or service) sector always move in perfect harmony with the weighted averages of the primary and secondary industries. The new real growth rate for the period has been estimated as 5.2% per annum.

To comprehend the implications of the new calculation, four factors should be kept in mind. First, one should account for hidden inflation that must have been unavoidable especially in the early stage of the manufacturing sector of a socialist economy such as North Korea's. The authors have borrowed the methodology used to determine hidden inflation rates in the Soviet Union during the 1928–1989 period.

Second, the authors argue that the nominal values of North Korean GDP may be estimated by noting that (1) the government's fiscal expenditure ( $G$  or revenues, for that matter) accounts for a large portion ( $\alpha$ ) of GDP ( $Y$ ), such that  $G = \alpha Y$ ; (2)  $G$  has been virtually the only officially available long-run time series statistics; and (3) annual changes in the values of  $\alpha$  have been well recorded and publicized. In fact, the authors have determined the nominal GDP value for 1954 to be 1,344 million won, and for 1990 to be 60,406 million won, for example.

Third, the values of GDP deflators are easily arrived at by using both the real and nominal values of GDP thus computed. According to the estimation, the average inflation rate in the nation for 1957–1960 was 13.0% per annum, while that for 1986–1989 was 1.1% per annum.

Fourth, the original time series of the calculated GDP growth rates (described in the first paragraph above) has been extended from 1990 to 2007, by borrowing the growth rates of both agricultural and manufacturing production in North Korea, as surveyed and published by the Bank of Korea of South Korea, and by using the same methodology as described above. The adoption of this methodology was unavoidable since the basic production statistics for post-1989 years have never been made public in North Korea. Finally, the real values of GDP for 1955–2007 have been arrived at by making use of 1954 purchasing power parity U.S. dollars, as estimated by Angus Maddison.

## Part 4 Long-Term Series

### Chapter 15 Linking the Prewar to the Postwar Series

#### (15.1) Linking the Colonial South with Post-Independent South Korea

Yasuhiro HARA

To link the values of the colonial South's GDP with those of post-independence South Korea's GDP, we have used two separate estimates of GDP in both real and nominal terms, one from Mizoguchi and Nojima's earlier estimates and the other from the Bank of Korea. There are four time series:

- A. Mizoguchi and Nojima's constant-price series at 1935 prices, a series estimated for 1918-1983 (note that this has been modified from the original that was expressed in 1934-1936 prices);
- B. Mizoguchi and Nojima's current-price series for 1918-1983;
- C. Bank of Korea's constant-price series in 2010 prices, covering 1953-2016;
- D. Bank of Korea's nominal current-price covering 1953-2016.

Having chosen an appropriate benchmark year (1963), we can calculate the ratio of  $B_{1963}$  to  $A_{1963}$  ( $\alpha = B_{1963}/A_{1963}$ ). By multiplying series D by this deflator ( $\alpha$ ), a new Bank of Korea series converted to 1935 prices is created. Let us call this series K—i.e.,  $K = D/\alpha$ . This allows us to compute a ratio used to convert a time series in 1935 prices to another series in 2010 prices, ( $\beta = C_{1963}/K_{1963}$ ). We use this ratio to “inflate” our own series of output estimated in 1935 prices for the 1912-1940 period into another series that is expressed in 2010 prices. The ratio ( $\beta$ ) is calculated for sector-specific output and GDP series.

In section 3 of this chapter,  $\beta_{GDP}$  thus derived will be used to calculate a linked GDP per capita series expressed in 2010 South Korean won for the period 1912-2016.

#### (15.2) Estimating the South-North Ratios

Ho Il MOON

The Korean population is divided into the South and the North throughout the present volume. The division is based on the Armistice Line, which was drawn immediately after the Korean War (May 25, 1950 to July 27, 1953), as shown on the map in the introductory chapter. The demilitarized zone (DMZ) marks the military frontier on which both sides fought face to face at the time of the ceasefire.

In the present volume the division between South and North Korea has been made, first, by visual inspection of the military demarcation line on the map; second, by counting the smallest administrative districts ( $r_i$ ) in the respective South or North Korean divisions.

More specifically, two large detailed maps have been used, one for post-independence Korea and the other for colonial Korea, with supplementary information from the *Dictionary of Names of Old Regions* (10 vols.), edited by the Social Science Council of North Korea. The populations of the South or North Korean districts are determined by referring to the reports that recorded population by the smallest administrative units ( $r_i$ ), leading to the South-North population ratios.

### (15.3) GDP and Industrial Structure: Long-Term Trends and International Comparisons

Kyoji FUKAO and Yasuhiro HARA

In this volume, we have estimated macroeconomic statistics (GDP and its components) for the Korean Peninsula for a period of about 100 years from the beginning of the 20th century to the beginning of the 21st century. In this section, we take a bird's-eye view to examine the results and compare them with existing estimates as well as long-term series for the United States, China, Taiwan, India, and Japan.

The estimates of real GDP per capita obtained in this volume for the start of the colonial period are higher than the estimates in both the Mizoguchi and Umemura volume and the Naksungdae Institute's 2012 book; conversely, the estimates from the late 1930s onward are lower. Looking at patterns in different periods, we find that although the 1930s, during the colonial period, marked the beginning of industrialization, the pace of capital formation was only moderate compared to that seen in South Korea from the 1960s onward, and labor absorption of secondary industry was low (probably because of relatively high capital intensity due to the introduction of technology). However, in the north, which served as the industrial base for Manchuria, the GDP share and labor absorption of secondary industry were higher than in the south.

After liberation, industrialization in South Korea went into full swing in the 1970s. From then on, the share of the primary sector in South Korea's GDP declined rapidly, while that of secondary industry rose rapidly until reaching a peak at the end of the high-growth period in the 1980s and then declining again as the process of industrialization came to an end. On the other hand, the share of tertiary industry gradually declined from a high level before the start of industrialization and then recorded a clear increasing trend once industrialization was complete. Moreover, in the industrialization process, real value-added labor productivity growth in primary industry rose gradually, while in secondary industry it increased rapidly until the end of the high-growth period and subsequently decelerated; meanwhile, labor productivity growth in tertiary industry was generally flat and saw little change. As an aside, it is interesting to note that, taking the changes in industrial structure and trends in real GDP per capita together, strong similarities can be found in the industrialization processes of Japan and South Korea.

Meanwhile, the North Korea after the Korean War achieved relatively steady economic growth until the 1960s, but the growth rate then started to decelerate. In the 1980s, North Korea's growth was overtaken by China's, and the economy started to stagnate from the latter half of the 1990s following the collapse of the Soviet Union.

Comparing long-term real per capita GDP series (expressed in 1990 international dollars) for the colonial south, the colonial north, Japan (excluding its colonies), Taiwan, and India shows that in the 1920s, per capita GDP in colonial Korea was almost in line with that of India. However, the growth rate of Taiwan's and South Korea's per capita GDP in the 1960s was almost on par with Japan's and from the 1970s exhibits a trend acceleration, so that by the early 21st century, growth in per capita GDP in the two countries overtook that in Japan.

#### (15.4) Inter-regional Economic Inequality and Industrial Structure

Kyoji FUKAO and Yasuhiro HARA

The time series data in this volume are organized on a provincial basis. Making use of this feature, in this section we examine a century of trends in inter-regional productivity and per capita income on the Korean Peninsula since the beginning of the 20th century.

We find that regional income inequality in the early 20th century was relatively pronounced, and while it temporarily declined at the beginning of the colonial period, it increased again in the 1930s with the start of industrialization. Especially with the expansion of the heavy and chemical industry sectors—in particular, the chemical fertilizer, metal refining, and power generation industries, which were concentrated in what today is North Korea—per capita income inequality between the northern and southern regions became gradually more pronounced, due primarily to the concentration of capital investment in the secondary sector in the north.

Following liberation of the peninsula, real income in the southern part of the country increased rapidly, especially when South Korea embarked on rapid industrialization from the 1970s onward, while North Korea pursued socialist economic development aimed at achieving economic equality. This led to a reversal in the relative productivity and income levels of the southern and the northern regions.

Long-term trends in real per capita GDP and regional economic inequality in Great Britain, Italy, Spain, the United States, Japan, and the southern and northern parts of Korea during the colonial period reveal that regional inequality tends to first increase as the economy develops but then eventually starts to decrease. At least in this regard, the findings provide support for the inverse-U hypothesis proposed by the American economist Simon Kuznets. As in many other countries, the increase in inequality was driven by the upgrading of the industrial structure in wealthier regions, which in Korea occurred during the colonial period, while the subsequent decline reflects the eventual spread of this upgrading to poorer regions, which in Korea's case occurred during the postwar period in the south. Meanwhile, from the mid-1980s to 2000, an extremely interesting phenomenon can be observed in South Korea: labor productivity in secondary industries was higher in poorer than in wealthier regions, which probably reflects the development of the heavy and chemical industries in relatively low-income areas. This may explain why regional inequality (measured in terms of the coefficient of variation) in South Korea during this period was lower than the regional inequality experienced by Western countries and Japan at the same level of economic development (in terms of per capita GDP).