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A New Database on Education Stock in the Philippines

Yoshihisa Godo¹

1 Introduction

This paper provides long-term detailed estimates on education stock in the Philippines. Average years of schooling by age groups and by levels of education are estimated for 1903-2000.

This is the first extension of Hayami and Godo's (2011) dataset, which contains nearly 100 years' worth of annual estimates on education stock for Japan, Korea, Taiwan, and the US. The definition and methodology in this paper follow those of Hayami and Godo (2011).

2 Definition of average years of schooling

Average years of schooling can be calculated by accumulating the total enrollment for corresponding years and ages after adjusting for changes in the population due to immigration and mortality. For reasons of simplicity, it is assumed that there are no differences in education level between immigrants and domestic citizens, and no correlation between school career and mortality. Average years of schooling are represented by the following equation.

$$(1) \quad AS_{x-y,t} = \frac{\sum_{u=x}^y \sum_{w=0}^{u-1} \left(\frac{G_{u,t}}{G_{w,t+w-u}} \right) N_{w,t+w-u}}{\sum_{u=x}^y G_{u,t}}.$$

where,

$AS_{x-y,t}$ = Average years of schooling for persons aged x - y years in year t ;

$N_{w,t}$ = Total enrollment of persons aged w years in year t ; and

$G_{w,t}$ = Total number of persons aged w years in year t .

¹ Department of Economics, Meiji Gakuin University; Address 1-2-37 Shirokane-dai, Minato-ku, Tokyo 108-8636, Japan; Tel1. 81-3-5421-5628 (Dial in); Tel2. 81-3-5421-5206 (Department of Economics); Fax. 81-3-5421-5207 (Department of Economics); Email godo@eco.meijigakuin.ac.jp

This equation shows that in order to estimate today's education stock, we need enrollment and population data that extend back for many years. For example, in order to estimate education stock for persons aged 60 years in 2000, the enrollment and population data must go back to the 1940s.

Equation (1) counts all enrollment evenly, regardless of education quality (such as qualification of teachers, student-teacher ratio, and the number of schooling days per year), levels, and types. Even a repeated year is counted as one. Barro and Lee (2010) and Nehru, Swanson, and Dubey (1995) exclude repeated years from average years of schooling. This paper does not do so because repetition data for as long as 100 years hardly exist.

Furthermore, this paper does not use the educational attainment surveys (people's highest education level completed) from the national census. The reason is that, since the classification of the highest level completed differs according to survey years and countries, attainment data from the census can cause inconsistencies in time-series and/or international comparisons. For instance, let us consider that country A's census uses the 8th grade as the cut-off for primary level education, whereas country B's census uses the 6th grade. In such a case, if a person gives up schooling at the 7th grade, country A's census counts zero years of schooling for that person while country B's census counts 6 years of schooling.

Another assumption underlying equation (1) is that there is no depreciation in the knowledge provided in school. This may also be too strong an assumption, considering the fading memory of the aged and the obsolescence of the knowledge they acquired in school in their earlier years.

In spite of these limitations, the author believes that such a basic approach expressed by equation (1) is adequate for a first attempt to construct a long-term dataset. In future analyses, we can revise equation (1) by putting weights on enrollments according to quality, levels, and types of education. We can also consider the possibility of depreciating knowledge by multiplying $(1-\delta)^{u-w}$ with $N_{w,t+w-u}$ in equation (1), where δ denotes the rate of depreciation. This is also a subject for future studies.

Total enrollment can be decomposed into three levels of education: primary, secondary, and tertiary. Classification of levels of education differs according to researchers. This paper follows the format of school statistics from the US Department of Education, in which grades 1-8 are counted as primary education; grades 9-12, as secondary education; and beyond grade 12, as tertiary education.

Following Hayami and Godo (2011), ages 15 to 64 are assumed to be working

ages.

3. Data sources

For $G_{w,t}$ (population by single years of age in each year), the Philippines' national census data are reliable. The national census was conducted in 1903, 1918, 1939, 1948, 1960, 1970, 1975, 1980, 1990, 1995, and 2000. For 1939, 1948, 1960, 1970, 1975, 1980, 1990, 1995, and 2000, the census data were used without adjustment. For 1903 and 1918, census data are available not by single years of age but by plural-year age groups (mainly 5-year age groups). Assuming that the mortality rates within an age group are the same, this paper has estimated population by single years of age. For non-census years, this paper has estimated population, using single years of age, by means of log-linear interpolations.

For $N_{w,t}$ (enrollment by single years of age in each year), the Philippines is endowed with a relatively rich accumulation of official statistics on education for the American colonial period (1901-1945) and for the postwar period (1946-). The Department of Education and the Bureau of Census have conducted various surveys on school attendance and population.² However, the comparability of data series over time is not high due to almost constant changes in definitions, data collection procedures, and educational systems. Adjustments of different series for different periods in order to form a single comparable series through splicing, interpolation, extrapolation, etc. constituted the majority of the exercises for this project.

Another major effort was allocated to treating the population who received an education in the Spanish colonial period. For this period, it is difficult to find reliable data on school attendance. To cope with this problem, literacy data was used from the 1938 census. The 1938 census provides literacy rate data by age groups. For the population under 30, sufficient data are available to apply equation (1). Therefore, a regression was run between literacy rate and average years of schooling for the population under 30 years, and average years of schooling were estimated for the population age 30 and over. Assuming that each cohort's average years of schooling did not change after age 24, I estimated average schooling data for before and after 1938.

² The name of the authority for school education and that of the population census changed occasionally. For reasons of simplicity, this paper calls them the Department of Education and the Bureau of Census, respectively.

4. Estimation Results

Before we examine the estimation results on average years of schooling, it is useful to review economic growth in the Philippines. Figure 1 compares per-capita GDP in the Philippines with those of Japan, Korea, Taiwan, and the US. As can be seen, the Philippines was a relatively wealthy country in East Asia. Until the beginning of the 1960s, per-capita GDP in the Philippines was higher than those in Taiwan and Korea. Indeed, the international society in the early post-war period often described the Philippines as “the hope in East Asia.” However, economic growth in the Philippines slowed in the 1960s. Currently, the Philippines is recognized as a instance of failure because it did not join the group of “East Asian Tigers.”

Estimates on the Philippines’ average years of schooling are summarized in Table 1. There, Hayami and Godo’s (2011) estimates on average years of schooling in Japan, Korea, Taiwan, and the US are also shown for comparison. As portrayed, average years of schooling for the entire working-age population in the Philippines were higher than those in Korea and Taiwan until the 1990s. Considering that the Philippines’ per-capita GDP is significantly lower than Korea’s and Taiwan’s, the Philippines’ relatively high education stock is mysterious.

The scatter diagram in Figure 2 shows how per-capita GDP and average years of schooling changed for the five countries. Broadly, Japan, Korea, and Taiwan followed the path of the US. In contrast, the Philippines’ path is unique: compared with the Philippines’ education stock, its per-capita GDP is low.

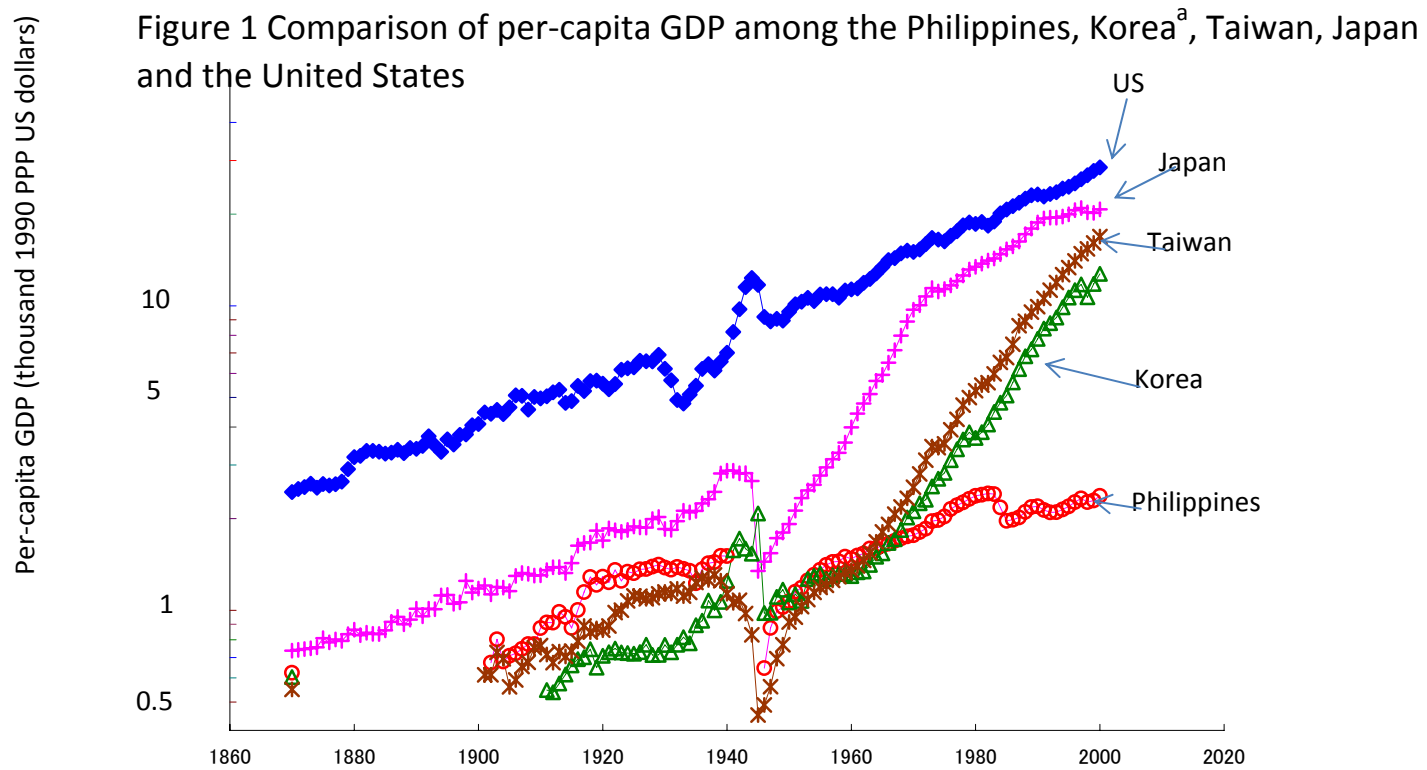
Why did the Philippines depart from the path of the US, as well as that of the other three East Asian countries? Various reasons are possible. Still, it may be important to point out that the percentage of primary education in the average years of schooling is the highest among the sampled countries (Table 2). In addition, unlike Japan, Korea, and Taiwan, primary school education in the Philippines was mostly in English. Thus, it may be legitimate to argue that the Philippines’ education was suitable for those who want to be hired as unskilled laborers by English-speaking foreigners.

Hayami and Godo (2011) assert that the economic successes of Japan, Korea, and Taiwan can be characterized by “military-style heavy industrialization.” Roughly speaking, their societies were rich in middle-level educated, homogeneous laborers during a miraculous economic growth period. Since the school education was usually not in English in these countries, those who received a middle-level education did not have clear advantages for working abroad. Thus, factories in their own countries were

favorable as workplaces. This situation produces a sharp difference from the case of the Philippines.

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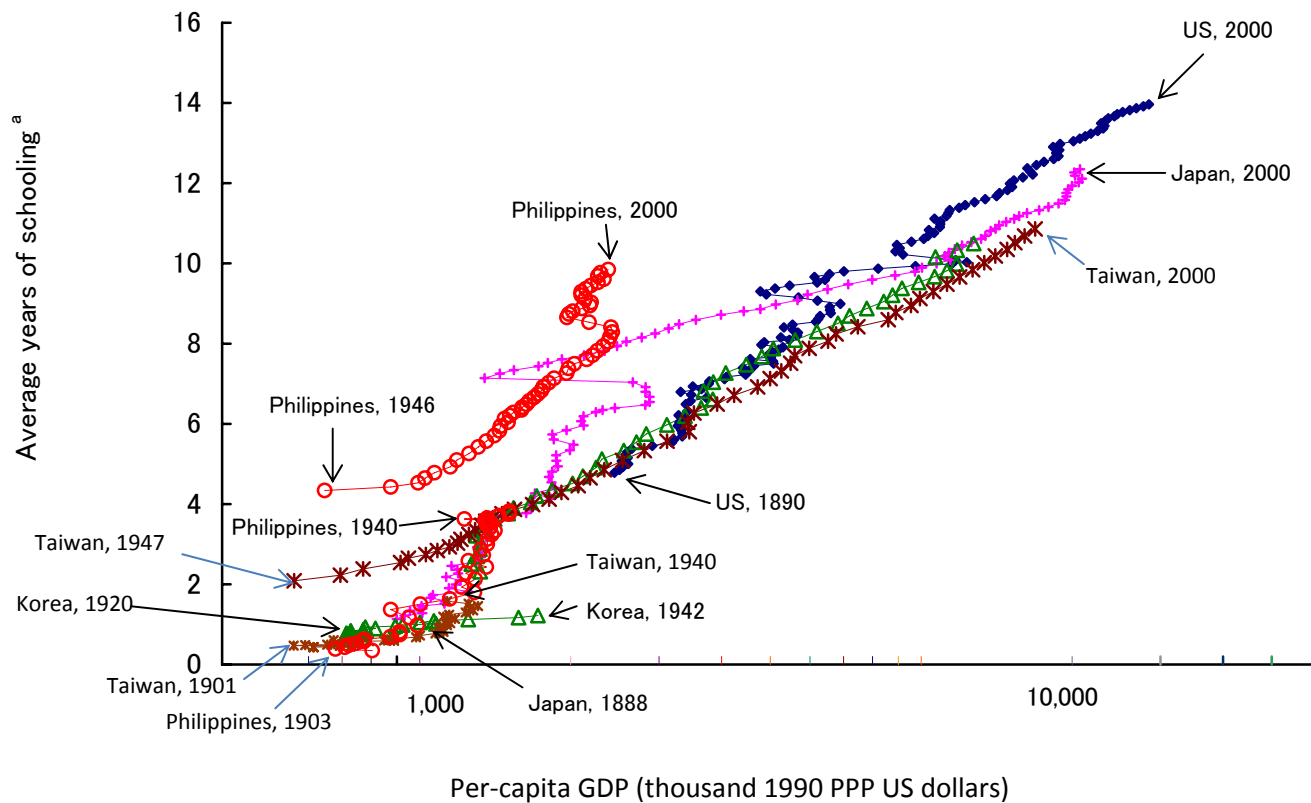


a. Korea before 1945 means the entire Korean Peninsula. Korea thereafter means the Republic of Korea (South Korea).

Source: Godo (2011), Maddison (2010)

Figure 2 Per-capita GDP versus average years of schooling ^a

Philippines (1903-40, 1946-2000), Korea ^b (1920-42, 1955-2000), Taiwan (1901-40, 1947-2000) Japan (1888-2000), United States (1890-2000)



a Average number of years of schooling per person in the working-age population (persons aged 15-64 years).

b Korea before 1945 means the entire Korean Peninsula. Korea thereafter means the Republic of Korea

Sources: See the maintext

Table 1 Average years of schooling^a by age groups: the Philippines, Korea, Taiwan, Japan, and the United States

	Philippines			Korea ^b			Taiwan			Japan			United States		
	Persons age 15-64	Persons age 15-39	Persons age 40-64	Persons age 15-64	Persons age 15-39	Persons age 40-64	Persons age 15-64	Persons age 15-39	Persons age 40-64	Persons age 15-64	Persons age 15-39	Persons age 40-64	Persons age 15-64	Persons age 15-39	Persons age 40-64
1890	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	1.3	1.8	0.39	6.5	7.1	5.2
1900	0.34 ^c	0.40 ^c	0.23 ^c	n.a.	n.a.	n.a.	0.41	0.47	0.26	2.0	2.9	0.45	7.2	7.7	6.0
1910	0.69	0.77	0.28	n.a.	n.a.	n.a.	0.53	0.61	0.30	3.0	4.1	1.2	7.7	8.1	6.9
1920	2.1	2.5	0.39	0.64	0.75	0.41	0.63	0.73	0.37	4.3	5.4	2.3	8.3	8.7	7.7
1930	3.4	4.2	0.65	0.81	0.97	0.48	1.0	1.3	0.47	5.6	6.7	3.5	9.1	9.6	8.2
1940	3.8	4.6	1.7	1.12	1.3	0.66	1.6	2.0	0.58	6.5	7.5	4.8	9.8	10.5	8.7
1950	4.8	5.1	3.7	2.3 ^d	3.2 ^d	0.94 ^d	2.5	3.2	0.91	7.6	8.4	6.1	10.5	11.3	9.5
1960	6.1	6.7	4.7	3.2	4.1	1.1	3.6	4.3	1.6	8.7	9.6	7.0	11.3	11.8	10.6
1970	6.9	7.7	4.9	4.7	6.0	1.7	5.1	6.2	2.6	9.8	10.8	8.1	12.0	12.3	11.5
1980	8.0	8.7	6.2	6.8	8.2	3.7	7.3	8.9	3.7	10.7	11.9	9.1	12.8	13.0	12.3
1990	9.0	9.5	7.7	8.9	10.5	5.4	9.1	10.9	4.8	11.5	12.6	10.4	13.4	13.6	13.1
2000	9.8	10.3	8.9	10.5	12.4	7.7	10.9	12.6	7.5	12.3	13.0	11.8	14.0	14.1	13.9

a. Average number of years of schooling per person in the working-age population (persons aged 15-64 years).

b. Korea before 1945 means the entire Korean Peninsula. Korea thereafter means the Republic of Korea (South Korea).

c. 1903 value

d. 1955 value.

Sources: See the maintext.

Table 2 Average years of schooling^a by levels of education: Philippines, Korea^b, Taiwan, Japan, and the United States

	Philippines			Korea ^b			Taiwan		
	Primary ^c	Secondary ^d	Tertiary ^e	Primary ^c	Secondary ^d	Tertiary ^e	Primary ^c	Secondary ^d	Tertiary ^e
1950	4.3 (90.6)	0.43 (9.0)	0.017 (0.4)	2.1 ^f (91.8)	0.16 ^f (7.0)	0.028 ^f (1.2)	2.5 (96.6)	0.066 (2.6)	0.020 (0.8)
1960	5.6 (90.6)	0.54 (8.8)	0.033 (0.5)	2.8 (87.3)	0.34 (10.5)	0.071 (2.2)	3.3 (92.0)	0.20 (5.6)	0.086 (2.4)
1970	6.1 (88.6)	0.68 (9.7)	0.12 (1.7)	3.9 (83.4)	0.64 (13.6)	0.14 (3.0)	4.3 (85.3)	0.51 (10.0)	0.24 (4.7)
1980	6.9 (85.2)	0.96 (12.0)	0.23 (2.8)	5.4 (79.6)	1.2 (17.5)	0.20 (2.9)	5.6 (77.0)	1.1 (15.3)	0.56 (7.7)
1990	7.4 (82.4)	1.3 (14.3)	0.30 (3.3)	6.5 (72.8)	1.9 (21.9)	0.47 (5.3)	6.5 (71.3)	1.7 (18.4)	0.94 (10.3)
2000	7.9 (80.2)	1.6 (16.0)	0.38 (3.8)	7.1 (67.8)	2.5 (24.0)	0.86 (8.2)	7.1 (65.7)	2.3 (20.9)	1.46 (13.4)

	Japan			United States		
	Primary ^c	Secondary ^d	Tertiary ^e	Primary ^c	Secondary ^d	Tertiary ^e
1950	6.3 (83.1)	1.1 (14.7)	0.17 (2.2)	8.4 (79.9)	1.7 (15.8)	0.45 (4.2)
1960	6.9 (79.0)	1.6 (18.2)	0.24 (2.8)	8.5 (75.3)	2.2 (19.2)	0.61 (5.4)
1970	7.3 (74.7)	2.1 (21.6)	0.37 (3.8)	8.4 (70.0)	2.7 (22.5)	0.89 (7.4)
1980	7.6 (70.6)	2.6 (24.0)	0.58 (5.4)	8.3 (65.0)	3.1 (24.4)	1.4 (10.6)
1990	7.8 (67.7)	3.0 (25.8)	0.75 (6.5)	8.2 (60.9)	3.4 (25.3)	1.8 (13.8)
2000	8.0 (64.7)	3.3 (27.0)	1.0 (8.3)	8.1 (58.2)	3.6 (25.8)	2.2 (16.0)

a. Average number of years of schooling per person in the working-age population (persons aged 15–64 years).

b. Korea before 1945 means the entire Korean Peninsula. Korea thereafter means the Republic of Korea (South Korea).

c. Schooling of 1st to 8th grades.

d. Schooling of 9th to 12th grades.

e. Schooling of beyond 12th grade.

f. 1955 value.

Within parentheses are percentages in the total (all the levels inclusive)

Sources: See the maintext