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# Changes in the Social Positioning of Higher Education and the Emergence of New Great Divergence

Noriko Ito [*], Nobuhiko Seki [†],
Masao Mori [*]

## Abstract

The purpose of this study is to find the relationship between the growth of the Japanese economy and the role of higher education over a very long-term perspective. Using the results of very long-term GDP estimates, it demonstrates that Japan belatedly jumped onto the Great Divergence pointed out by Pomeranz. In addition, these open data show the beginning of the new great divergence in this modern time, and some advanced countries that fail to evolve their socio-economic systems are stagnant so that they cannot grow their economies. The study also identifies the evolution of countries' investment attitudes towards higher education by comparing the history of university establishment in medieval Europe and ancient Japan and the population that has received the equivalent of modern tertiary education. With the adoption of the SDGs at the United Nations Summit, a major challenge for each country is the continuation of sustainable growth. The restraint of economic growth with the sustainability demands has been tormenting the world, as if at the same point as the Great Divergence in the 19th century just before the gradual increase in GDP per capita began. Draw linear predictions from open data on changes in doctorate degree holders per million per capita and GDP per capita in major countries shows that countries with a higher percentage of doctorate degree holders tend to have higher economic growth rates. On the contrary, because the percentage of doctorate degree holders is too low, Japan has not been able to contribute to economic growth.

*Keywords:* a very long-term GDP, doctorate holders, open data, the Great Divergence.

## 1 Introduction

Pomeranz describes western economic growth since the 19th century as the Great Divergence from earlier human history [1]. Economic development through the labor force of land, coal, and slaveries in the New World has transformed the previously labor-intensive and resource-saving state economy flow in Western Europe into a resource-intensive system. This study utilizes the Maddison Project Database 2020 (MPD2020), the latest version of the Maddison Project, which continues to update its data set after the death of Angus Maddison, to demonstrate the remarkable economic development since the 19th century. The most notable characteristic of MPD2020 is that the purchasing power parity (PPP) calculation in 1990 international dollars (intl$) has changed to PPP based on International Comparison Program (ICP) 2011 [2] and applied the Penn World Table (PWT) 10.0. It is a set of national-accounts data developed and maintained by the

[*] Tokyo Institute of Technology, Tokyo, Japan
[†] Kochi University of Technology, Tokyo, Japan

researchers in the University of California, Davis, and the Groningen Growth Development Center of the University of Groningen to measure PPP based GDP per capita [3].

Figure 1 shows GDP per capita from the year 1000 to 2000 for the Netherlands and Sweden, in addition to the G7 based on MPD2020. Takashima (2016) estimates Japan's GDP per capita from 730 to 1874 with an average growth rate of 0.08% per year. In this study, the data is reconstructed based on Takashima's claim. All European countries had a period of slow growth until the 19th century. In North America, both the United States and Canada began to show higher growth than the European countries after 1800. All nine countries, including Japan, have shown similar growth rates since 1900.

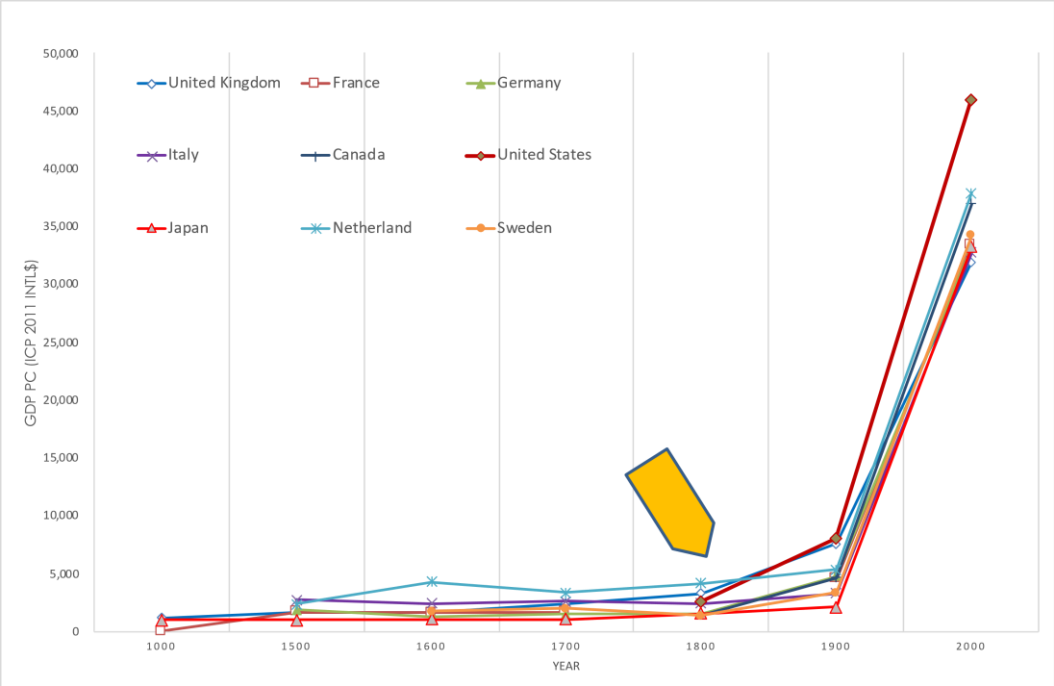


Figure 1: Transition of GDP per capita by countries, 1000-2000 (ICP 2011 Intl$) [4][5][6]

Labor input, capital accumulation, and other factors, such as technological progress determine the economic growth rate. From ancient to early modern ages, the lack of capital accumulation, slow natural population growth, and slow technological progress meant little growth in GDP per capita. Thus, rulers acquired their wealth such as the territory, the people, and the resources through wars [7].

# 2 The Origin of Universities in Western Europe

## 2.1 Universitas

The English word for the university came from universitas, a derivative of the Latin word *universus,* meaning whole. According to Merriam-Webster, universitas is something "composed of one or more than one unit that is treated as an indivisible whole by the law" [8].

## 2.2 University of Bologna

It is believed that the oldest Western university is the University of Bologna, which dates back to 1088, the year known as the year in which the Studium in Bologna was founded according to its website. It states that "the Founders established Bologna Studium independently arose and stood out as a private school" [9]. Yamabe points out that they not only fabricated the foundation year, but also have a forged document called the 'patent letter for the founding of the University of Bologna' by Emperor Theodosius. "In any event, the document was created in the 13th century. More restrictively, the patent was created between 1226 and 1234 since the territory of Bologna in the document does not include Frignano, which came under Bologna's control in 1234. This is a clear 'spurious document'" [10]. Between 1155 to 1158, Friedrich Barbarossa, who was also Holy Roman Emperor, issued an imperial constitution called *Authentica Habita*. This established special privileges and impunity in favor of non-resident students of Roman law at the Law School of Bolognese Studium [11].

Despite founding ambiguity, the most powerful characteristic of the University of Bologna was its student autonomy. According to Grendler, student associations in Bologna had the ability to hire and dismiss the professors during the most of the thirteenth century. This was the case because it was feared that the knowledge created by and wealth, which came with students, will disappear if they left the city [12].

## 2.3 The University of Oxford

The University of Oxford is known as the oldest university in the English-speaking world, claiming its existence for over 900 years. "Oxford is a unique and historic institution. There is no clear date of foundation, but teaching existed at Oxford in some form in 1096. Oxford developed rapidly from 1167, when Henry II banned English students from attending the University of Paris following a quarrel with Thomas Becket" [13].

## 2.4 The University of Paris and Two New Principles

The University of Paris, known by the nickname, Sorbonne, began in 1150 as an annex of the Cathedral School of Notre Dame, with the corporation of students and teachers, although its exact origins are unknown. In 1200, King Philip II of France decided to provide teachers and students with the suitable living conditions, and with the diplomas that proved the quality of their education, which was becoming a new means of social mobility at that time, with the Charter. It brought two new principles to the world that followed. First, universitas as a teacher-student corporation was granted the same status as clergy as long as they followed the rules of communal life. Second, the universitas was autonomous [14][15].

## 2.5 University Gaining Privilege and Becoming of Social Infrastructure in Western World

The following is understood based upon the formation of the oldest universities:

- International students gathering under the eminent scholar-researchers of certain cities produced the earliest higher educational system.

- Each king granted citizenship and privileges as great as those of the clergy by the royal charter to the student-led *universitas* (unions) at the University of Bologna and teacher-student *universitas* (community) at the University of Paris.
- The medieval universities developed under the patronage of their respective national authorities.
- The Charter from the King granted teachers and students freedom of movement and stipends as security of status and livelihood.

One of the reasons why university teachers and foreign students were able to obtain such privileged status and treatment was because of the historical background. It was the time that the European countries were at the threshold of religious wars that lasted from the Second Crusade (1147-1150), the Third Crusade (1189-1192), the Fourth Crusade (1202-1204), the Fifth Crusade (1202-1204), to the Ninth Crusade (1271-1272). Furthermore, during the Crusades, nations repeatedly fought wars over territorial gains, and it is fair to say war itself was a business model for each state [16]. Against this social background, it is not difficult to imagine that in addition to the seven liberal arts (*septem artes liberales*) with quadrivium added to trivium, with theology as supreme, the importance of law and medicine increased in practical terms [17][18]. And the privileges and treatment granted during this period were reinforced as time went on and became embedded in the social infrastructure.

# 3 Emergence of Universities in Japan

## 3.1 Great Learning

The origin of the word *Daigaku* (university in Japanese) is found in the "*DaXue* (university in Chinese)", a Confucian scripture and one of the Four Books of Confucianism. The "*DaXue*" is the 42nd chapter of the "*Liji*" (*Raiki* in Japanese) and describes the philosophy of the university as an educational institution, established around the 2nd century BC. The literal translation of the word university is 'Great Learning' [19].

The three principles that the Great Learning conveys are: to illustrate virtuous virtue, to innovate people, and to rest in the highest good [20]. The "*DaXue*", which means university in English, aims at bringing peace and the best to the world.

## 3.2 Transition of Higher Education in Japan

The first educational organization with the name "university" was established in 670 in Japan during the reign of Emperor Tenji (reigned 668-71), which is about 500 years earlier than in Europe, as "*Daigaku-Ryo*". It means a facility where people live and study in the same place, and literally translates as university dormitory in English. According to Tanaka (2002), it was established by the government to train bureaucrats in time when Japan was finally trying to establish itself as a nation. Therefore, Japan needed to learn from China (Tang Dynasty), an advanced cultural nation at that time, to master the Tang language (Chinese), and through this, hastily absorb the political organization, institutions, and culture of the Tang Dynasty. At that time, a large amount of Chinese language along with many Chinese institutions and cultural relics flowed into Japan [21]. The emperor government founded the *Daigaku-Ryo* in the capital, while established "*Kokugaku* (national schools)" and "*Fugaku* (governmental schools)" in the provinces, and

provided lectures using the same textbooks. The *Daigaku-Ryo* reached its peak during the mid-Heian period (794-1185), but its authority gradually declined as aristocrats built dormitories called "*Daigaku-Besso* (university dormitory annex)", and in the end, *Daigaku-Ryo* was reported destroyed by fire in 1177 [22]. The total number of university students in Japan during this period was about 4,000 including medicine and pharmacy, and the number of university-educated people was 0.53% of the total population.

With the transition from aristocratic society to samurai society, educational institutions were set up by powerful warriors, such as *Ashikaga Gakko* (Ashikaga College) and *Kanazawa Bunko* (Kanazawa Library), two of the most famous institutions. There are two theories that *Ashikaga Gakko* was established in 839 or 842, and another that it was established in 1447 when Uesugi Norizane reestablished the school with the enactment of the "Three Articles of School Regulations." On the other hand, Kanazawa Bunko was founded by Hojo Sanetoki in 1275 [23][24].

Francis Xavier communicated the importance of *Ashikaga Gakko* in a letter to the Pope: "in addition to the capital city universities, there are five other major universities, named Koya, Negoro, Hieizan, and Omi, all four of which are located around Kyoto, and each is said to have more than 3,500 students. Far from Kyoto, in a region called Bando (Kanto), there is another university, the largest and most famous in Japan" [25].

In the Middle Ages, the Buddhist temples functioned as educational institutions for samurai families and common people, besides universities in Japan. On the other hand, population in France and Japan was about the same around 15 million in 1500 [4], and the number of students in a single university was estimated to be similar based on GDP per capita.

The early modern age of the Edo period (1603-1867) was the time when education greatly flourished in Japanese history. Shogunate and clans operated public educational institutions for their samurai, whilst many private schools and *Terakoya* (community schools) were established for the common people. The education for townspeople and farmers developed significantly since the Middle Ages. This enthusiasm for education brought a high literacy rate and provided the solid basis for the rapid modernization of Japan during the Meiji period. The Okayama Library estimates that the total number of *Terakoya* throughout Japan at the end of the Edo period was two to four times bigger than the total number of 15,564 written in "Japanese Educational History Materials" [26][27].

During the Edo period, the clans all over Japan established schools for educating their samurai, and there were about 270 schools, almost the same number as the number of clans until the abolition of feudal domains and establishment of prefectures in 1871 in the Meiji period. The ruling class, including aristocrats, samurai, and religious leaders, accounted for 7.76% of the total population in the Edo period, and the number of people with higher education in 1870 was estimated to be 2.63 million. Meanwhile, the total population of Western Europe was 188 million, and GDP per capita was $5,800 in the UK (ICP 2011 Intl$) and $2,800 in Italy (ICP 2011 Intl$), which was 1.7 to 3.6 times higher than Japan's $1,600 (ICP 2011 Intl$) [4][28].

With the castling and occupation of Edo, the new government merged the three schools inherited from the Edo shogunate, *Shohei* School, *Kaisei* School, and Medical School, to create a government-run educational institution centered on the former *Shohei* School system in 1868. This institution later underwent several name changes and eventually became the University of Tokyo (1877). The new government enacted the University Regulations, and adopted the western-style

divisions of subjects; law, science, medicine, and literature in 1870. This is the bureaucratic training institution established at the behest of the government. Universities in Japan, from their origin, are educational institutions created by the state for the purpose of training people for the empire, and are characterized by the fact that they attempted to learn about foreign countries that had advanced cultural spheres [29]. Again, the western languages, especially English, flowed into the Japanese language in large numbers, and the western ideas, institutions, and culture flowed into Japan. In this context, there was no room for the ideas of "university autonomy" and "academic freedom" to emerge.

## 4 Relationship between Education and GDP per Capita over a Very Long-Term

The university enrollment rate in the late 19th century started at about 1% of the total population and rose to 17% by 1945. Although the number of people entering higher education in Japan in 2020 exceeds 50% and the number of college graduates aged 25-64 is at the highest among the G7 member countries at 64.8%, however Figure 2 shows that in the same year, only 0.49% of the population aged 25-64 holds a doctoral degree.

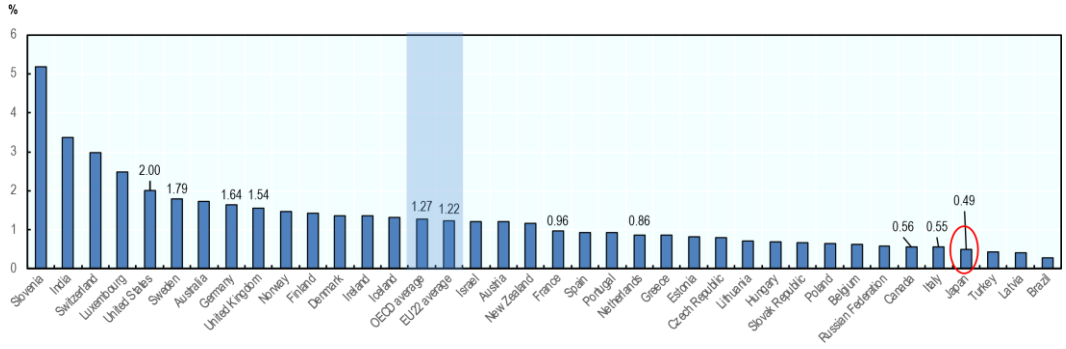


Figure 2: Comparison of 25-64 year-old doctorate holders for a million people by countries [30]

Figure 3 shows a very long-term relationship between GDP per capita and population growth from 1000 to 2000. GDP per capita in 1950 was $15,000 in the United States (ICP 2011 intl$), compared to $6,200 in Germany (ICP 2011 intl$) and only $3,000 in Japan (ICP 2011 intl$). In 1913, just before World War I, the United States' GDP per capita already exceeded $10,000 (ICP 2011 intl$), while Germany's GDP per capita was $5,500 (ICP 2011 intl$) and was $2,400 (ICP 2011 intl$) in Japan. This graph shows that only the United States is currently growing steadily, taking advantage of the synergistic effects of population growth, capital accumulation, and technological innovation. Considering this in conjunction with Figure 1, the independence of the North American nations has stimulated the stagnant economies of other countries, and their economic growth has followed suit. In other words, after 1000, mankind was unable to grow economically due to various constraints for a long time.

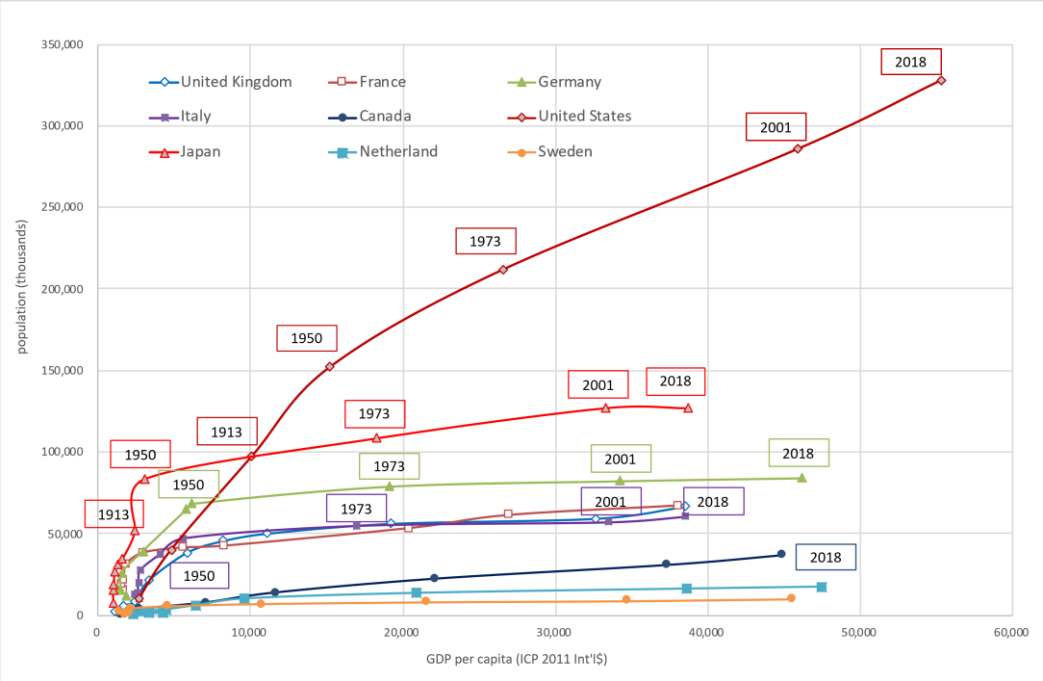


Figure 3: GDP per capita/population transition by country, 1000 to 2018 [4][5][6]

Figure 4 shows a graph detailing the change in GDP per capita for the period between 1800 and 2018. With independence, the U.S. has gained access to cheap labor, although illegal, and new resources, and the world has grown with the U.S. leading the way. This is the Great Divergence noted by Pomeranz [31]. Until just before the Meiji Restoration, Japan had adopted an economic system that relied on agricultural output, which could be described as a rice-based system, resulting in a chronic state of deflation. Japan was fortunate to hang on to its position among the best of the developed world because of the ample funds invested in it by the United Kingdom and the United States. This is generally attributed to the high level of education up to the Edo period and a certain degree of literacy among the general population. Of course, literacy as a basic skill is important, but higher education and the youth of the Meiji Restoration government were a major advantage in understanding science and technology and in making the transition to a new economic system. Humanity appears to be at a new crossroads after two world wars. As can be understood from the graph, as of 2018, GDP per capita is being classified into four groups among OECD countries: over $50,000 (ICP 2011 intl$), over $40,000 (ICP 2011 intl$), over $30,000 (ICP 2011 intl$) and under $30,000 (ICP 2011 intl$). The top group are energy-producing countries or countries that have created their own revenue models through financial and tax reforms. The second group are countries that are changing their industrial structure using digital technology and are creating economic models that emit as little greenhouse gases as possible. The third group consists of countries that once played a central role in the developed economy but have stagnated, unable to break away from their traditional growth model. The fourth group is countries that have the potential to develop in the future.

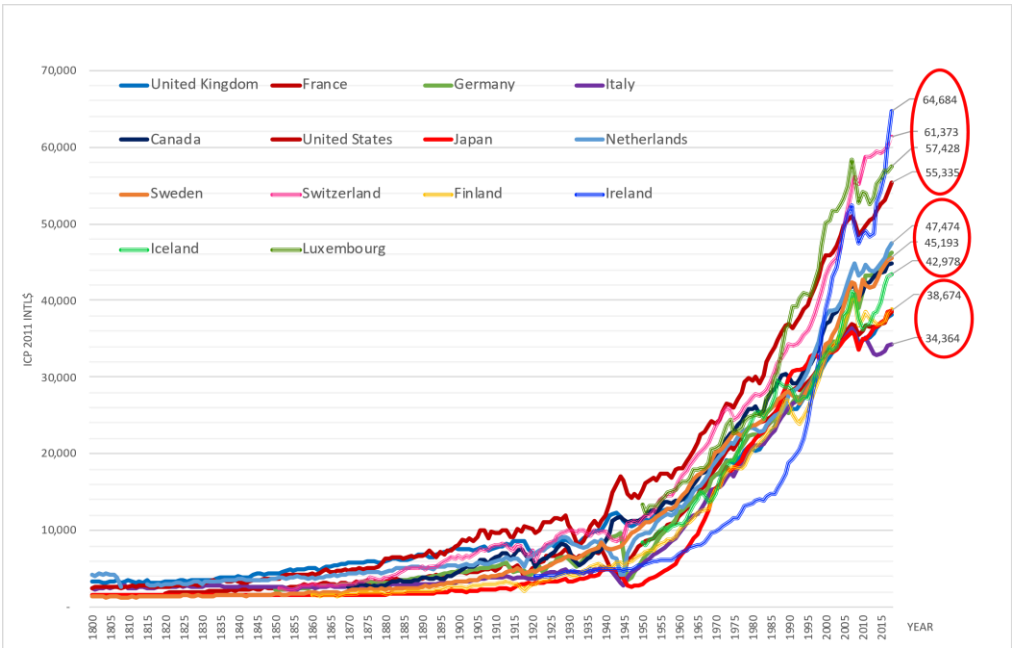


Figure 4: GDP per capita by countries, 1800-2018 (2011 ICP Intl$) [4][5][6]

In today's exponentially more complex and information-intensive socioeconomic systems, the use of doctoral talents is becoming increasingly important. However, Japan only has 0.5% of its workforce with doctorate holders, a quarter of the U.S. average for all generations. The causes have long been attributed to low public spending on higher education and doctoral talents, a situation that remains unresolved to this day. Figure 5 shows the change in public spending on tertiary education as a percentage of each country's GDP over the period 1995-2019. From this graph, it can be understood that Japan's public spending on tertiary education is half the OECD average and only 1/3 of that of countries that focus on higher education.

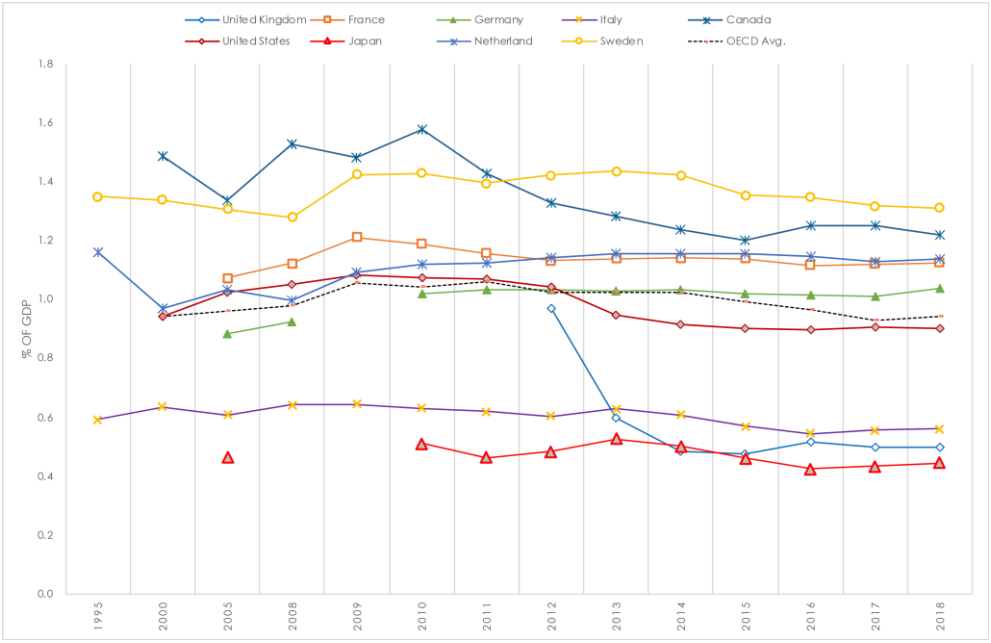


Figure 5: Transition of public spending on tertiary education, % of GDP, 1995-2019 [32]

Figure 6 is a graph comparing how much tuition their citizens pay for higher education. In 2019, only a minority of countries charge tuition fees for doctoral programs while many countries offer stipends, salaries, or fellowships to support the livelihood of those pursuing doctoral degrees. This means that the doctoral degree is recognized as an essential infrastructure for the development of the socio-economic system.

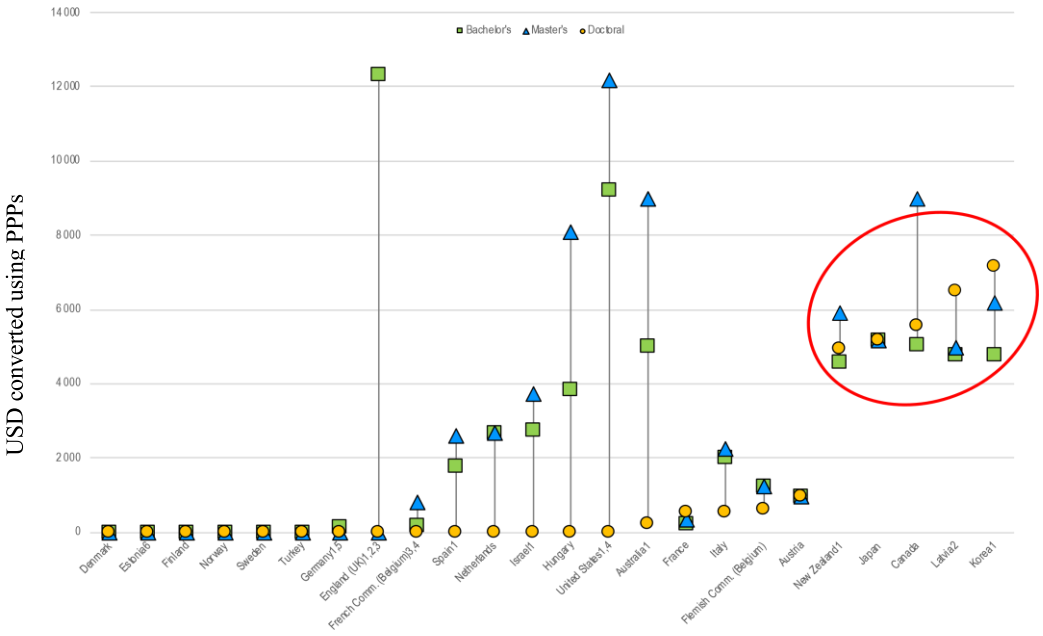


Figure 6: Annual average tuition fees charged by public institutions to national students, by level of education (academic year 2019/20) [33]

Figure 7 shows the correlation between changes in the number of doctorate holders awarded per million people in major countries from 2000 to 2018 according to NISTEP (2021) and changes in per capita GDP according to IMF (2022). The linear prediction in each country shows that countries with a higher ratio of doctorate holders tend to have a higher correlation between per capita GDP and the number of doctorate holders. Conversely, countries with a lower percentage of doctorate holders have lower per capita GDP growth. In Japan, where the number of doctorate holders per million people has decreased since 2000, the per capita GDP has also declined. This graph shows us more doctorate holders per million people transform society and spur economic growth.

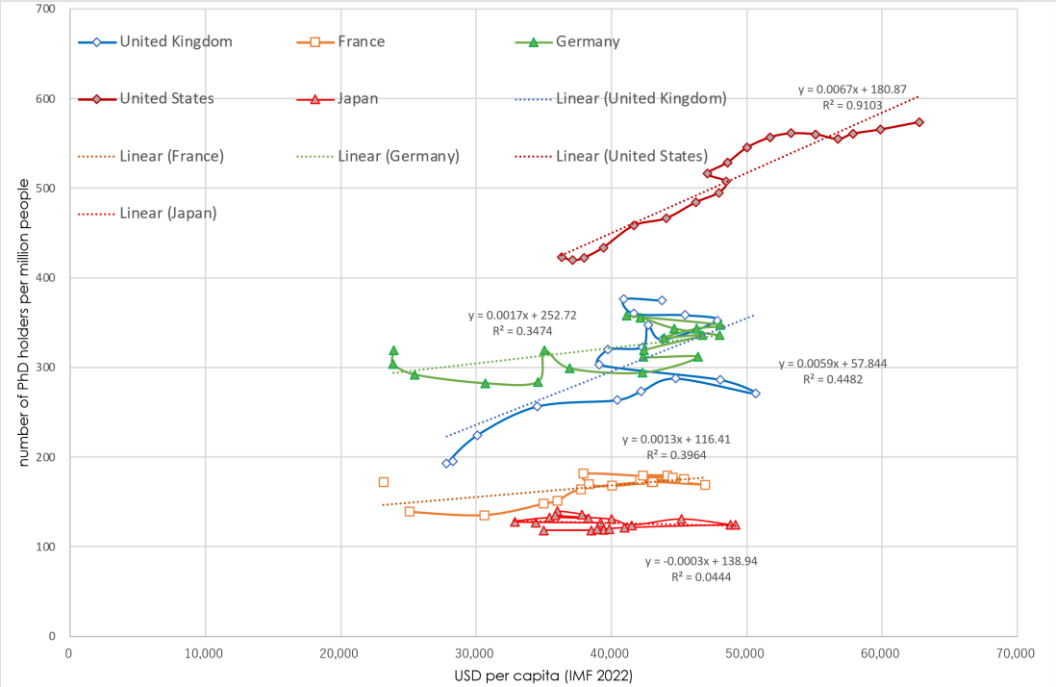


Figure 7: GDP per capita, doctoral degree ratio for million, 2000-2018 [34][35]

Tertiary education was practical and valuable for improving productivity and expanding reproduction. However, the research and knowledge brought by the presence of doctorate holders with new and rich ideas as a knowledge base is important for the transformation and development of society.

## 5 Conclusion

From a very long-term perspective, this study examines the relationship between higher education and the development of socioeconomic systems in Japan as a comparison to Western world. Since ancient times, Japan has continuously and intensively invested in tertiary education as a nation. As a result, a certain intellectual class was formed, as in Western world. In addition, as the transition from the medieval to the early modern period, education equivalent to elementary education spread spontaneously to the common people and peasants. This was both to improve literacy and to train them to "take direction and act on it," which was essential for modernization in terms of manners and morals.

Because of an excessive preoccupation with modernization in the wake of the Meiji Restoration, the system for fostering core human talents who would lead the transformation of the socioeconomic system was left out of tertiary education. Originally in Europe, financial support was provided to students pursing doctoral degrees to ensure their freedom of thinking and mobility, and stability in life. In Japan, when the Meiji Restoration set the country on the path to modernization, many words were translated into Japanese, and the concepts were transferred. However, the point of economic security in higher education was not translated or transferred. This is demonstrated by the fact that the number of doctorate holders continuing to the present day is less than 1/2 that of other developed countries, and that the very differently defined words such as stipend,

scholarship, fellowship, student loan, and bursary have only one translation, "*Shougakukin* (scholarship)".

Doctorate holders have a growing role to play in today's increasingly complex socioeconomic systems. It was already stated in OECD 2012 report that "doctorate holders are the most highly educated group, and as such considered to have a high potential to contribute to the advancement and diffusion of knowledge and technologies. They are often seen as key actors behind the creation of innovation and knowledge-based economic growth" [36].

Developed countries need to shift their previously dominant manufacturing industries to countries with less developed and lower-cost labor since developed countries have already enjoyed the benefits of the Great Divergence, and this technology transfer is steadily underway. Furthermore, as the earth's population has grown, becoming wealthier and consuming more resources, the added constraint from the environmental challenges to the development of socioeconomic systems has increased the complexity of problem solving exponentially. What is needed at this point of paradigm shift is a doctoral talent who can think from a broad perspective and communicate ideas in the common language of the scientific method. As Japan is experiencing a super-aging society and a declining birthrate compared to other countries, it is necessary to urgently establish a social system to foster and utilize more and more doctoral talents.

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