

Institutions, Property Rights, and Economic Growth in Asia

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Abstract

Recent empirical studies link modern economic performance to institutions transplanted by European colonizers in the Western Hemisphere, Africa and India. In this paper, we extend this line of work to 23 former Japanese colonies in Asia. By the late 1800s Japan had a system of secure property rights in land and later imposed this legal system on colonies such as Taiwan, Korea, and Palau, which initially had features of tenure that impeded loans. Palau makes an excellent natural experiment for study. To identify the causal impact of new institutions, we use two instruments for estimating the degree of transfer: the number of years of Japanese occupation and whether Japan conducted a formal land survey. The instrumental variable estimates show that the quality of institutions was critical for economic growth. Our results are confirmed when using a similar approach with British Colonies in Asia. Finally, historical analysis shows that special features of land as “immovable and everlasting” made it attractive to banks as collateral for loans if secure title and well-defined boundaries were part of a central information system. In the early twentieth century land was the most important asset in these colonies, and its collateralization had the power to jump start credit markets that led to economic development. More specifically, secure property rights attracted outside capital, made access to credit easier, lowered interest rates, encouraged investment, and fostered new technology.

I. Introduction

How and why developed nations became rich, relative to the past, are central questions in economics and history. The process was undoubtedly complex, involving many factors such as government policies, investments in infrastructure, terms of trade, legacies of colonialism, natural resources, climate, and luck. Differential economic progress around the globe over the past half century has stimulated a scholarly search for fundamental conditions that trigger and sustain the process of development and modernization.

Many researchers now recognize the importance of institutions for economic development, especially laws, customs and traditions that define and protect property rights.¹ Research on the institutional roots of economic development often pays homage to the work of Douglass North and collaborators, who were trying to understand the onset and geographic spread of industrialization within Europe (North and Thomas, 1973; North and Weingast, 1989). They linked England's head start, for example, to the Glorious Revolution of 1688, which limited the confiscatory power of the Crown and strengthened rights in private property. In their view, the commitment to property rights lowered interest rates on public and private investments that became the building blocks of industrialization. In this paper, we pursue the relevance of these ideas for Asian economic development during the twentieth century by estimating the long-term economic impact of property rights that Japan transferred to its colonies, which were acquired through exogenous forces of war.

A large strand of work emphasizes the legacy of colonial rule. La Porta et al. (1997, 1998) argue that colonies inheriting common law traditions were more successful than descendants of civil law in the operation of capital markets. Acemoglu et al. (2001, 2002) maintain that mortality rates faced by

¹ Henry and Miller (2009) provided an example of Jamaica VS Barbados that suggests macroeconomic policy is more important than institutions. They assume that institutions in Jamaica and Barbados are similar. However, we found that institutions in those two islands are very different especially for the land tenure systems. For more details, see appendix A.

European settlers governed the form of colonization, which in turn affected emigration rates and the extent to which Europeans transplanted their institutions. High mortality rates, as found in sub-Saharan Africa, discouraged European settlement and eventually led to powerful governments and extractive institutions. In contrast, lower mortality rates characteristic of North America led to settler economies with constrained government and secure property rights. Engerman and Sokoloff (1997, 2002) emphasize the interaction of factor endowments with colonization in the Western Hemisphere, which shaped decisions to create slave regimes that fostered inequality, which had lasting adverse consequences for development. The existing work, however, has yet to incorporate Asia.

The diverse outcomes in Asia provide an excellent laboratory for studying property rights and economic growth. Japan is the only Asian country to successfully begin industrialization in the late nineteenth century. Asian growth miracles (South Korea, Taiwan, Hong Kong and Singapore) successfully industrialized in the second half of twentieth century while other countries in the region are currently underway or have yet to begin. Although many scholars have researched Asian industrialization, the institutional side has been neglected as a leading cause for Japan's success and that of other Asian growth miracles. This paper provides evidence on property rights and growth in Japan and its colonies relative to other countries in the region, and tests the hypothesis that secure property rights were important for economic growth.

The recent empirical literature has grappled with two issues: reverse causality and identifying the mechanisms through which institutions operate. Researchers typically address reverse causality by using instrumental variables that measure the degree of institutional transfer, such as distance from the equator (Hall and Jones 1999); settler mortality rates (Acemoglu et al 2001); the type of British revenue system across Indian states (Banerjee and Iyer 2005); coercive labor systems in South America (Dell 2008); and wind patterns that affected the date and pace of colonization (Feyrer and Sacerdote 2009). Ideal instruments affected the timing and nature of colonization in the past but did not affect GDP in the

present except through institutions. Some researchers have questioned the validity of existing instruments. Distance from the equator, for example, may continue to affect output via the disease environment. Westerly wind patterns may have affected the date of colonization and the duration of colonial rule, but the study includes only islands that were colonized.² Others have questioned the quality of the settler mortality data (Albouy, 2008).

This paper argues that length of Japanese occupation and whether Japan conducted a formal land survey are appropriate instruments for institutional transfer, especially property rights and the land tenure system. Japan acquired 23 colonies through wars from the 1890s to the early 1940s, including the growth miracles Taiwan and South Korea. Japan lost all of these colonies after WWII. The Japanese land surveys, by which land ownership was identified and registered in a verifiable way, took 7 to 13 years and the process was completed only in the colonies that were occupied for more than 29 years, i.e. Taiwan, Korea, and Palau — the leading economy in the Pacific islands (GDP per capita: \$7,600 in 2005, \$8,800 in 2008). In fact, among Pacific islands, Palau approximates a good controlled experiment of the relationship between secure property rights and economic growth because it shares similar initial economic conditions (isolated geographic location, extremely limited land area, and a clan ownership system) with other Pacific islands that did not exhibit such growth. This paper estimates the impact of institutions on economic growth by using instrumental variables suggested by the natural experiment of Palau (length of Japanese occupation and whether Japan conducted a formal land survey) and shows that having secure property rights is critical for economic growth.

Powerful vested interests are likely to oppose policies of institutional change, and efforts to reform government would be bolstered if guided by clear and convincing research results on features that matter most. Institutions imposed by colonizers, however, often arrived as a package, which in

² Our research suggests that Japanese influence was substantial in the South Pacific. However, Feyere and Sacerdote (2009) do not consider Japanese influence.

econometric terms, creates a multi-collinearity problem. Study of the package fails to identify and prioritize institutional features most beneficial for growth. Measuring the marginal contribution of each aspect of institutions will be a difficult task because there are considerable limits on data availability, especially for the distant past when many institutions were first transplanted, and this aside, degrees of freedom would be small if one chooses detailed facets of institutions as explanatory variables. In a research environment of multi-collinearity and few degrees of freedom, more evidence is always welcome. In this spirit we offer our research on the economic consequences of institutions transmitted by Japan during its era of colonizing the Pacific.

Many researchers acknowledge that secure property rights matter, but do not identify the detailed pathways leading to economic development. If they mention property rights, earlier works treat them as a “Black Box” partly because limited data are available from the eighteenth and nineteenth centuries (Acemoglu et al, 2001). In our research, we open the Black Box and make a substantial down payment on pathways from property rights to economic development based on more abundant and reliable data from the early twentieth century. The identified pathways suggest that a secure land tenure system is a precursor of industrialization, which operates to encourage investment; attract outside capital; ease access to credit; lower interest rates; promoted new technology; and increase agricultural productivity. The identified pathways help to prioritize institutional features that benefit growth.

II. The Evolution of Property Rights in Japan and the Process of Colonization

In order to investigate the effect of institutions on economic growth in Asia, we need to start with a question, “Did Japan have secure property rights that were important for economic growth?” Japan began to establish secure property rights in the late sixteenth century. According to *The*

Cambridge History of Japan (1991), the Taiko land survey of the late sixteenth century established secure property rights for land tenure in the following steps:

1. Inspectors were dispatched to the provinces where they were ordered to investigate each parcel of land in each village.
2. The cadastres (land registers) listed the location (or name) of each field, an assessment of its overall quality, use, area, and expected yield, as well as the person in whose name the field was registered.
3. The Taiko survey defined not only the proprietor's claim to the produce of the land but also strengthened the farmer's rights to secure possession of the land.
4. There were difficulties in making informed judgments concerning land rights amidst the confusion of almost constant warfare. Survey inspectors commonly awarded the rights of possession to those peasants who had paid the land tax in previous years and those who were actually tilling the field at the time of survey. Their rights of possession became increasingly strong and secure under the Edo shogunate.
5. Although formal restrictions were placed on the use and conveyance of land, as long as a farmer continued to pay the annual imposts and did not commit any crimes, his right of possession was secure, and he could generally buy, sell and will land. (*The Cambridge History of Japan*, Vol 4)

The Taiko land survey provided a basis for secure property rights in Japan. In fact, the cadastres based on the Taiko land survey were used until 1945, and the survey provided the main structure of the Japanese land tenure system (De Soto, 2000).

About 300 years later Japan established a complete modern land tenure system. New tax laws promulgated in 1873 provided a uniform land tax throughout the country. The new tax was payable in money rather than rice and was assessed on the value of land, not the size of the harvest. Thereafter, peasants not only received title to the land, but gained the ability to buy and sell land, grow vegetables or fruit instead of rice as they saw fit, and even abandon their land if they wished (Duus, 1976).

Between 1895 and World War II Japan overtook dozens of countries or territories in Asia. If we use the duration of occupation, or a related variable, whether the colonial government administered a land survey as instruments, it is important to know whether Japan prioritized the colonization process

based on future economic potential. If so and if Japan's initial forecasts were correct, our instruments would be correlated with current GDP per capita. This is unlikely for several reasons and in fact as late as the 1950s, almost nobody forecast vigorous economic growth for South Korea and Taiwan.

The map given in figure 1 presents a rough time line of territorial acquisitions, beginning with Taiwan, acquired at the conclusion of the Sino-Japanese war in 1895. Japan invaded the Liaodong peninsula and the island of Sakhalin during the Russo-Japanese war of 1904-1905, and by terms of the Treaty of Portsmouth retained Liaodong peninsula and the southern portion of the island. In 1905 Japan declared Korea as a protectorate, and completed the process of colonization by annexation in 1910. Japan supported the Allies in World War I and was later rewarded with Germany's colonies in the Pacific (Palau, The Marshall islands, and The Federal States of Micronesia). Japan became increasingly militaristic in the 1920s and 1930s, invading Manchuria in 1931 to acquire resources and to create a buffer against Russia's territorial ambitions to the south. Japan occupied the remaining territories in the south, from the Philippines to Indonesia and Indochina, during World War II.

It is well-known that Japan's ambitions in the 1930s favored territories holding strategic natural resources for industrialization and the military, such as iron, coal, rubber and oil. In the early years of expansion, however, Japan imported these materials from the United States, and instead sought agricultural colonies that would also act as geographic buffers against China and Russia. Japan's early interest in Taiwan and Korea therefore had little to do with industrial potential. Also, the poor economic performance of North Korea suggests that Japan did not prioritize the process of colonization based on its future economic potential. Japan may have been opportunistic in gaining the former German colonies after World War I, but a successful outcome was far from assured as of 1914.³ Moreover, these colonies arrived as a package but only some (such as Palau) enjoyed later economic success.

³ In fact, the Germans treated these islands nothing more than trading posts. In the South Pacific, the Germans' main interest was Nauru that had phosphate (raw material for fertilizer). The British took Nauru after WW I.

III. Traditional Land Rights Prior to Japanese Colonization

Table 1 summarizes important aspects of land rights. The top row repeats the salient features of the modern Japanese system discussed above: single owner; universal land registration that is updated as transactions occur; titles linked to a central registration system; and cadastral surveys. Other areas that became Japanese colonies might have had single owners (Korea) but much of the land was either unregistered or the registers were outdated, titles were not linked to a central system and surveys were based on landmarks. The systems in Taiwan and Palau were even more complex than found in Korea, with separate top-soil and sub-soil owners (Taiwan) or a clan system (Palau). Registration did not exist in Palau and less than one third of land was registered in Taiwan. In the latter case, registers were not regularly updated and in any event were not linked to a central system. Surveys either did not exist (Palau) or were based on landmarks (Taiwan).

Thailand is offered as a control, where property right changed little during the twentieth century and economic development has been slow. As late as 1985 very little land was registered and only 15 per cent of land had clear titles that included survey maps. About one third of parcels had no title and the remaining 55 percent had certificates of utilization based on photos of the plot.

IV. Transfer of Property Rights to the Colonies

Japanese colonial governments conducted land surveys in Taiwan (1898 - 1905), Korea (1911 - 1918), and Palau (1926-1939) by which land ownership was identified and registered. Prior to the survey about 30% of land was officially registered in Taiwan, and thereafter registered land increased by 215% (Ka and Mintz, 1995). In Korea, registered land increased by 80% after the land survey (Kwon, 1989). It is widely believed that the main purpose of these land surveys was to facilitate tax collection. Two years after the completion of the land survey, the land tax revenue increased more than three fold in Taiwan (Ka and Mintz, 1995) and two fold in Korea (Kwon, 1989).

In identifying the long-run economic effects of the land survey one must avoid the post-hoc fallacy. In the cases of Taiwan and South Korea, one may be led to conclude that the effect was important since the current economic performances are very good.

The post-hoc fallacy is not an issue in the case of Palau, a Pacific island that enjoys twice the GDP per capita (\$7,600 in 2005) compared to other Pacific islands (for example, \$1,600 in Tuvalu and \$5,000 in Nauru). In Palau, the Japanese colonial government not only surveyed land, but also introduced a private ownership system. Japanese influence was enormous because they shifted the Palauan economy towards a market system in which property ownership transitioned from the clan to individuals. (Minnesota State University EMuseum Homepage: <http://www.mnsu.edu/emuseum/cultural/oldworld/pacific/palau.html>).

The case of Palau is also illustrative because the Pacific Islands have quite similar initial economic conditions (isolated geographic location and extremely limited land area) and a tradition of clan ownership. Arguably Palau can be interpreted as an outcome of a natural experiment. Palau shows that secure property rights matter for economic growth under a quasi-experimental setting. Furthermore, it is worth noting that the clan ownership system still fetters most of Pacific islands' economic development. For example, registering properties requires 2 procedures and 2 days in New Zealand, but takes 5 procedures and 433 days in Kiribati.

Moreover, the case of Ngardmau State in Palau also suggests the relationship between a secure land tenure system and economic development. During WW2, the U.S. bombed Palau and the land registers (Tochi Daicho, the land register in Japanese) of 4 states – Aimeliik, Airai, Anguar, and Ngardmau – were destroyed. The state of Ngardmau, which was once one of the most developed states before WW2, but now is one of the least developed states in Palau. It is likely that the lack of a land register is

one of the causes of low development.⁴ In fact, the case of Palau is very similar to a scientific experiment in biology, which is called complementation. When a biological scientist tries to identify the function of a specific gene, she first removes the gene and confirms that the cell loses a particular function (step 1). Then she inserts the gene and confirms that the cell's function is restored (step 2). Although, the order is reversed in the case of Palau, the case is quite similar to the steps of a scientific experiment.

Comparing the traditional land tenure system of Taiwan during the Qing period and colonial land tenure system of Taiwan during the Japanese colonial period helps to identify the relationship between property rights and economic development. According to Lin (2008), although the Qing government supported economic development, the Qing system had little success in attracting outside capital and modern technology due to insecure and complex property rights. In southern China and Taiwan, custom recognized top-soil and sub-soil rights. The top-soil rights were permanent tenancy contracts that the community recognized as a kind of property that was secure so long as he paid rent to the person with sub-soil rights. Both top-soil and sub-soil rights could be leased out. The dual owner system provided security for tenants, but made land transactions and tax collection very difficult (Macauley, 2009). Only the native Taiwanese could control every aspect of complex property rights: multiple owners and potentially numerous rental contracts (Ka and Mintz, 1995).

From June of 1886 to December of 1889 (10 years before the Japanese occupation), a Chinese general Liu Ming-chuang reformed the land tenure system of Taiwan, an effort that cost 426,635 ounces of silver. Notably the general did not create a new system of file management or a new kind of land administration regime to effectively register land exchanges, new land reclamation or other changes from that point onward (This kind of problem still exists in many African and Latin American countries). Consequently, this new system gradually lost its effectiveness, as had happened with earlier reforms.

⁴ The chief of Land and Survey department in Palau introduced us the case of Ngardmau state. In her opinion, the lack of land register in Ngardmau State is one of the causes of low development.

Moreover, the surveyors did not acknowledge the complicated land customs of different districts in Taiwan. Their priority was to determine which landowner should be taxed under the new system. Although ownership and contracts were transparent, settlement of land boundary disputes was often more like a "redistribution" of rights than a "protection" of them in Taiwan during the Qing period (Lin, 2008).

In contrast, the Japanese colonial government introduced the modern single owner land tenure system with accurate cadastral surveys. Its total expenditures in surveying land and making data were about 4,230,905 ounces of silver (ten times of the expenses of Liu's reform). More importantly, coupled with a series of land registry regulations, household registry rules, and other administrative measures, the government could now control and recheck all changes in land distribution and household composition. These surveyors investigated the process of land reclamation in different districts and recognized their various land customs. The Land Survey Bureau first began a half-year preliminary survey, and then performed a formal survey across the whole island. The Bureau also recruited local gentry to help carry out the surveys (Lin, 2008).

The new system increased land yields and agricultural productivity by 81% from 1901 through 1938 (Lin, 2008). Then, Taiwan landlords who benefited from the land-tax reform continued to save and to invest in commercialized enterprises such as sugar and rice processing. Moreover, after the land reform that established the Japanese land tenure system, a large amount of Japanese capital flowed to Taiwan (Myers and Peattie, 1984).

V. Land Surveys as a Solution to Public And Private Finance

Land has two special characteristics which distinguish it from other assets: it is "immovable" and "everlasting." Generally it is easier for the government to tax land because land cannot be readily "hidden" as other assets could be. Effective taxation of land requires land registers and maps to identify

parcels, as well as a system linking taxpayers to the registers (Cho, 2003). In many countries, land taxes are evaded because the government cannot link registers, maps, and taxpayers. In some cases governments appoint local authorities to make the links based on local information, giving them a percentage of the tax receipts as payment. This remedy is imperfect, however, because principal-agent problems may lead to corruption.

Traditionally Asian countries had land registers, but given the lack of surveys and ownership updates, the land registers were not very useful in collecting land taxes directly from the taxpayers. Sng (2009) argues that it was difficult for the central government to increase tax revenues assigned to local authorities because the poor usually shoulders a heavy tax burden. The Japanese land survey linked the registers, maps, and taxpayers. Moreover, the Japanese colonial government also introduced a citizen identity system in Korea and Taiwan as a way to control the population, but this inadvertently aided tax collection by identifying particular individuals as taxpayers. The new land tax system was much more successful than expected. For example, in Korea, the Japanese colonial government was able to decrease the land tax rate from 3% (planned) to 1.5% as a result of higher-than-expected revenues.

Interestingly, solution of a public finance problem eventually was important for private finance. Because land is immovable and everlasting, banks are more willing to accept it as collateral relative to other assets that can be stolen, hidden, or readily destroyed. However, tapping land as collateral is more difficult than one might expect. Legally, land ownership is an abstract concept and what the seller of land owns and offers is “the right to sell.” (Simpson, 1976) However, “the right to sell” is justified only by the law. In most cultures, traditionally land was considered to be held either directly or indirectly from the King. Therefore to prove ownership the title had to be traced back to the original Crown grant (or state grant). For example, in the U.S., title insurance links the deed through an unbroken chain to the original state grant. A centralized information exchange system such as a record of deeds or registration of title is a more efficient way of proving ownership. Moreover, immovability of land

generates a very special problem of ownership, i. e. boundary disputes. Therefore, banks usually accept land as collateral if secure title and well-defined boundaries are part of a central information system. A land survey clarifies the boundary and makes abstract land ownership more concrete and secure by reducing boundary disputes.

At the time of Japanese conquest, Korea and Taiwan were heavily agricultural and land was the most abundant asset. By accepting land as collateral, banks solved a problem of private finance. After the official land registration system was operational in Korea, interest rates declined and access to credit became easier. Traditionally, the private interest rate was about 50% in Korea. After the Japanese land survey and registration, the total amount of loans from banks increased because land titles became a more reliable form of collateral (figure 2). At the same time, the private interest rate decreased to 30% after the land survey and kept decreasing over the next 20 years (figure 3). Figure 4 shows that value added in the financial sector increased dramatically after the land survey was completed.

The financial impact of the land survey is also evident in Taiwan. Tables 2 and 3 show that the volume of private property transactions as well as the number of parcels collateralized rose sharply after the land survey was completed around 1905.

VI. Pathways between Property Rights and Economic Growth

Identifying the pathways from secure property rights to economic growth helps to understand the mechanism. Historical facts suggest that secure property rights stimulate capital investment; lower interest rates through the development of financial markets; improve the inflow of outside capital; and facilitate the transfer of technology.

On the first point, De Soto (2000) argues that lack of property rights impairs capital accumulation in the Third World. People sometimes accumulate substantial wealth but because land rights are often poorly documented, these assets are not easily collateralized for loans that create

productive capital. In Peru, for every one hundred homes built, only about thirty have legal title, and seventy have been built extralegally. Throughout Latin America, De Soto (2000) found that at least six out of eight buildings were in the undercapitalized sector and that 80 percent of all real estate was held outside the law. In contrast, in the United States up to 70 percent of the credit new business receives comes from using formal titles as collateral for mortgages.

Second, secure property rights stimulate development of financial markets as illustrated in the previous section. A secure land tenure system makes access to credit easier and lowers interest rates.

Third, secure property rights improve the inflow of outside capital as illustrated by the case of Hawaii. In Hawaii most land was owned by the government or a small number of landlords. Before 1967, most people leased property for 55 years rather than buying the land and houses (La Croix, 1995). Consequently, mainland Americans were reluctant to invest in Hawaii because the land tenure system was unfamiliar and perhaps subject to arbitrary change. A history of Palau provides a similar example. *Palau - Cultural history* (2004) explicitly describes the relationship between the inflows of outside capital for tourism and secure property rights. "Land title disputes scared off legitimate investors, and make high-end hotel development a real challenge, because no Palauan can afford to do this type of project without foreign investment." This explains why other countries in Micronesia could not attract outside capital for tourism. Even Palau with its individual ownership system had problem attracting outside capital due to land title disputes. The other countries in Micronesia could not attract outside capital because, under their clan ownership systems, there are no land titles.

Finally, transfer of technology is also sensitive to property rights. Observers have suggested, for example, that the collective land tenure system in Africa is an obstacle in transferring Western irrigation technology, which operates most efficiently on a large scale. Collective ownership of land complicates decision making by creating hold outs and assorted groups with diverse if not adversarial interests.

Customary (tribal) law therefore impedes the adoption of this complex and expensive technology (Slabbers, 1990).

The process of irrigation investment in Korea illustrates a clear pathway from property rights to economic development. According to Rhee et al. (1992) irrigation investment was possible because the land survey clearly identified the boundary and owner of the land.

1. After the land survey, the board for the new irrigation system could identify the relevant land owners from the land register.
2. The board for the new irrigation system could get permission from the relevant land owners.
3. The board could identify the land owners who needed compensation due to a new reservoir.
4. When the permission and compensation processes were finished, the relevant farmers could finance the cost for the new irrigation system by getting loans from banks. (Banks founded by Japanese capital accepted the land title as collateral and the farmers got a low interest rate.)
5. The agricultural productivity increased by 100 - 200 percent after the construction of new irrigation system (The farmers could use improved seeds with better irrigation system).

All of these steps were possible because the formal land survey encouraged irrigation investment. Before the formal land survey, making a new reservoir for irrigation was a real challenge. Without clear land ownership, it was very difficult for a local society to carry out the project⁵. The case of Korea shows why the transfer of a western irrigation system is very difficult in many African countries. The permission, compensation, and financing processes require a clear individual ownership system, but many African countries still operate under the clan ownership system.

In Korea, the land survey secured property rights and attracted Japanese capital. At the same time, the secure land tenure system promoted access to credit and lowered interest rates. These

⁵ Usually, only government could pursue a project for irrigation.

financial market developments were possible because the land title could be used as reliable collateral. Secure property rights and improved financial markets promoted adaption of new irrigation technology. Finally, agricultural productivity increased substantially thereafter.

VII. Occupation and Land Survey as Instruments: Statistical Analysis

In identifying the long-run economic effects of property rights, one must consider the problem of reverse causality, i. e. secure property rights can be a result of economic development. Researchers typically address reverse causality by using instrumental variables that measure the degree of institutional transfer. Technically, a valid instrument is correlated with the explanatory variables (regressors) but not with the error term of the dependent variable. If the instrument is exogenous (or pre-determined) and correlated with the explanatory variables (regressors), then the instrument is valid.

The number of years of Japanese occupation and whether Japan conducted a formal land survey satisfy the conditions for a valid instrument if these variables affect current GDP per capita only through institutions. Then the number of years of Japanese occupation and whether Japan conducted the formal land survey are uncorrelated (exogenous or predetermined) with the error term of current GDP per capita. We also argue that if Japan occupied a colony for a long time, it was more likely to transfer and enforce the Japanese land tenure system in the colony. Finally, we maintain that the new institutions (i.e. Japanese land tenure system) persisted. In fact, the current land tenure systems of Taiwan, South Korean, and Palau are based on Japanese land surveys. Consequently, the current institutions are correlated with the number of years of Japanese occupation and whether Japan conducted a formal land survey.

We divide former Japanese colonies into two groups according to the duration of occupation. The first group includes Taiwan, Korea, Palau, the Marshall Islands and the Federal States of Micronesia, all of which Japan occupied for more than twenty nine years. The second group includes Southeast Asian

countries and other Pacific Islands. Those countries were occupied by Japan during World War II for less than 4 years.⁶ Compared to the first group, the occupation period for the second group was too short for the transfer of Japanese institutions. A land survey took, for example, 7 years in Taiwan, 8 years in Korea, and 13 years in Palau. Therefore, we can assume that the degree of institutional transfer was low in the second group. Infrastructure investments usually followed the land survey. In Palau, the colonial government also built causeways, the first schools, agricultural experiment stations, airports, and seaplane ramps. By 1940, the estimated population was 7,000 Palauan and 23,700 Japanese (in 1920 the island had 5,700 Palauan and 600 Japanese) (Ono, 2002). In contrast, Japan occupied Nauru for 3 years, essentially for military reasons. The case of Nauru shows that a legacy of institutions could exist even if the occupation period was short. The airfield constructed by Japan is still in operation in Nauru. However, compared to Palau, the degree of transfer of institutions in Nauru was clearly low.

By using the number of years of Japanese occupation or the existence of a Japanese land survey (a dummy variable) as an instrument for measuring the degree of institutional transfer, we can estimate the impact of institutions on economic growth without concern for reverse causality. Table 4 contains the basic information on 23 former Japanese colonies. Since Japan colonized only parts of China, Russia, and India, those three countries are excluded in the main regression (robustness checks are discussed later).

Data on the log of GDP per capita (Purchasing Power Parity) is taken from the CIA World Fact Book (2007), which covers North Korea and all of the Pacific Islands. The World Bank and IMF's GDP per capita (PPP) figures, however, are very similar to the CIA World Fact Book estimates.

⁶ Myers and Peattie (1984) use the same criteria in dividing the former Japanese colonies.

We use various measures of current institutional quality assembled under the auspices of the World Bank (Kaufmann, Kraay, and Mastruzzi, 2007). The World Bank's governance indicators provide six measures of institutions, which we averaged over the years 1996-2007:

- A. Voice and Accountability
- B. Political Stability & Absence of Violence/Terrorism
- C. Government Effectiveness
- D. Regulatory Quality
- E. Rule of Law
- F. Control of Corruption

Table 5 gives the correlation matrix between log GDP per capita and the six measures. Measure B, Political Stability & Absence of Violence/Terrorism, is consistent with the idea of North and Weingast (1989) who emphasized the protection of property rights from political abuse. The other measures are used to check for robustness, which is confirmed.

The first task is to estimate the relationship between current institutions and current GDP per capita, for which we use the following specification:

$$\text{LGDP} = a + b_1 \text{INSTITUTION} + b_2 \text{PACIFIC ISLAND} + e \quad (1)$$

where LGDP is the log GDP per capita (PPP in 2007) of the country, INSTITUTION is the governance indicator of the country (B. Political Stability & Absence of Violence/Terrorism; high score denotes high political stability), and PACIFIC ISLAND equals one if the country is a Pacific island, zero otherwise.

The specification is motivated by work of Hall and Jones (1999) and Acemoglu et al. (2001), who maintain that institutions are the primary and fundamental determinant of economic growth. This conviction is based in part on the finding that human capital and physical capital explain a modest portion of cross-country differences in productivity. Hall and Jones (1999) observe, for example, that of the 35-fold difference in output per worker between the U. S. and Niger, only a factor of 1.5 is explained

by physical capital and only a factor of 3.1 is explained by human capital. The remaining difference - a factor of 7.7 – is a productivity residual.⁷

Plausibly, island conditions in the Pacific are disadvantageous for economic growth due to isolated geographic location and extremely limited land area. The Federal States of Micronesia, the Marshall Islands, and Kiribati consist of widely scattered islands, which make government operations difficult and raise transportation costs for economic development. Subsistence fishing is the main economic activity in these small scattered islands.

The Ordinary Least Squares (OLS) regressions are given in table 6a and 6b (6a: the number of years of Japanese occupation is used as the instrument, 6b: Japanese land survey is used as the instrument). As can be seen, INSTITUTION and PACIFIC ISLAND are significant at the 1% level.

Next, we address the reverse causality (or endogeneity) problem using the number of years of Japanese occupation or the existence of a Japanese land survey as instruments for estimating the degree of institutional transfer. Intuitively, reverse causality means that the measure of institutional quality (the governance indicator of the country, INSTITUTIONS) is affected by the current economic performance of a country. For example, if a country has high GDP per capita today, then researchers may simply infer that the country had good institutions, whether it did or not. In order to solve this problem, we use 2SLS. In the first stage, one re-estimates the measure of institutional quality based on instruments (the number of Japanese occupation and whether Japan conducted a formal land survey). Then, in the second stage, one estimates the effect of institutions on GDP per capita by using the re-estimated measure of institutional quality. The equations for the first stage are as follows:

$$\text{INSTITUTION} = g + d_1 \text{LENGTH OF JAPANESE OCCUPATION} + d_2 \text{PACIFIC ISLAND} + u \quad (2a)$$

⁷ The case of North Korea suggests that institutions are more fundamental than education. Barro (1991) explained high growth rates of South Korea and Taiwan based on their high primary-school enrollment rates in 1960. However, the primary-school enrollment rate of North Korea in 1960 was almost the same as that of South Korea.

$$\text{INSTITUTION} = \alpha + \beta_1 \text{LAND SURVEY} + \beta_2 \text{PACIFIC ISLAND} + \epsilon \quad (2b)$$

where LENGTH OF JAPANESE OCCUPATION is the number of years of Japanese occupation of the country (the log is taken to check the robustness) and LAND SURVEY equals one if the Japanese colonial government completed a land survey in the country.

The first stage regression results are given in table 7a (LENGTH OF JAPANESE OCCUPATION) and 7b (LAND SURVEY). As can be seen, PACIFIC ISLAND is significant at 1% level with either instrument. It is plausible that Pacific islands have less political disturbance, leading to less property loss due to political upset. (In the case of measure E, the Pacific islands have relatively low degree of rule of law. However, the 2SLS result is still robust. Results are similar for C, Government Effectiveness). Neither LENGTH OF JAPANESE OCCUPATION nor LAND SURVEY are strong instruments (not significant and adjusted R-squared is low). It seems that the outliers such as Hong Kong, Singapore, Macau and Brunei are the main source of weakness. According to the quantitative measures, Hong Kong, Singapore, Macau and Brunei have good institutions even though the Japanese occupation period was quite short (2 - 4 years) compared to Taiwan, South Korea, and Palau (32 - 50 years).

The easiest way of controlling for the three outliers (Hong Kong, Singapore, and Macau) is by creating a dummy variable for a city-state (CITY). If CITY is included in the first stage (2a), the LENGTH OF JAPANESE OCCUPATION becomes significant and adjusted R-squared in the first stage increases substantially (Adjusted R-squared=0.49; see table 7a). Similarly, if CITY is included in the first stage (2b), then the adjusted R-squared of the first stage increases substantially (Adjusted R-squared=0.48; LAND SURVEY is not significant, but R-squared is more important in the first stage; see table 7b). Although, it is plausible to assume that establishing good institutions for city-states is easier than establishing good

institutions for large countries⁸, creating the dummy variable for a city-state is quite similar to excluding outliers in the regression.

A more conservative way of improving the first stage regression is by including the number of years of British occupation (LENGTH OF BRITISH OCCUPATION) in the first stage. It is widely believed that Hong Kong and Singapore are heavily influenced by British institutions. Furthermore, 11 out of 23 Japanese colonies experienced British occupation. As can be seen in table 7a and 7b, if LENGTH OF BRITISH OCCUPATION is included in the first stage (2a), then the number of years of Japanese occupation becomes significant at 5% level and adjusted R-squared increases substantially (to 0.42). Similarly, if LENGTH OF BRITISH OCCUPATION is included in the first stage (2b), then the adjusted R-squared of the first stage increases substantially (to 0.37; LAND SURVEY is not significant, but R-squared is more important in the first stage). As can be seen in table 6a and 6b, the effect of institutions is greater in the 2SLS regression. The effect of institutions on log GDP per capita is 1.583 (With instruments of LENGTH OF JAPANESE OCCUPATION and LENGTH OF BRITISH OCCUPATION) and 1.767 (With instruments of LAND SURVEY and LENGTH OF BRITISH OCCUPATION), respectively. These estimates are significant at 1% level and larger than OLS estimates regardless of the choice of instruments. This empirical result is consistent with the findings of Acemoglu et al. (2001), showing that institutions matter for economic growth.

VIII. Generalizing to Other Countries

Investigating the institutions of Hong Kong and Singapore provides a more complete picture about the relationship between institutions and economic growth. If the British colonial government transferred British institutions that secure property rights (i. e. the British land tenure system) to Hong

⁸ If we regard Brunei (total land area is three times larger than that of Hong Kong) as a city-state, then we can get even better regression results. However, in this paper we do not regard Brunei as a city-state.

Kong and Singapore, then the argument can be made even stronger. Also, the number of years of British occupation is more justified as the instrument.

According to Phang (2000) Hong Kong and Singapore have many similarities:

Both started off as British colonies, with British legal and administrative systems. Hong Kong and Singapore are both densely populated cities. Land is a scarce resource. However, what is less well known is the fact that the state owns all the land in the case of Hong Kong, and four-fifth of the land in the case of Singapore. Hong Kong and Singapore capture economic rent primarily by nationalizing land and leasing it out. (Phang, 2000)

In Hong Kong and Singapore, the governments own and lease property. If the leasing contracts provided a kind of modern secure property rights for land, then we can apply the analysis of institutions to Hong and Singapore. The following excerpt from Phang (2000) shows that British colonial leases, in fact were secure.

The British government, on taking over Hong Kong Island in 1841, recognized immediately the importance of controlling land. In 1843, it proclaimed that all land belongs to the Crown and that the government would not allow any private ownership of land. Leases were sold at public auctions or granted directly for the payment of an annual rent. Enforcement powers for land use decisions are found in the Building Ordinance and contractual powers in Crown leases. In 1826, English statutes in force on November 26, 1826, and the principles of common law and equity were received as part of the law in Singapore. This meant that English doctrines of tenure and estates operated in Singapore. (Phang, 2000)

The previous 2SLS regression results show that LENGTH OF BRITISH OCCUPATION is a good instrument for measuring the degree of transfer of British institutions. However, if Bangladesh, India, Pakistan, and Sri Lanka are included in the model, LENGTH OF BRITISH OCCUPATION becomes a weak instrument. The British occupied those countries for 105 - 191 years: Pakistan (105 years), Sri Lanka (153 years), Bangladesh (172 years), and India (191 years). Compared to Hong Kong (157 years) and Singapore (141 years), however, economic performance and institutions of Bangladesh, India, Pakistan, and Sri Lanka are much worse. Maybe, this is one of the reasons that LENGTH OF BRITISH OCCUPATION

has seldom been used as an instrument. However, if we focus on the land tenure system, then we may introduce another instrument that is related to LENGTH OF BRITISH OCCUPATION. A history of Sri Lanka's cadastral survey provides a basis for the better instrument.

After the occupation of the country by the British, several attempts had been made for the establishment of a cadastre based on cadastral surveys. The proclamation by Governor North in the year 1800 for land owners to appear before the 'Land raad' (a judicial official) to produce evidence of title and get their lands surveyed was the first attempt. This failed.

Systematic cadastral surveys commenced in three sub urban villages within the capital Colombo itself based on an Act passed in 1877 for the purpose. However, this activity was abandoned in 1891, after three years of operation, mainly due to the high costs involved. Subsequent attempts in the form of several studies, recommendations and draft acts prepared for the purpose did not borne fruit.

There is at present, what can be described as, a limited cadastre. About eighty percent of the country is covered by village plans prepared by the Surveyor General demarcating State (Crown) land. These plans are [...] prepared after 1910.

Source - Cadastral Template, Country report: Sri Lanka (2003)

<http://www.cadastraltemplate.org>

As the above excerpt shows, the British colonial government attempted to implement a modern land tenure system in Sri Lanka, but it failed in 1800, and failed again in 1891 due to the high cost.

Although the British occupied Sri Lanka for 153 years, the British colonial government could not transfer the British institutions (i. e. the British land tenure system based on cadastral surveys) for 114 years. This is a huge difference between Sri Lanka and the two city-states. In Hong Kong and Singapore, the colonial government transferred the British institutions at the beginning of the occupation. In contrast, in Sri Lanka the colonial government failed to transfer British institutions at the beginning.

Considering this difference, we can create another instrument, the number of years of British occupation after the successful introduction of the British land tenure system (REVISED LENGTH OF BRITISH OCCUPATION). For example, if we count the number of years of British occupation in Sri Lanka after 1910 (when the village plans enabled a limited cadastre), REVISED LENGTH OF BRITISH

OCCUPATION for Sri Lanka is 39 years. Since most of the countries clearly recorded when the laws for the land tenure system were enacted, REVISED LENGTH OF BRITISH OCCUPATION can be calculated with less concern of subjectivity.

REVISED LENGTH OF BRITISH OCCUPATION is also a good instrument because it captures the transfer of operational experience. Introduction is not enough for successful institutional transfer, which requires experience operating under the new rules. The case of Hawaii illustrates the problem of new rules without operational experience. When the system was first introduced, Hawaiians did not understand the value of the title. They did not believe that a piece of paper could guarantee ownership of land. Thus, some foreigners purchased titles at very low prices, and these transactions created many problems later. A similar situation unfolded in the Pacific islands, where it was so confusing that some of the countries returned to the traditional system. The case of Brunei provides a good example of the importance of operational experience. This country attained autonomy from the British in 1959 (after 72 years of occupation), and government officials hired a British adviser to manage their new land tenure system. This example suggests that the locals also realized the importance of operational experience in transitioning to the new system.

Table 8 contains the basic information and REVISED LENGTH OF BRITISH OCCUPATION of 32 countries: 23 former Japanese colonies (11 of them experienced British occupation), 4 South Asian British colonies and 5 Pacific British colonies. For the Pacific Islands, REVISED LENGTH OF BRITISH OCCUPATION are counted from the introduction date of 'the modern cadastral survey' or 'the modern land tenure (law)' under the British administration (See Appendix 2 for details). The correlation matrix between log GDP per capita and the six measures in 32 Asian colonies is given in table 9. Table 10a (LENGTH OF JAPANESE OCCUPATION) and 10b (LAND TENURE) contains the second stage regression results with REVISED LENGTH OF BRITISH OCCUPATION and table 11a (LENGTH OF JAPANESE OCCUPATION) and 11b (LAND TENURE) contains the first stage regression results. As can be seen in

table 11a and 11b, REVISED LENGTH OF BRITISH OCCUPATION is not a weak instrument. As can be seen in table 10a and 10b, by including REVISED LENGTH OF BRITISH OCCUPATION in the first stage as the instrument, we can get a consistent result in 31 Asian colonies. The effect of institutions on log GDP per capita is 1.641 (With instruments of LENGTH OF JAPANESE OCCUPATION and REVISED LENGTH OF BRITISH OCCUPATION) and 1.858 (With instruments of LAND SURVEY and REVISED LENGTH OF BRITISH OCCUPATION), respectively. These estimates are significant at 1% level and larger than OLS estimates regardless of the choice of instruments.

These results suggest that the analysis is consistent if the observations are expanded to the British colonies in Asia. Moreover, it suggests that the bias from endogeneity is likely to distort the empirical estimates more than that of omitted variables. The regression result is robust if we consider all of the colonizers in Asia and their occupation years (i. e. the number of occupation years of France, Germany, Netherlands, Spain, Portugal, and the U. S. See Appendix 2 and 3 and tables 13 and 14).

Finally, we conduct a Hausman test to check the validity of 2SLS. As can be seen in table 12, there is a systematic difference between the OLS and 2SLS estimates. Thus, in order to overcome the problem of LENGTH OF BRITISH OCCUPATION, an improved instrument, REVISED LENGTH OF BRITISH OCCUPATION, has been constructed by considering the differential transfer of institutions within the former British colonies. With REVISED LENGTH OF BRITISH OCCUPATION, the institutional analysis provides a consistent explanation of the economic growth when the data base is expanded to the former British colonies in Asia.

IX. Weak Instruments and Robustness Checks

Recent econometric studies provide a way of testing weak instruments and identification problems. To check the strength of instruments, this paper uses four weak instrument tests: 1) Shea's Partial R-squared (weak instruments, low R-square means weak instruments); 2) Anderson's Canonical

Correlation LM statistic (under-identification, H_0 : under-identified); 3) Stock-Yogo statistics (weak instruments, size distortion problems); 4) Sargan statistics (over-identification, H_0 : instruments are valid). These statistics are provided in the tables 6a, 6b, 10a and 10b.

First, Shea's partial R-squared tests whether the included instrument (in this paper PACIFIC ISLAND) is dominating the R-squared of the first stage. In other words, if the included instrument explains most of the R-squared in the first stage, then it means that the excluded instruments (in this paper LENGTH OF JAPANESE OCCUPATION, LENGTH OF BRITISH OCCUPATION, REVISED LENGTH OF BRITISH OCCUPATION, and LAND SURVEY) are weak. High Shea's partial R-squared shows that our instruments are not weak.

Anderson's procedure is based on the correlation of two canonical variables, one representing a set of independent variables (in this paper instruments, LENGTH OF JAPANESE OCCUPATION, LENGTH OF BRITISH OCCUPATION, REVISED LENGTH OF BRITISH OCCUPATION, and LAND SURVEY), and the other representing the set of dependent variables (in this paper endogenous variable, INSTITUTION). CCEV denotes the minimum eigenvalue of the canonical correlations. The smallest canonical correlation between the K_1 endogenous regressors and the L_1 excluded instruments is \sqrt{CCEV} . The test statistic is $N \times CCEV$ (N times the square of canonical correlation). Analogous with ordinary correlation, canonical correlation squared is the percent of variance in the dependent set explained by the independent set of variables. The null hypothesis is that the equation is under-identified and the test statistic is distributed as a chi-square with $(L_1 - K_1 + 1)$ degrees of freedom. Anderson's Canonical Correlation LM statistics show that our instruments do not have an under-identification problem.

Third, the Cragg-Donald Wald test statistics is calculated from CDEV where $CDEV = CCEV / (1 - CCEV)$. The test statistic is $N \times CDEV$ which has a chi-square distribution with $(L_1 - K_1 + 1)$ degrees of freedom (For details see Hall et al., 1996). Stock and Yogo (2002, 2005) compiled critical values for

Cragg-Donald statistics. The Stock and Yogo statistics suggest that our instruments do not have a large distortion problem.

Finally, the over-identification test, the Sargan statistic, is calculated from $N \times R$ -squared from a regression of the IV residuals on the full set of instruments. The null hypothesis is that the instruments are valid. The Sargan statistics suggests that our instruments are valid.

Weak instrument tests show that LENGTH OF JAPANESE OCCUPATION (or LAND SURVEY) is not a weak instrument when REVISED LENGTH OF BRITISH OCCUPATION is included in the first stage. With respect to robustness, the regression results are robust to the definition of variables (taking log or not; the ways of counting occupation years, especially for Cambodia, Laos, and Viet Nam) and inclusion of extra samples (China, Russia)^{9 10} (The results are not provided).

Finally, the regression results are robust when we use other measures of institutions; C, Government Effectiveness and E, Rule of Law (Regression results are not provided). We can still get a consistent result by using LENGTH OF JAPANESE OCCUPATION, LENGTH OF BRITISH OCCUPATION (or REVISED LENGTH OF BRITISH OCCUPATION) as instruments.

⁹ Plausibly, communism (or the number of years of communism) is a very important factor influencing GDP per capita. Four Asian countries, Cambodia, Laos, North Korea, and Viet Nam, experienced (or are experiencing) communism (including China and Russia, 6 countries). The problem is that the number of years of communism is an endogenous variable. Communism lowered GDP per capita and low GDP per capita forced the countries to give up communism. In addition, another endogeneity problem exists between communism and the measure of institutions. So far we have not found a good instrument for communism except a dummy variable for communism (the dummy variable for communism is less endogenous than the number of years of communism). When the dummy variable for communism is included in the model, the regression results are robust. The results are not provided).

¹⁰ In the legal viewpoint, communism is serious violation of property rights (Banning, 2002). Yoo (2009) investigates communism as serious legal violation of property rights in Asia and the post-colonial constitutional reforms in Africa that weakened legal property rights.

X. Policy Recommendation: Land Title as Acceptable Collateral

A secure land tenure system is an effective precursor of financial market development but how can the institution be established? Many developing countries have undertaken reforms, but most did not stimulate the development of financial markets because land ownership remained vague and/or complex. Experiences in Asia suggest that the following are effective links of a chain: land surveys, land titles, recording of deeds, and acceptable collateral.

First, banks are reluctant to accept land titles as collateral if the document does not clearly specify the boundaries. In developing countries, many land titles vaguely describe the boundaries, often based on landmarks, not a cadastral survey. Thus, if the landmark is destroyed or moved, boundary disputes follow. For example, in Thailand 55 percent of land is held under a certificate of utilization, which is a quasi-formal land title having rough boundaries, but banks do not accept this as collateral. In Thailand, only 15 percent of land has a legal title accepted by banks (Angus-Leppan and Williamson, 1985)

Second, governments must provide a centralized information exchange for land titles. The legal history of Korea provides a good example. Here the Japanese land survey began in 1910 and finished in 1918. Before 1918 there was no official complete land register and Koreans could not record deeds in land transactions. Before the official recording of deeds system, the Japanese colonial government issued a governmental verification letter for land transactions. However, the law implicitly stated that the letter did not guarantee ownership to a third person (Cho, 2003). Foreigners could buy land in Korea after 1905 and the colonial government tried to promote land transactions by verification letters, but ownership was not fully guaranteed. After the land survey, the recording system started and the law explicitly indicated that the government guaranteed ownership of such land. Consequently, banks begin to accept land titles as collateral.

A history of the Torrens system shows how Australia and Canada satisfied the two conditions. Under this system the government stored the original land title and gave a copy to the owner. Initially a Torrens title did not require a clear boundary map, only a rough diagram of the land, which was later formally surveyed. This system accommodated countries that had large land areas and large parcels, but small labor forces. In some cases the survey took place much later, even after the original owner already sold the land to another person. Therefore, Australians and Canadians sometimes hired a private surveyor and then provided the result to the government. Then the government checked the survey to confirm the results (Dale, 1976).

Many developing countries adopted the Torrens system, but most did not require a clear boundary map. Although some titles in developing countries accept privately-sponsored boundary surveys, most of the governments do not check the survey results and do not guarantee the title (Dale, 1976). In other countries that do not use the Torrens system, for example Nigeria, the government does not provide an official land title. Thus, the owners create a private certificate of ownership by hiring a lawyer and by collecting evidence that the court accepts for a transaction. However, banks do not accept this private document as collateral in the absence of a centralized information system, which limits fraud by preventing the owner from creating multiple private titles.

Experience indicates that the systems that mobilize credit have a central information exchange and uniform surveys conducted or verified by the government. Unfortunately researches report that the speed of governmental surveys is extremely slow in most developing countries (Dale, 1976; Angus-Leppan and Williamson. 1985). Under these conditions a step forward would be to accept private surveys combined with a government verification and central registration system.

XI. Concluding Remarks

The historical record provides an excellent laboratory for study of institutions and economic growth, but existing work excludes Asia and institutions are largely treated as a “Black Box.” Economic performance in Asia has been highly varied, with stable economies such as Japan, emerging growth miracles, and various countries with mediocre or poor records of growth. These diverse outcomes provide a useful setting for study, and along with abundant and reliable data from the early twentieth century, allow us to identify the mechanism linking property rights to economic growth.

Japan began to establish secure property rights in the late sixteenth century and completed the process in 1873. Its colonial governments transferred Japanese institutions to Taiwan, Korea, and Palau, two growth miracles and the leading economy in the Pacific Islands, respectively. Palau provides a quasi experimental setting, which shows that a well defined land tenure system helps economic development. Unlike other parts of Palau, one of its states (Ngardmau) struggled economically after its well-defined land records were destroyed by Allied bombing in World War II.

Institutions that secured property rights are found not only in Taiwan, Korea, and Palau, but also in Hong Kong and Singapore. In the latter cases the British colonial government transferred institutions of land rights. These historical facts enable us to extend the scope of institutional analysis and provide a consistent explanation of economic growth in Asia. The British occupied India, Bangladesh, Pakistan, and Sri Lanka for an extended period, but their colonial government failed for some time to transfer the British land tenure system based on the cadastral surveys. This situation contrasts sharply with the two city-states, Hong Kong and Singapore, where the colonial government moved quickly to transfer the British land tenure system following occupation.

The degree of institutional transfer varied across Asian countries and transferred colonial institutions persisted to the present. An issue of reverse causality between institutions and economic growth is addressed by instrumental variables that measure the degree of institutional transfer during

the colonial period. Instrumental variables estimates suggest that secure property rights were critical for economic growth.

These findings lend support to the idea that a strong agricultural sector based on a secure land tenure system is a precursor for industrialization. Weak or poorly defined property rights in the agricultural sector impede borrowing important for capital accumulation. Historical analysis shows that secure property rights encouraged investment, attract outside capital, stimulates financial market development, and promote new technology. Consequently, secure property rights increased agricultural productivity in Asia.

Based on the diverse experience of Asia, we emphasize that a secure land tenure system stimulate economic growth. A history of Korean irrigation projects shows that the permission, compensation, and financing processes of irrigation investment require a clear individual ownership system. However, many African countries are still under the clan ownership system and this explains why the transfer of western irrigation system is a real challenge in Africa. Moreover, historical analysis shows that banks accept land titles as collateral only if the titles clearly describe the boundaries and the government provides centralized information exchange system. We suggest private surveying and government verification system at the time of land transactions creates a more secure land tenure system. These procedures transform land titles into acceptable collateral and stimulate the development of financial markets. Finally, we note that recommendations to improve institutional quality have focused on their introduction. Here we add that attention should be paid to operational experience thereafter. Otherwise, the newly introduced institutions may be misunderstood and allowed to wither.

In sum, a proper land survey defines boundaries and the central recording of deeds enables banks to verify ownership. Because land is immovable and everlasting, banks are more willing to accept it as collateral relative to other assets that can be stolen, hidden, or readily destroyed. Of course land

can lose value if inundated, expropriated or the market sours, but usually these risks can be hedged. We do not claim that land is a “perfect” form of collateral, only that it has mobilized considerable capital when couched in the proper institutions. Moreover because land is the most abundant asset in agricultural economies, its collateralization can provide a major boost for final markets that nurture economic development.

This paper analyzed a number of Asian countries, but in principle the scope of the analysis can be extended to all former British colonies by calculating the length of British occupation after the successful introduction of their land tenure system. In this regard, we are now undertaking preliminary work on Africa. Additional opportunities for study are Eastern Europe in the late twentieth century and the transformation of European economics that followed enclosures.

Appendix A. Jamaica vs. Barbados

“Two highly distinctive systems of land tenure are to be found side by side in many British Caribbean societies.” (Smith, 1956) “The land tenure system in Jamaica is of customary and traditional character which neither observes the forms nor directly invites the sanctions of law” (Clarke, 1953). “The island of Barbados, when its historical emergence is examined, this system of tenure is found not only to be in complete harmony with the [British] law, but is actually based upon it.” (Greenfield, 1960) The traditional land tenure system in Barbados was very similar to that of the British land tenure system. Thus, the transfer of the British system was very successful in the island of Barbados (Greenfield, 1960).

In "Institutions vs. Policies: A Tale of Two Islands," Henry and Miller (2009) assume that the institutions of Jamaica and Barbados are similar. However, this assumption is not supported by historical fact, especially for the land tenure system.

Appendix B. Calculating REVISED LENGTH OF BRITISH OCCUPATION in India

Calculating REVISED LENGTH OF BRITISH OCCUPATION for India (including Bangladesh and Pakistan) is complicated. According to a country report (2003) for India about the cadastral survey:

The colonial rulers in India initiated revenue surveys two [centuries] ago, which was based on the systems adopted in England and Western Europe. This survey was started with a view [toward the] collection of revenue for estates. [The] Survey of India, as a department of government of India establish[ed] in 1767, was fully involved in the process of revenue surveying till 1904.

In 1904, each [state] of India were made responsible for cadastral surveys. Each state has evolved its own [...] legal system of cadastral survey for revenue collection.

Source - Cadastral Template, Country report: India (2003)
<http://www.cadastraltemplate.org>

In India, "the revenue survey" was started in 1767, but the revenue survey differed from the cadastral survey. According to Banerjee and Iyer (2005), three types of land revenue systems existed in colonial India.

Up to a first approximation, all cultivable land in British India fell under one of three alternative systems: (a) a landlord-based system (also known as zamindari or malguzari), (b) an individual cultivator-based system (raiyyatwari), and (c) a village-based system (mahalwari).

(a) In the landlord areas, the revenue liability for a village or a group of villages lay with a single landlord. The landlord was free to set the revenue terms for the peasants under his jurisdiction and to dispossess any peasants who did not pay the landlord what they owed him. Whatever remained after paying the British revenue demand was for the landlord to keep.

(b) The raiyyatwari system was adopted under which the revenue settlement was made directly with the individual raiyyat or cultivator. In these areas, an extensive cadastral survey of the land was done and a detailed record-of-rights was prepared, which served as the legal title to the land for the cultivator.

(c) Village-based (mahalwari) system was adopted in which village bodies which jointly owned the village were responsible for the land revenue. In some areas it was a single person or family that made up the village body and hence was very much like the Bengal landlord system (zamindari), while in other areas the village body had a large number of members with each person being responsible for a fixed share of the revenue. The latter is very much like the individual-based raiyyatwari system. (Banerjee and Iyer, 2005, p.1193-1195)

The individual cultivator-based system (raiyyatwari) provided a basis for secure property rights. As a result, "the overall agricultural yields are 16% higher" (Banerjee and Iyer, 2005). However, the landlord based system which provided less secure property rights was more prevalent, accounting for 49% of the total land area excluding the portion of landlord system in village-based system (from Banerjee and Iyer, 2005).

The following excerpt is illustrative in calculating L-YEARS for India. "Following the recommendation of the 1904 Committee of Govt. of India, the cadastral surveys were delegated (in my opinion, "abdicated!") to the States." (Mishra, Cadastral surveys in India: A critique, <http://www.gisdevelopment.net/application/lis/policy/lisp0001.htm>)

This suggests that it is appropriate to count REVISED LENGTH OF BRITISH OCCUPATION from 1904 in India.

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Figure 1. Japanese Colonies

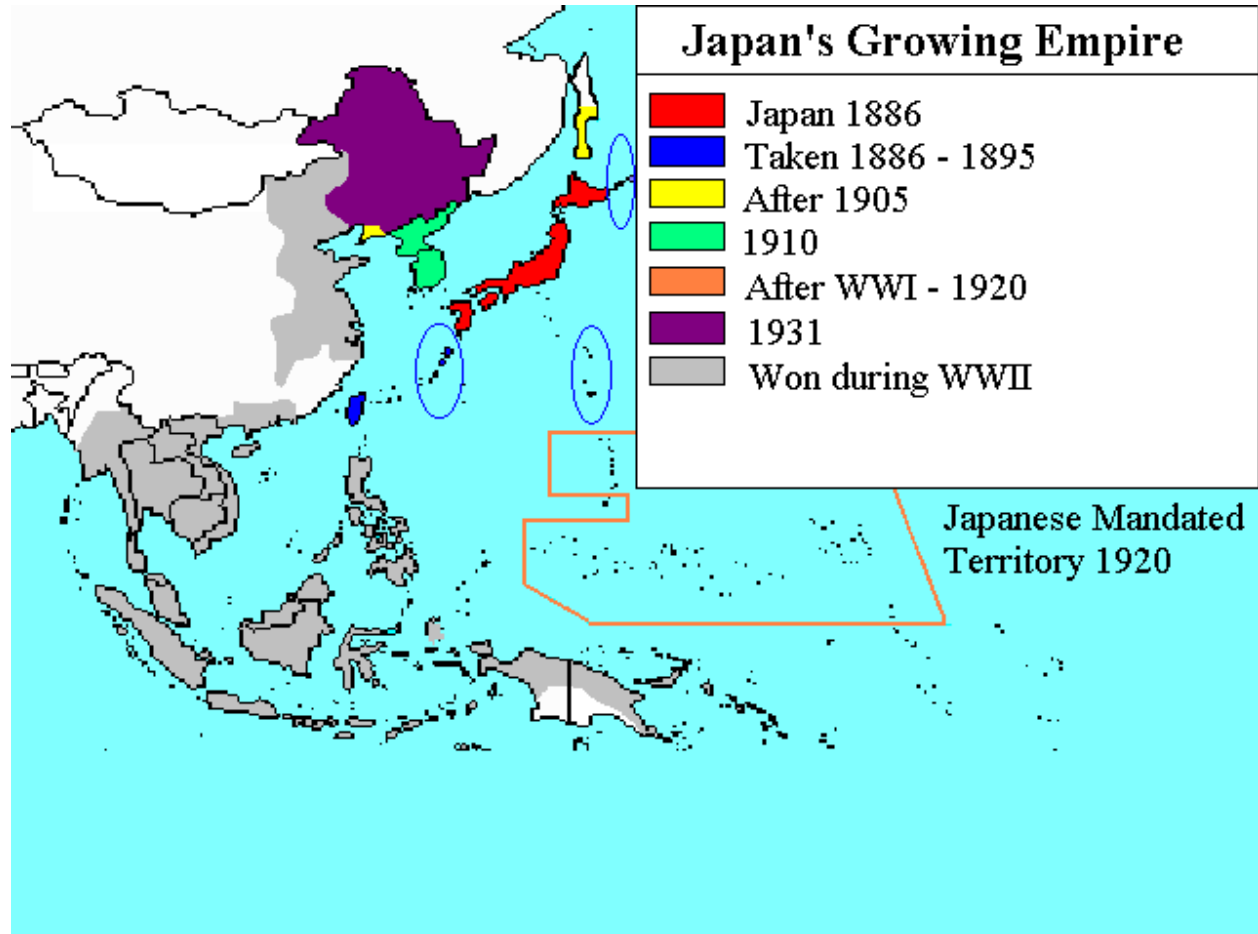


Figure 2. Total amount of collateralized loan (collateral type: land) in Korea, 1918 – 1930

第 8 表 朝鮮の不動産抵当貸出額 (単位：千円)

	不動産抵当年賦・定期貸出			不動産抵当短期貸出			合計
	殖銀	東拓	金組	朝銀	殖銀	普銀	
1918年末	6,621	11,371	1,253	5,049	3,320	6,590	34,204
20	28,216	30,571	10,639	12,037	5,820	17,557	104,840
22	61,326	37,927	18,128	19,438	12,426	28,164	177,407
24	70,075	39,806	18,749	21,417	14,813	32,253	197,113
26	83,817	35,609	25,518	17,003	15,520	36,033	213,600
28	110,399	38,743	25,642	9,070	16,669	34,429	234,952
30	140,120	44,430	38,076	20,538	8,996	46,423	298,583

(出典) 矢野永三郎「朝鮮に於ける不動産金融に就て」(『舎心』12-9)。

(Unit: 1,000 yen)

	Collateralized (land) regular loan			Collateralized (land) Short-term loan			Total
	Siksan	Dongchuk	Geumjo	Choeun	Siksan	Botong	
1918	6,621	11,371	1,253	5,049	3,320	6,590	34,204
20	28,216	30,571	10,639	12,037	5,820	17,557	104,840
22	61,326	37,927	18,128	19,438	12,426	28,164	177,407
24	70,075	39,806	18,749	21,417	14,813	32,253	197,113
26	83,817	35,609	25,518	17,003	15,520	36,033	213,600
28	110,399	38,743	25,642	9,070	16,669	34,429	234,952
30	140,120	44,430	38,076	20,538	8,996	46,423	298,583

NOTE:

1) Source: Hori, Gazuo (1982)

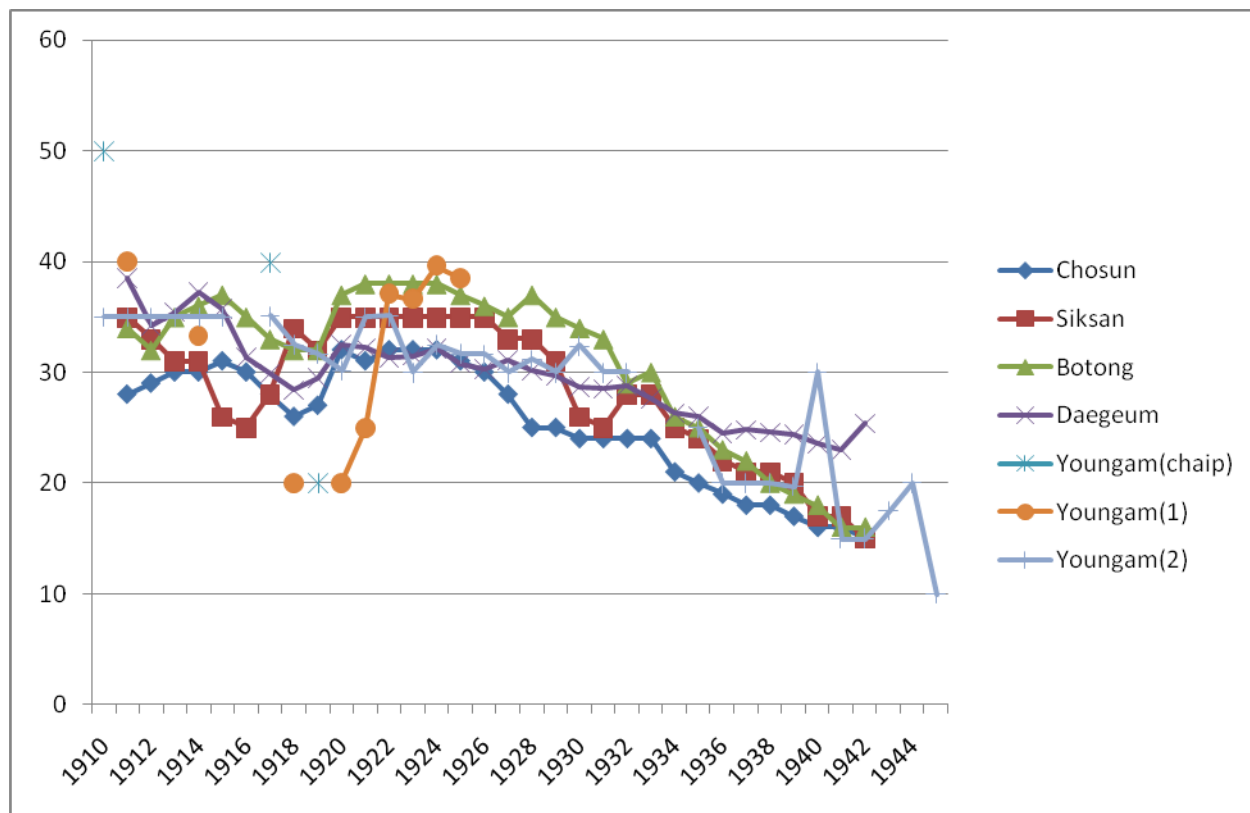
2) Siksan, Dongchuk, Geumjo, Choeun, and Botong are the names of financial institutions.

3) The formal land survey was completed on November 1918.

1918: 34,204,000 yen (Before the completion of Land Survey)

1920: 104,840,000 yen (After the completion of Land Survey)

Figure 3. Public and Private interest in Korea from 1910 – 1944



Note:

1) Source: Kim and Park (2004)

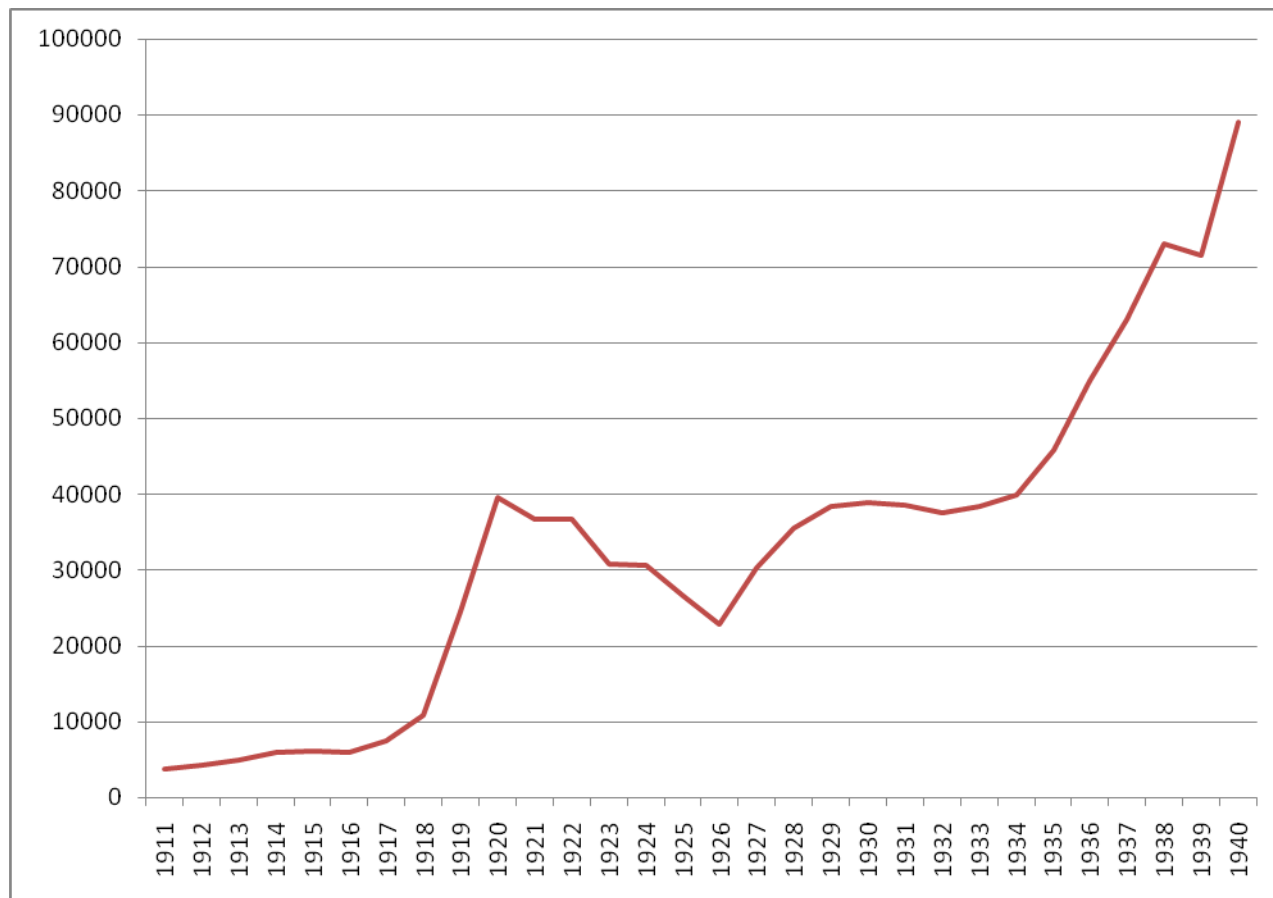
2) Public interest rate: Chosun, Siksang, Botong

Private interest rate: Daegum, Youngam(chaip), Youngam(1), Youngam(2)

3) Inflation was high in early 1920s.

Figure 4. Value-added by Year in Finance Services in Korea

(Unit: Thousand Yen)



1) Source: Joo (2005)

2) Sub-total of valued added in finance services including special banks, commercial banks, oriental reclamation company, financial cooperative, moneylenders and pawnshops, stock exchange, trusts, other financial companies