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Essays on Shanghai: Past and Present

By

MINGXI LI

DISSERTATION

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DOCTOR OF PHILOSOPHY

in

ECONOMICS

in the

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of the

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DAVIS

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2022

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I have been extremely fortunate to join the economic history group at UC Davis and have the opportunity to communicate with the excellent professors, especially Katherine Eriksson and

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ABSTRACT

Essays on Shanghai: Past and Present

From an old port to the "Paris of the East" in modern history, then to today's international metropolis with an world influence, the history of Shanghai in the past one hundred and eighty years is a microcosm of the ups and downs of modern China. What has happened and what is happening in the rapidly changing city provide various settings for empirical study. This dissertation investigates Shanghai, from past to present, in the aspects of the institution, transportation, and culture, trying to explain how the city has evolved to what it is today, and point out the possible direction in which it is going.

Chapter 1 examines the importance of legal systems to economic performance by focusing on a historical period from colonial Shanghai, where quite different legal systems operated in the International Settlement and French Concession. In particular, employing novel historical data, I examine 1903–1934 land value discontinuities at the border between them. Substantial discontinuities were found in the 1900s, with higher land values associated with the International Settlement. However, by the 1930s, such discontinuities had disappeared. A closer look at the institutions reveals that the French Concession adapted its operation to be more business-friendly, under competition from the neighboring International Settlement. This suggests that the French legal system *per se* was not a barrier to economic growth, but rather it could function well if interpreted and implemented properly. This chapter thus adds to evidence that the formal legal system is not a key determinant of economic performance.

Chapter 2 studies the short-run and long-run economic consequences of the now-extinct Shanghai tramway system. Geo-locating the tramway lines on both historical cadastral maps and current google maps, I sort land parcels in the 1900s–1910s and residential complexes in 2018 into treatment and control groups based on their proximities to the tramway that opened for public transit in 1908. Utilizing historical data, a triple difference estimation indicates that the tramway system brought integration to the real estate market by connecting geographically dispersed areas. Estimation based on modern data reveals a persistent effect of the tramway lines on the nearby housing

price, but only in the "periphery" that is outside the former Settlements and the Old Shanghai Town. Comparison between the effects of the tramway in the short-run and long-run thus implies that the influence of retired public transportation is decaying over time.

Chapter 3 uses the hedonic pricing model to study the effects of cultural heritage on the market value of historic properties and their neighboring houses in Shanghai. Though lacking modern facilities, community management, and even necessary renovation, residential complexes that were built during the colonial era (1845-1943) are highly valued by the market, and have not depreciated with age. Generally, a designated historic building is associated with a higher price and positive externalities, but being part of an ensemble with a historic ambiance plays a more important role than the designation itself.

Chapter 1

Firm Foundations:

Legal Systems and Economic Performance in

Colonial Shanghai, 1903–1934

1.1 Introduction

There has long been a continuous debate among scholars regarding the importance of legal systems to economic development. Some believe that the features of legal systems are reflected in institutions and thus affect the economic performance, while others consider the connection between the two to be weak. In a summarization of economic consequences of legal origins, La Porta et al. claim that "common law stands for the strategy of social control that seeks to support private market outcomes, whereas civil law seeks to replace such outcomes with state-desired allocations" (La Porta, Lopez-de Silanes and Shleifer, 2008). Utilizing the experience of European colonialism as a natural experiment and viewing the adoption of the legal systems as exogenous, they pioneer a strand of literature that favors the common law system for its better investor protection, lighter government regulation, and more independent judicial systems, arguing that it is more conducive to economic growth (La Porta et al., 1997, 1998; La Porta, Lopez-de Silanes and Shleifer, 1999; La Porta et al., 1999). On the other hand, utilizing former colonies as well, Acemoglu, Johnson, and Robinson argue that it was the settler mortality (Acemoglu, Johnson and Robinson, 2001) and population density before colonization (Acemoglu, Johnson and Robinson, 2002) that shaped the colonization strategy

of Europeans: regardless of their identity, Europeans were less likely to settle and were more likely to set up extractive institutions in areas where they faced high mortality or prosperous areas with dense populations. So it is not the identity of the colonizer or legal origin, but the way in which countries were colonized that matters for the institutions and thus economic development.

In this paper, I use land value in colonial Shanghai from 1903 to 1934, and a regression discontinuity (RD) design to provide more direct evidence for the unsettled debate regarding how legal systems shape institutions and thus influence economic growth. The key idea behind this approach is that the original British Settlement and French Concession were built from scratch and then coexisted for nearly 100 years. They lay adjacent to each other, with a common law legal system adopted in the British Settlement (later developed to the International Settlement), and the French civil code used in the French Concession. Legal disputes and licensing rules were determined by which Settlement the activities operated within, but both people and goods could move freely across the border—a firm could move its operations from one legal system to the other by simply relocating to the other side of a road. Thus if one legal system was indeed more conducive to economic growth, a gap in land value at the border should be detectable by the RD design. Following this historical setting, I find statistically significant discontinuities in the 1900s–1910s, but none in the 1930s. As shown in Table 1.1, which presents the bias-corrected RD estimates with robust standard error estimator obtained from the local linear regression, a gap of 80% and 91% in land value was found in 1903 and 1907, respectively, but later shrank by more than half in the 1910s. In 1934, there was no significant boundary effect at all.[1]

Table 1.1: Bias-corrected RD Estimates from Local Linear Regression

	1903	1907	1911	1916	1934
	0.7958***	0.9111***	0.4066***	0.3302***	-0.0270
	(0.0941)	(0.1271)	(0.1283)	(0.1265)	(0.0823)
Effective # of obs (l, r)	127, 116	127, 116	127, 116	127, 116	127, 116

Notes: This table reports the estimated discontinuities in land value at the border between the original British Settlement and the French Concession. The dependent variable is expressed in natural logarithm so the coefficients stand for percentage changes. Robust standard errors are noted in parentheses. * indicates statistical significance at the 10% level, ** at the 5% level, and *** at the 1% level.

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[1]Although the focus is the original British Settlement and French Concession that were claimed in the 1840s, the findings based on the extensions claimed between the 1890s and 1910s also align with these basic results (see Figure A1.4).

To document the authenticity of the discontinuities in the 1900s and 1910s, I conduct a series of robustness checks that test for the identification assumption of the RD design, the sensitivity of the discontinuities to the cutoff, and the insensitivity to the choice of bandwidth. The discrete drop in land value across the border from the original British Settlement to French Concession, even sixty years after the British and the French obtained land in Shanghai, passes all the tests, indicating that the French civil code may have indeed caused difficulties in attracting residents and businesspeople at first. However, the later integration in the 1930s indicates that, under constant competition from the neighboring Settlement, the French were perfectly capable of modifying the manners in which they operated their institutions, making the French Concession a competitive location for carrying out business in the 1930s at the latest.

Besides the baseline comparison between the original British Settlement and French Concession, I investigate the British and American Settlements, which had the same legal system, and show that the border between these two Settlements did not mark a discontinuity in land value. Though claimed independently by the American consul-general, the American Settlement, unlike the French Concession, had much in common with the British ever since its founding. The administration was conducted uniformly by the Shanghai Municipal Council from its inception, and in 1863 the two Settlements were amalgamated into one (i.e., the International Settlement). Despite the border between them being a much wider river than that between the British and French before 1914, discontinuity was hardly discernible until 1932, when the original American Settlement was damaged and then captured by the Japanese via the January 28 Incident. This pattern of results reinforces the findings in the baseline comparison, suggesting that the discontinuity could come from discrete change in legal system, but not just geographic feature of the border, for example, the existence of a river.

Catch-up in land value since the late 1910s proved that the French legal system *per se* was not a barrier to economic growth, but rather it could function well if interpreted and implemented properly. According to the official records and anecdotal reports, discrepancies in legal origins did lead to discrepancies in institutions, but were probably limited to those that had no significant effect on economic outcomes. Although the two Settlements exhibited entirely different governing philoso-

phies, with self-rule under merchant elites or oligarchies in the International Settlement versus administrative rule under consular officials in the French Concession, the French legal system did not generate "inferior" institutions in the French Concession—at least, not those that weaken the market attractiveness or hinder the economic development. Instead, the French legal institutions are capable of adapting to become compatible with economic activities, providing a comparable environment in terms of taxes, sanitation and public goods. The "property rights institutions" (Acemoglu and Johnson, 2005) worked equally well in the two Settlements. Like the land value, in later years neither firm density nor industrial structure changed discontinuously at the border.

The overall development of the French Concession can be affirmed by the long-run trend of population plotted in Figure 1.1, where the French Concession was closing its population gap from the International Settlement in the first half of the 20th century. There was no barrier to migration, either natural or artificial, and the government revenue came from all kinds of taxes and license fees, so the number of residents voting with their feet could serve as a measure of the attractiveness of each municipality, or more specifically, the effectiveness of the respective legal institution. In this sense, the French legal institutions had functioned quite well since the beginning of the 20th century, a period when the French Council started to operate its own public utilities, instead of purchasing from companies in the other Settlement, and succeeded in maintaining the comparable tax rates and license fees.

An advantage of the analysis in this paper is that it studies adjacent Settlements built from scratch almost at the same time. In the 1840s, the British, the French, and the American claimed three plots of yet undeveloped rural land outside of the old Shanghai town to establish the "settlements". By virtue of the treaty, they were able to administer themselves under the privilege of extraterritoriality, with administrative, legislative, and judicial institutions transplanted from their home countries. Such an empirical setting was like a natural experiment. By applying RD design to the land value at the border between the Settlements, this paper does not need to impose strong assumption of the exogenous adoption of legal systems, and therefore effectively overcomes the problems of reverse causality and omitted variable bias common in the cross-country studies, which are the most commonly used methodology in the legal origins literature.
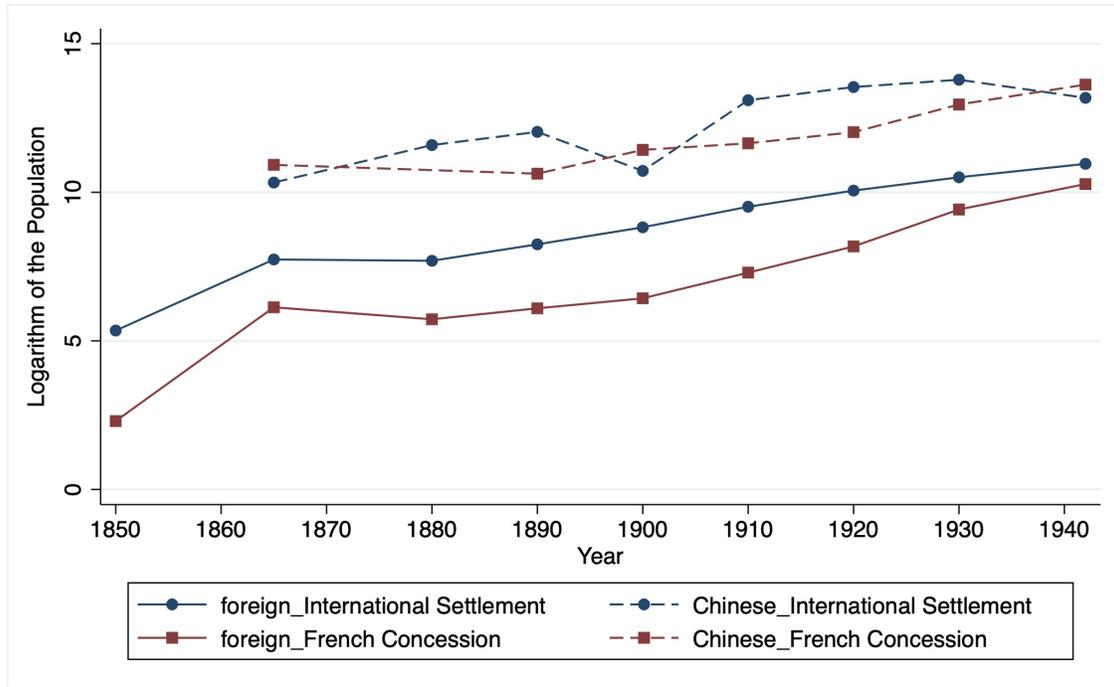
Figure 1.1: Foreign and Chinese Population in the Shanghai Settlements

Notes: This figure shows the log of the population in the International Settlement and French Concession. The numbers are obtained from the annual reports published by the two municipal councils (1892–1933; 1893–1940).

The empirical setting has a number of other attractive features. First, the object of the study is the contemporaneous land value, so the influence of the post-treatment policies is not a disturbance term, and the strong assumption that the fundamental strategies of legal systems survived even after centuries of evolution is not necessary, either. Second, land lots could not move, so the treatment and control groups were closed and thus immune to the "contamination" by the migration across the border (McCauley and Posner, 2015). Third, in Shanghai, the Settlements remained unimproved until the entrance of the foreigners, so the treatment effects could be clearly attributed to their later practices (McCauley and Posner, 2015): *continuous* treatments, such as the distance to the most prosperous commercial street, Nanking Road, could be safely eliminated by the RD design, while any *discontinuous* treatment is considered as incorporated in the connotation of legal origin. It is legitimate to do so because the connotation is broad—as stated in La Porta et al. (2008), "Legal Origin Theory traces the different strategies of common and civil law to different ideas about law

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and its purpose," and the ideas and strategies were incorporated not only into specific legal rules "but also into the organization of the legal system, as well as the human capital and beliefs of its participants."

This paper contributes to several strands of existing research. It connects with the legal origins literature pioneered by La Porta, Lopez-de-Silanes, Shleifer, and Vishny (La Porta et al., 1997, 1998; La Porta, Lopez-de Silanes and Shleifer, 1999; La Porta et al., 1999). Subsequent research extends their study from finance to many other spheres, including government ownership of banks (La Porta et al., 2002) and media (Djankov et al., 2003a), corruption (Treisman, 2000), labor markets (Botero et al., 2004), judicial system (Djankov et al., 2003b; La Porta et al., 2004), entry regulation (Djankov et al., 2002), military conscription (Mulligan and Shleifer, 2005a,b), public goods provision (Iyer, 2010), and spatial structure (Baruah, Henderson and Peng, 2021). All of the above literature points to a significant relationship between legal systems, or legal origins in cases where the original legal systems survived and continued exerting influence after a long time, and institutions, one of the fundamental explanations for economic growth (North and Thomas, 1973; North, 1990). A major concern about empirical work in this literature is endogeneity, as there were all kinds of differences between countries that got one system as opposed to countries that got another, and the adoption of one legal system versus another may not be exogenous at all.

Partly in response to the weaknesses, using RD design in colonial institutions literature has become a popular trend in the last decades. This approach is particularly attractive when there is an arbitrary border drawn between different colonial powers. Examples include Berger (2009), Lee and Schultz (2012), Cogneau and Moradi (2014), Cogneau et al. (2015), Dupraz (2019), and Ali et al. (2019). They leverage the arbitrary nature of Africa's country borders and find different long-run outcomes[2] for each side of the boundaries. In contrast to those "persistent" effects, I exploit the contemporaneous data to provide a more straightforward assessment of different legal systems on different sides of the border. This paper, to the best of my knowledge, is the first to apply the RD design to colonial Shanghai, and it also is the first to provide a quantitative comparison between two adjacent settlements with different legal systems based on the contemporaneous land

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[2]The outcomes range from quality of governance, household wealth, public goods provision, literacy and religious affiliation, socio-economic welfare, and education, to the salience of ethnicity.

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value, an overall economic indicator.

This paper also relates to a body of research on colonial Shanghai, including Ma (2006; 2008), Keller et al. (2013) and Levine et al. (2021). The focus is usually the International Settlement, whereas the French Concession has not been well studied due to data limitation, not to mention the comparison between them. Levine et al. (2021) is a good attempt in this field, but the tumultuous history of Shanghai and the imbalances among its settlements are non-negligible challenges. Though the two plots of land were identical as a "wilderness of marshes" (MacPherson, 1987) in pre-concession characteristics, the differences in the location and early development did exist—it was the British that first picked the original British Settlement in 1843, right after the Opium War, and then the French that chose the original French Concession much later in 1849.[3] Notably, the French would have claimed the same plot of land as the British, had they had the opportunity to select first.[4] Moreover, the initial establishment of the French Concession was more like a result of French national pride rather than necessity, as there were very few French settlers in Shanghai in the 1840s and 1850s.[5] This underpopulation perhaps contributed to the French Concession missing the first wave of financial and commercial development, when large banks and trading companies came to Shanghai en masse.[6] Due to the first-mover advantage, the British Settlement (and later the International Settlement) kept a leading position for a long time with higher population[7] and

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[3] Before the Opium War, Canton was the only port in China opened to foreign trade, where the British dominated the business and claimed 4/5 of the total trade volume. The French, on the other hand, knew much less about China at that time. In 1843, the French government was motivated by the Treaty of Nanking to send a diplomatic corps to China. The corps signed a treaty with the Chinese government in 1844 in Canton and then spent two years investigating other ports in the north. In 1847, when Montigny was designated as the first French consul-general in Shanghai, the French were still unfamiliar with the city (Fredet and Maybon, 1929).

[4] As stated in *Histoire de la Concession Française de Changhai* (1929), a book about the French Concession in Shanghai, the British were the first to arrive and claimed the "best plot of land for themselves" in this region. On the contrary, when the first French consul-general, Montigny, "bravely" settled down, the original French Concession was covered in tombs and foul-smelling ponds.

[5] The French built their settlement at the insistence of Montigny in 1850 when only 10 foreign citizens were living there, as opposed to 210 in the British Settlement. By 1857, there were only 13 foreign land renters (Fredet and Maybon, 1929).

[6] The first foreign banks opened branches in Shanghai were the Oriental Bank Corporation in 1845, the Mercantile Bank of India and the Commercial Bank of India in 1854, the Chartered Bank of India in 1858, the Central Bank of Western India in 1861, and the Asiatic Banking Corporation and the Bank of Hindustan in 1864. The first trading companies such as Dent & Co., Gibb Livingston & Co., Jardine Matheson and Russell & Co. were operated by the British or Americans, who had already gained experience from the transactions with the Chinese businesspeople in Canton, Hong Kong, and Macaw.

[7] The number of foreign people who lived in the French Concession remained approximately only one-tenth of that in the International Settlement until the 1920s (see Table A1.1).

commercial density, more advanced public facilities, and greater fiscal revenue[8]. Consequently, any naive comparison would undoubtedly favor the British Settlement as the preferred system, and the quite possible violation of the "parallel trends" in pretreatment outcomes could invalidate a difference-in-difference method. This paper, taking advantages of RD design, avoids the above caveats by focusing on land lots in a small neighborhood around the border, and thus provides rigorous evidence to the debate about the effects of legal systems on economic performance.

The remainder of this paper proceeds as follows: Section I gives a brief background of colonial Shanghai. Section II introduces the data and empirical strategy. Section III identifies the boundary effect on the land value between the original British Settlement and French Concession. Section IV presents a placebo test on the original British and American Settlements. Sections V discusses the institutions. Section VI describes the similarities in firm distribution, and Section VII concludes.

1.2   Background

1.2.1   The Establishment and Expansion of the Shanghai Settlements

Soon after China was forced to open to the world in 1840, Shanghai, located at the mouth of the Yangzi River, was picked as one of the first trading ports under the Treaty of Nanjing, which allows the foreigners to live and engage in trade in the city. The 1910s–1920s was regarded as the golden era of Shanghai—with the help of the unique institutions, Shanghai transformed from a colonial treaty port to a European style city-state, providing effective public security and private property rights for both Chinese and foreign business within its jurisdiction (Ma, 2006, 2008). As the fastest-growing region, Shanghai was a sparkling representation of the industrialization and urbanization of China in the first half of the 20th century. In the 1930s, Shanghai accounted for more than 50% of China's foreign trade, 45% of foreign investment, 50% of industrial production, and 40% of workers and industrial capital (Tang, 1989). In the *Decennial Reports on the Trade Navigation Industries 5 (1922–1931)*, Layford (1932) attributes Shanghai's prosperity to its more stable political and social environment relative to the other regions of China, which effectively encouraged long-range investments.

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[8]See Table A1.2.

On November 7, 1843, Shanghai, once a small county of Songjiang Prefecture, formally opened. Foreign firms like Dent & Co., Gibb Livingston & Co., and Jardine Matheson flocked to Shanghai, seizing the best sections of land by the Huangpu River. To avoid chaos and conflicts, foreigners were confined within a specific district known as "settlement". Their requests to buy land were rejected, as the Qing government regarded it as a cession of territory. Instead, a "perpetual lease" was employed. In 1854 the first general Land Regulations—the city charters, as they may be called, were arranged between the British consul-general and the local authorities, acting under Imperial instruction. Through these regulations, foreign persons were allowed to rent land within defined limits. The tenancy period was listed as "forever," as the original owners were not allowed to recover the land unless the foreign tenants returned it.
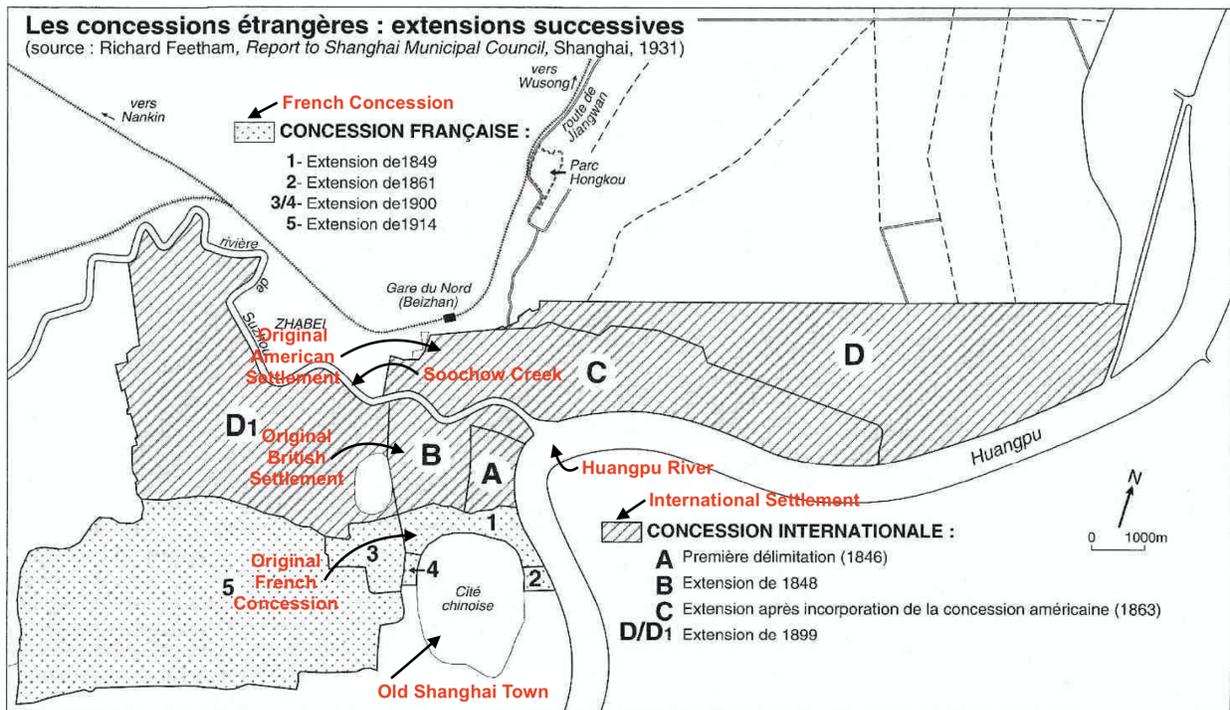
Figure 1.2: Expansion of Settlements in Shanghai

Notes: This figure shows the territory of the Shanghai Settlements at different times. The focus of this paper is the original British Settlement and French Concession due to data limitations—the newly developed extensions of the French Concession (Regions 3, 4 and 5) was not assessed until 1924. The comparison between the original British Settlement and the American Settlement is employed as a placebo test. Source: Marie-Claire Bergère, Historie de Shanghai (History of Shanghai).

Between the 1840s and 1940s, there were mainly three Settlements in Shanghai: the British Settlement, the American Settlement, and the French Concession. They all experienced several waves of expansion, as shown in a map included in the 1931 report by Richard Feetham[9] (Figure 1.2). The British Settlement, located to the west of the Huangpu River and south of the Soochow Creek, was officially set up at the end of 1845. Its initial area was 0.56 km^2 (Region A) and then increased to 1.88 km^2 (Regions A and B) in 1848. The American Settlement, located to the north of the British Settlement, was set up in 1848 with an initial area of 1.86 km^2, and its boundary was officially defined in 1863 (Region C). The French Concession, located between the British Settlement and the old Shanghai Town, was built in 1849 with an initial area of 0.66 km^2 (Region 1). The British and American Settlements combined to form the International Settlement in 1863. The largest expansions (Regions D, D_1 and 3, 4, 5) occurred at the turn of the century. Limited by data availability, however, this paper focuses solely on the original British Settlement (Regions A and B) and the original French Concession (Regions 1 and 2), which have remained the most populous and prosperous commercial district of Shanghai (see Figure A1.1). The supplementary findings based on the limited data from the extensions (Regions 3, 5, and D_1) do not conflict with these basic results though.

The border between the original British Settlement and French Concession previously was a canal called Yang-king-pang (see Figure 1.3), but people could travel from one Settlement to the other via bridges built at each intersection of the south-north thoroughfares and the Yang-king-pang about every 200 m. In the same manner, they crossed the border, the Soochow Creek, between the original British and American Settlements. Unlike the Soochow Creek, Yang-king-pang was filled by the authorities in the two Settlements and transformed into a new thoroughfare in 1914 named Avenue Edward VII, which then evolved to today's Yan'an Elevated Road. Once having crossed the Yang-king-pang (or later, the Avenue Edward VII), one was required to comply with different laws and regulations. For example, a Jinriksha driver needed a different license, and police from one Settlement was not allowed to arrest criminals in the other.

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[9]He was appointed in 1931 by the Shanghai Municipal Council to investigate the possibility of the end of extraterritoriality in China.

Figure 1.3: (a) Yang-king-pang and (b) Avenue Edward VII

Notes: These figures depict the border of the International Settlement and French Concession, which was a canal before 1914, and a thoroughfare after that.

1.2.2 Population and Land Market in Shanghai Settlements

In the beginning, the Chinese were not permitted to lease land in the foreign Settlements, and neither the foreign consuls nor the Chinese government anticipated them living there. In the 1850s, the Small Sword Uprising and Taiping Rebellion motivated Chinese people living in the old Shanghai Town and its surrounding cities to seek shelter in the Settlements, nullifying the rule of exclusion. More and more Chinese people began to "own" land in a foreigner's name. Figure 1.1 shows that the Chinese people remained a majority for nearly 100 years.

A foreigner could lease land in any of the Settlements, no matter which nationality he or she held. In the procedure of the land lease (or to some degree the land sale), the foreign businessperson and the original landowner signed a contract after they reached an agreement on the rental. Next, the

foreigner would send their application to a foreign consulate[10]; the title deed went into effect after it passed audits by both the foreign consul and Shanghai Daotai (an administrator in Shanghai). By such a kind of land lease, a large amount of land was developed, and a real estate market was thereby established.

The importance of land value in colonial Shanghai can never be overemphasized. In the absence of corporate tax and income tax, land tax and rental tax based on the assessed land value were the major costs of living and operating a business in any of the Settlements, constituting approximately half of the fiscal revenue of the authorities according to the annual reports published by the two municipal councils (1892–1933; 1893–1940). In addition to real estate, land value was also critical to the financial market. The period studied in this paper, 1903–1934, marked a tumultuous era in Chinese modern history[11], when the weak governments together with the turbulent domestic and international situations infused the market with continuous uncertainty. In Shanghai Settlements, however, land property endorsed by the title deeds was protected under the extraterritoriality signed in the Treaty. The high degrees of security and liquidity made it the most trusted collateral property for credit, helping Shanghai grow to the financial center of China in the early 20th century (Feetham, 1931). As depicted by Shiroyama (2011), real estate mortgage was an essential way of raising funds for commercial and industrial ventures in Shanghai, where the modern stock and bond markets were underdeveloped. In this sense, the fluctuation in land value should closely reflect the variation in investor confidence. Figure 1.4 shows the steady increase in land values since 1903 (1902) in the British Settlement (French Concession), with the starting values standardized at 100. From the 1900s to the 1930s, land value increased six-fold in the British Settlement and more than nine-fold in the French Concession.

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[10]Land lots in the original French Concession were registered with the French consulate; others were allowed to be registered with any consulate.

[11]Stimulated by the military defeat by the Western allied forces in 1901, the Qing government started a limited modernization reform in 1905 but failed to put the fractured empire back together again. In 1911 the Qing was buried by the Revolution. China then entered the Republican era (1911–1949), experiencing the Beiyang decades (1911–1927), the Nanking decade (1927–1937), the Japanese invasion (1937–1945), and the Chinese Civil War (1945–1949).
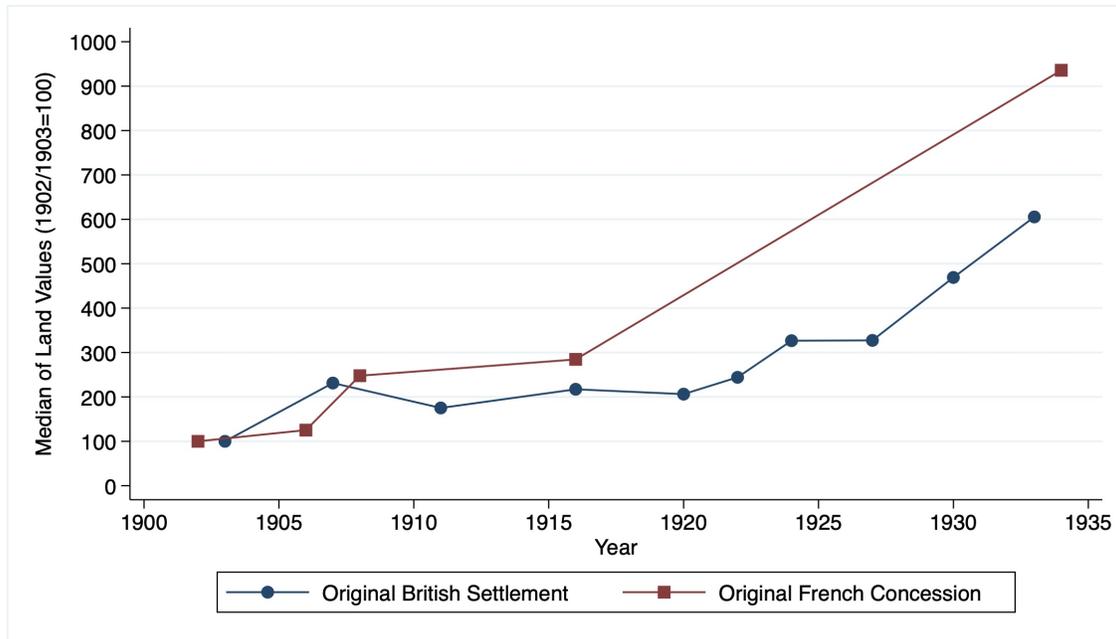
Figure 1.4: Increase in Land Value in the Shanghai Settlements

Notes: This figure shows the medians of land values in the original British Settlement and French Concession with the starting values set as 100. The data are obtained from the land valuation schedules posted by the municipal councils and then adjusted based on the cost of living indices in Yan (2010).

1.2.3 Municipal Administration in Shanghai Settlements

In local affairs, the foreign residents governed themselves and the natives within the Settlements by means of the municipal councils, which existed under the authority of the "Land Regulations." They also had legislative institutions (at first the Land Renters' Meeting and then the Rate Payers' Meeting) and judicial institutions (the Consular Courts for the foreigners, and the Mixed Courts for the Chinese and unrepresented foreigners), replicated from their home countries.

In the International Settlement, the "Committee of Roads and Jetties," originally consisting of "three upright British Merchants" appointed by the British consul-general, became in 1855 the "Municipal Council," elected by the land renters. When the revised Land Regulations came into force in 1870, the Council underwent elections in January of each year by all householders who paid rates on an assessed rental of five hundred taels, or owners of land valued at five hundred taels and over. As described by Jackson (2017), the Shanghai Municipal Council "combined elements of

English municipal councils with the New England tradition of town hall meetings, with the former emphasizing decisions deliberated on by committees informed by salaried officials, and the latter promoting a form of democratic representation through speeches and voting on local business at public meetings"(p. 4).

The counterpart of the Shanghai Municipal Council in the French Concession was the Conseil d'administration municipale (hereafter, the French Council). In 1854, to defend the Settlements from the Small Sword Uprising, the French Concession combined itself with the British-American Settlement, acquiescing to the rule of the Shanghai Municipal Council. In 1862, as different opinions toward administrative affairs could not be reconciled, the French consul-general Route Edan initiated the French Council, which then carried out governance independently in the French Concession. The French Council also consisted of a board of directors and multiple functional departments, with the former making policies and the latter dealing with specific matters (Fredet and Maybon, 1929; Ma and Jiang, 2016). The first directors were selected and nominated by Edan, but in later years, the members were elected by all owners of land in the Concession, or occupants paying a rental of a thousand francs per annum, or residents with an annual income of four thousand francs. This, it can be noted, more closely approaches "universal suffrage" than the franchise of the other Settlement.

Both municipal councils were in charge of public goods provision, including police, water, electricity, sanitation, road maintenance, and public transportation. Regular income mainly came from land tax, rental tax, dues on goods, and all types of license fees.

Though had much in common, authorities in the two Settlements exhibited different philosophies of government. The International Settlement was more like a charter city that emphasized self-governance.[12] In the 1850s, during the time of the Taiping Rebellion the Shanghai Municipal Council proposed a "free city" plan, with the almost unanimous consent of the land renters and residents, to make Shanghai independent from any country. The plan was declined by the foreign governments[13], but the Shanghai Municipal Council gained immense power by amending

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[12]As noted by Ma (2008), this is an institutional feature that distinguished the International Settlement from not only most other treaty ports in China but also the neighboring French Concession.

[13]Unlike the businesspeople, the foreign governments looked beyond the economic interests.

the constitution in 1866. Within the Settlement, the ultimate authority resided with the board of directors, which was elected from (the largest) ratepayers. It had supreme decision-making power over any relevant issue, with no responsibility to the British or American government. The French Concession, on the other hand, exhibited more features of centralization. Its ultimate authority belonged to the French Consul-General, who had full control over the Concession's police forces, and could veto any resolution put forward by the French Council. The only person to whom he was beholden was the French ambassador to China. When there were disputes between the French consul-general and the board,[14] the former had the right to dismiss the latter and nominate new directors.[15]

1.3 Data

The prime data for this paper is land value, which comes from land assessments conducted every few years by the Shanghai Municipal Council and the French Council[16] between the 1860s and 1940s, served as a basis for collecting land tax. The goal, as defined in the preface of the land valuation schedules, was to "place the properties as near as possible to their fair market value," and thereby to provide a more reasonable tax base than the initial sale price. If the assessed value was thought to be unfair, the landowner had the right to raise an objection and ask for a revaluation. The revised result would be published and presented to the ratepayers for their final approval.

Generally, the outputs of a land assessment included the following: (1) the cadastral maps showing the location of each land lot, and (2) the land valuation schedule, recording the name of the renter, cadastral number, area, land value, and taxation assessment for each land lot. Figure A1.2 shows one part of the 1931 cadastral maps in the French Concession, from which the location of land lots with cadastral numbers 1 through 49 can be noted. Figure A1.3 shows one page of the 1911 *Land Assessment Schedule* in the International Settlement, from which information of the cadastral number, registered owner, area, and value per *mu* can be obtained. Relatively complete

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[14]The relative status of the two partners was changing over time, largely due to the personalities of the consul-general and the directors (Fredet and Maybon, 1929).

[15]During the approximately 80 years since its foundation, the board had been dismissed six times (Shi, Ma and Feng, 2001).

[16]Land assessments appeared in the French Concession as early as in the 1860s (Fredet and Maybon, 1929), but were much less accurate before 1900, where land lots were usually classified simply into several grades according to their locations (Shi, Ma and Feng, 2001).

and detailed data of land assessments in the International Settlement are well preserved in the Shanghai Municipal Archive[17]. The author, together with Fusheng Luo[18], have digitized all the land valuation schedules between 1900 and 1933, which are available upon reasonable request. The availability of land assessments in the French Concession is much more limited. The latest ones are kept in the Shanghai Municipal Archive, while some of the earlier ones can be found only in the French archives, with the total number of them unknown. Christian Henriot (An Keqiang)[19] and his team have made great efforts in collecting, organizing, and digitizing these French land assessments. The author is grateful for their admirable work and generous sharing, which make the comparative study on the two Settlements possible.

Geo-referencing and Creating Land Lots

All Land Lots Assessed in 1934
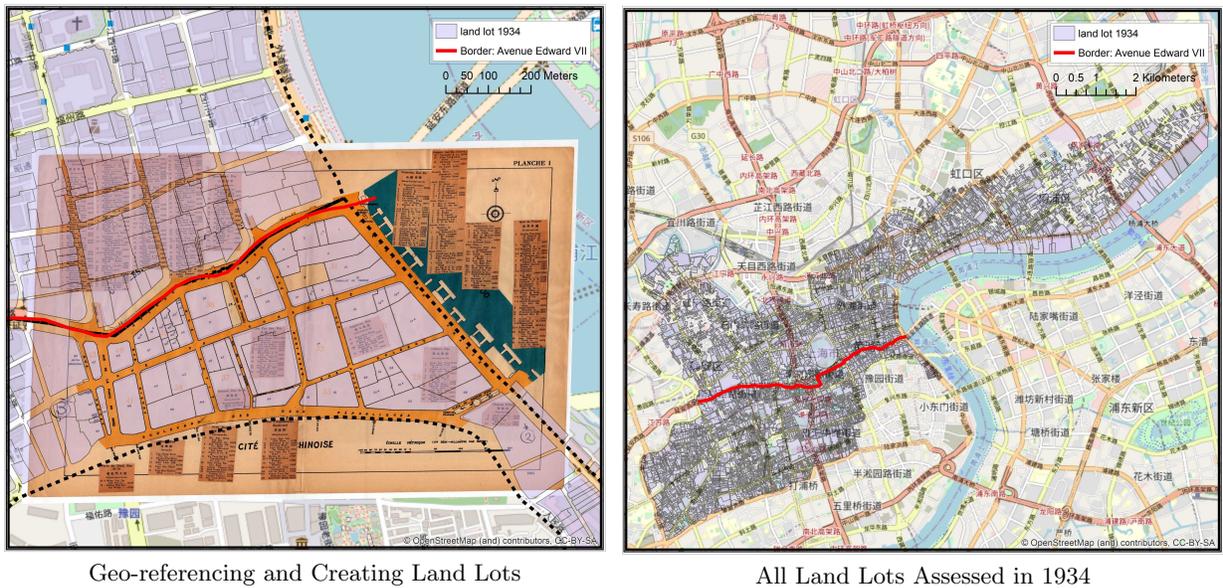
Figure 1.5: Geo-coding of the Land Lots

Notes: These figures demonstrate how the location information of the land lots are obtained from the cadastral maps and recorded into ArcGIS.

Based on the cadastral number, each land lot is geo-located in ArcGIS, so its distance to the border can be calculated. Figure 1.5 demonstrates the general geo-coding process, where a cadastral

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[17]Namely, land valuation schedules in 1867, 1869, 1874, 1876, 1880, 1882, 1889, 1892, 1897, 1900, 1903, 1907, 1911, 1916, 1920, 1922, 1924, 1927, 1930, and 1933, to which the cadastral maps of each district were attached after the 1900s

[18]https://lsa.umich.edu/history/people/graduate-students/fusheng.html

[19]https://ankeqiang.org

map showing a piece of land in the French Concession near the Bund is geo-referenced; next, 49 land lots on the map are drawn as features by hand. In this manner, the spatial information of nearly 15,000 land lots has been recorded.

Data of the years 1903, 1907, 1911, 1916, and 1934 are used in this paper.[20] No data in the 1920s are used to get the basic results because the only land survey conducted during the 1920s in the French Concession, the 1924 assessment, contains land values only in the extensions. It also is the first one that reports land values in the new extensions of the French Concession, making it less informative to compare them to the extensions in the International Settlement. Nevertheless, RD estimation applied to the extensions in only two years (1924 and 1934) reveals a similar process of catching up (see Figure A1.4).

Figure 1.6 shows the locations and values of land lots assessed in 1916. The numbers of observations for the original British Settlement and French Concession are 777 and 255, respectively. As time went by, one land lot could be divided into several lots. For example, the entirety of Lots 17, 17A, 17B, 17C, 17D, and 17E in the British Settlement in 1916 was only one piece of land in 1903—Lot 17. To fairly compare land value across time, this paper views 17A-E as one unit as Lot 17, the value of which was the average of the six pieces of land, weighted by their respective areas. Such an adjustment reduces the number of observations in the original British Settlement in 1916 to 675 and French Concession to 234.

Summary statistics for 1903, 1916 and 1934 are reported in Table 1.2.[21] The unit for area is mu[22], and for value is tls. per mu[23]. As shown in Table 1.2, the mean value in the French Concession was about 65% of that in the British Settlement in 1903. In 1916 this ratio increased

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[20]Land assessments were not conducted simultaneously in the two Settlements. In most of the years, land valuation schedules were published in one Settlement but not in the other. For comparison, I interpolate data for the corresponding years with a constant growth assumption as follows: assessed values in 1934 of the International Settlement are interpolated using the assessments of 1930 and 1933; assessed values in 1903 of the French Concession are interpolated using the assessments of 1902 and 1906; assessed values in 1907 of the French Concession are interpolated using the assessments of 1906 and 1908; assessed values in 1911 of the French Concession are interpolated using the assessments of 1908 and 1916.

[21]Data of 1903 of the French Concession are interpolated using the assessments of 1902 and 1906; Data of 1934 of the International Settlement are interpolated using the assessments of 1930 and 1933.

[22]Unit for area was recorded in *mu, fen, li*, with 1 $mu = 10$ *fen* $= 100$ *li*$= 674.45$ $m^2 = 0.1667$ *acre*.

[23]According to *Zhongguo de Duiwai Maoyi he Gongye Fazhan: 1840-1948 (Foreign Trade and Industrial Development in China: 1840-1948)* (Zheng, 1984), tls. 1=$0.640 in 1903, $0.790 in 1907, $0.650 in 1911, $0.790 in 1916, $1.240 in 1920, $0.810 in 1924, $0.690 in 1927, $0.460 in 1930, and $0.526 in 1934.
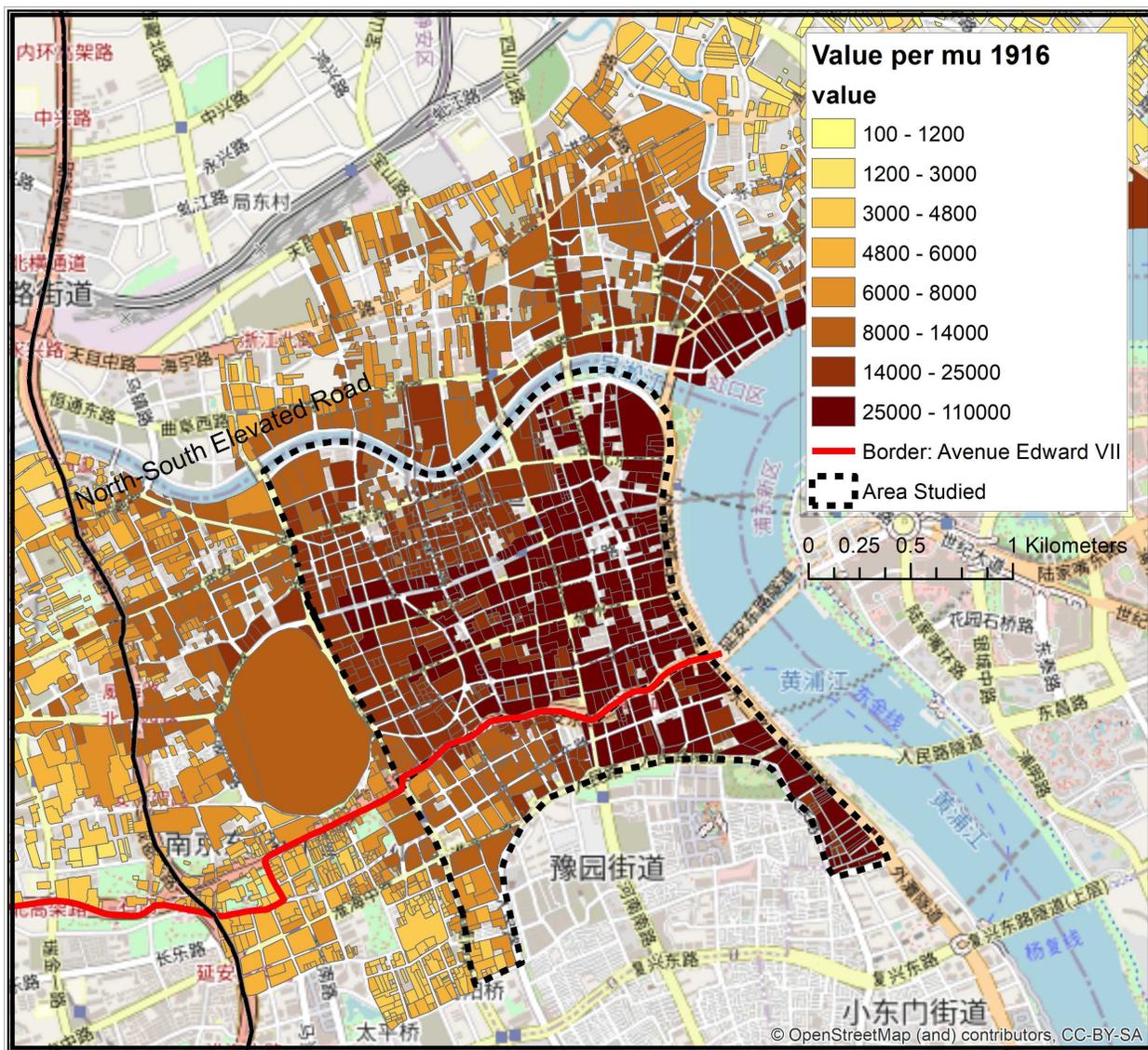
Figure 1.6: Land Value Gradient 1916

Notes: This figure plots the land lots that were assessed in 1916.

to 80%; and in 1934, it increased to 87%. Although the land lots in the British Settlement were still more expensive on average, a closer look at the neighborhood around the border indicates that the land markets in the two Settlements had already become highly integrated at that time. Area, on the other hand, was relatively similar, and no significant discontinuity was found at the border (see the right panel of Figure 1.8).

Table 1.2: Summary Statistics of Land Lots

	1903		1916		1934	
Original British Settlement	Value	Area	Value	Area	Value	Area
Min	4,500	0.05	10,000	0.03	41,667	0.02
Max	37,500	48.65	110,000	48.65	371,667	48.65
Mean	11,859.49	3.39	28,542.88	3.28	128,137.50	3.02
Std. Dev	5,720.44	4.25	16,798.79	3.90	52,591.96	3.78
Obs	663	663	675	675	713	713
Original French Concession	Value	Area	Value	Area	Value	Area
Min	2,150	0.02	3,500	0.02	29,400	0.02
Max	16,663	22.90	80,000	23.62	245,063	23.61
Mean	7,653.85	3.46	22,832.57	3.41	111,433.40	3.51
Std. Dev	4239.54	3.53	16,593.60	3.52	45,444.59	3.64
Obs	232	232	234	234	230	230

Notes: This table presents the summary statistics of the land lots in the original Settlements. The unit for area is *mu*, and for value is tls. per *mu*. Data are collected from the land valuation schedules posted by the Shanghai Municipal Council and the French Council.

Land assessments acted as fundamental reference sources in land transactions. According to a comprehensive guide for property investment in Shanghai published in 1933, the most common method of property evaluation was to borrow from the land assessment schedules posted by both municipal councils: "Empirically, the market price was always set as the assessed value with a 25% appreciation, subject to rentals in the neighborhood" (p. 192) (Chen, 1933). The similar positive relationship between the assessed value and the market value presented in Part D of Section III can serve as a solid testimonial to the common recognition of the land assessment in the two Settlements.

1.4 Empirical Results

1.4.1 Basic Results

The changing discontinuity can be illustrated straightforwardly using a graphical presentation of the RD design. As plotted in Figure 1.7, where each dot denotes an average log of land value in some bin, in 1903 the discontinuity was nearly 80%, with higher land values associated with the International Settlement. In the 1910s such gap closed substantially. In 1934, although dots in the British Settlement were still on average higher, no significant discontinuity can be found at the cutoff.
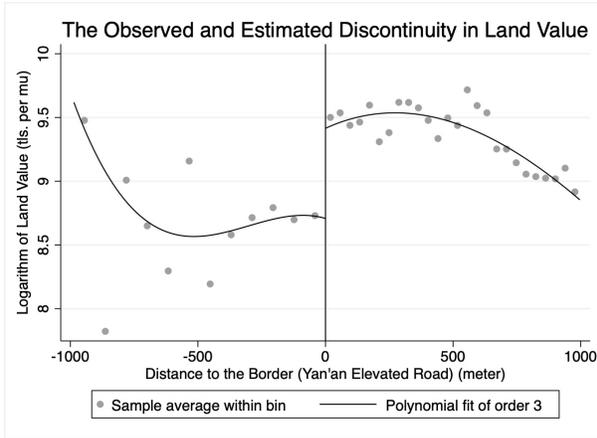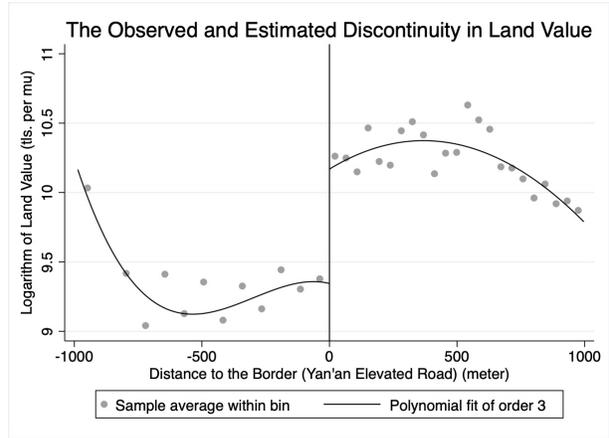
The Observed and Estimated Discontinuity in Land Value

1903 (Original Settlements Only)

The Observed and Estimated Discontinuity in Land Value

1907 (Original Settlements Only)

The Observed and Estimated Discontinuity in Land Value

1911 (Original Settlements Only)

The Observed and Estimated Discontinuity in Land Value

1916 (Original Settlements Only)

The Observed and Estimated Discontinuity in Land Value
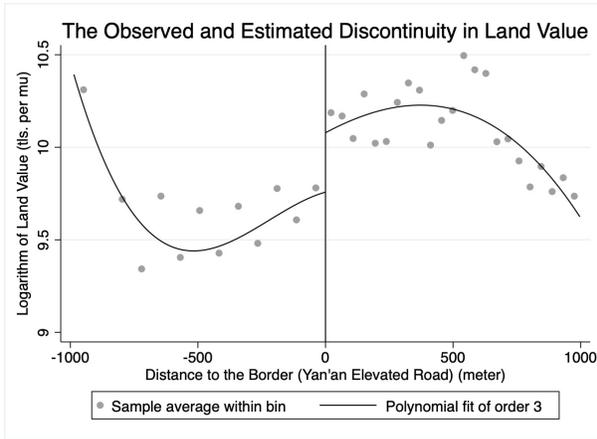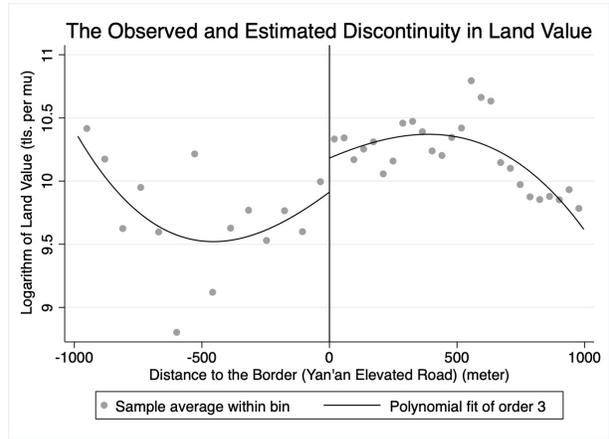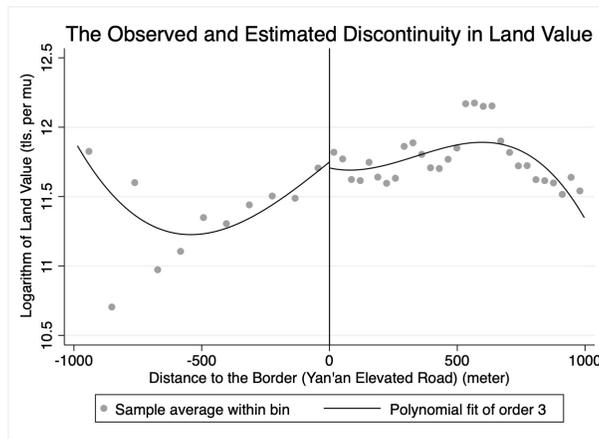
1934 (Original Settlements Only)

Figure 1.7: Discontinuity between the original British and French Settlements

Notes: These figures show the changing discontinuity in land value at the border. Distance to the border is positive for the land lots in the International Settlement and negative for those in the French Concession.

20

To quantitatively assess the effects of being inside the original British Settlement relative to the French Concession on land value, I estimate the following equation using (1) local linear regression, (2) local quadratic regression, and (3) local cubic regression, respectively.

$$Y_i = \alpha_l + \tau D_i + \beta_l X_i + (\beta_r - \beta_l)D_i \times X_i + \epsilon_i \tag{1.1}$$

In Equation 1.1, Y_i denotes the logarithm of the average value of land lot i; X_i denotes the distance to the border of land lot i and is positive for land lots in the International Settlement while negative in the French Concession; $D_i = 1$ if $X_i > 0$ and $D_i = 0$ otherwise; the interaction term is included to allow the regression functions (e.g., the slope of the linear function) to differ on both sides of the cutoff; and ϵ_i is the error term.

Table 1.3 presents the results, which largely mirror the patterns in Figure 1.7. In each column (a), the bandwidth is selected to be the same for the two Settlements, while in each column (b), the bandwidth is set differently for different sides of the border. In all the columns, the bandwidth is selected based on the 1903 data and kept consistent across years. The bandwidth is allowed to be selected separately for each year using the contemporaneous data in Table A1.3, leading to narrower bandwidths (and thus fewer numbers of observations) in 1916 and 1934. But the pattern stays almost the same, with the exception that the original French Concession overtook the British Settlement in 1934.

As shown in Table 1.3, the estimated coefficient on the treatment, τ, is significantly positive by 1916 under most of the specifications. Since adding higher-order polynomials does not result in additional efficiency, I will refer to the local linear regression as the favorable model. Estimates in column (b) with polynomial=1 and two different MSE-optimal bandwidth selectors perfectly replicate those magnitudes of discontinuity at the cutoff in Figure 1.7 and therefore are selected as the baseline result to be visualized in the left panel of Figure 1.8. Both the conventional and the bias-corrected RD estimates strongly reject the null hypothesis that there was no discontinuity at the border in the 1900s and 1910s. The estimated coefficients imply that, compared to the land lots in the original French Concession that were just below the border, land lots in the original British Settlement that were just above the border had an average of 80% higher assessed values in 1903

Table 1.3: RD Estimates Between the Original British and French Settlements

Year		Polynomial=1		Polynomial=2		Polynomial=3	
		(a)	(b)	(a)	(b)	(a)	(b)
1903	(1)	0.769***	**0.769***	0.783***	0.746***	0.762***	0.728***
		(0.083)	(0.082)	(0.097)	(0.098)	(0.114)	(0.115)
	(2)	0.782***	**0.796***	0.795***	0.742***	0.759***	0.713***
		(0.083)	(0.082)	(0.097)	(0.098)	(0.114)	(0.115)
	(3)	0.783***	**0.796***	0.795***	0.742***	0.759***	0.713***
		(0.096)	(0.094)	(0.107)	(0.111)	(0.123)	(0.127)
Effective # of obs (l, r)		117, 119	127, 116	144, 187	134, 238	157, 248	152, 344
1907	(1)	0.881***	**0.880***	0.902***	0.849***	0.905***	0.834***
		(0.113)	(0.111)	(0.131)	(0.134)	(0.154)	(0.158)
	(2)	0.9025***	**0.911***	0.923***	0.851***	0.913***	0.828***
		(0.113)	(0.111)	(0.131)	(0.134)	(0.154)	(0.158)
	(3)	0.903***	**0.911***	0.923***	0.851***	0.913***	0.828***
		(0.131)	(0.127)	(0.146)	(0.151)	(0.166)	(0.173)
Effective # of obs (l, r)		117, 119	127, 116	144, 187	134, 238	157, 248	152, 344
1911	(1)	0.383***	**0.390***	0.373***	0.312**	0.335**	0.269*
		(0.113)	(0.112)	(0.132)	(0.134)	(0.154)	(0.158)
	(2)	0.373***	**0.407***	0.375***	0.300**	0.326**	0.248
		(0.113)	(0.112)	(0.132)	(0.134)	(0.154)	(0.158)
	(3)	0.373***	**0.407***	0.375**	0.300**	0.326*	0.248
		(0.132)	(0.128)	(0.146)	(0.151)	(0.167)	(0.174)
Effective # of obs (l, r)		117, 119	127, 116	144, 187	134, 238	157, 248	152, 344
1916	(1)	0.325***	**0.342***	0.270**	0.191	0.185	0.115
		(0.111)	(0.110)	(0.128)	(0.128)	(0.153)	(0.149)
	(2)	0.285***	**0.330***	0.241*	0.151	0.153	0.069
		(0.111)	(0.110)	(0.128)	(0.128)	(0.153)	(0.149)
	(3)	0.285**	**0.330***	0.241*	0.002	0.153	0.069
		(0.129)	(0.127)	(0.142)	(0.145)	(0.161)	(0.165)
Effective # of obs (l, r)		117, 119	127, 116	144, 187	134, 238	157, 248	152, 344
1934	(1)	-0.044	**-0.025**	-0.074	-0.147**	-0.133*	-0.197***
		(0.069)	(0.072)	(0.089)	(0.085)	(0.079)	(0.075)
	(2)	-0.0704	**-0.027**	-0.100	-0.180***	-0.160**	-0.237***
		(0.069)	(0.072)	(0.089)	(0.085)	(0.079)	(0.075)
	(3)	-0.070	**-0.027**	-0.100	-0.180**	-0.160*	-0.237***
		(0.079)	(0.082)	(0.103)	(0.097)	(0.085)	(0.084)
Effective # of obs (l, r)		117,119	127, 116	144, 187	134, 238	157, 248	152, 344

Notes: This table reports the estimated discontinuities in land value at the border of the original British Settlement and the original French Concession. The dependent variable is expressed in natural logarithm so the coefficients stand for percentage changes. Row (1)'s report the conventional RD estimates with conventional standard error estimator. Row (2)'s report the bias-corrected RD estimates with conventional standard error estimator. Row (3)'s report the bias-corrected RD estimates with robust standard error estimator. In column (a)'s one common MSE-optimal bandwidth selector is used: $[-250.793m, 250.793m]$ when polynomial=1, $[-386.004m, 386.004m]$ when polynomial=2, and $[-503.690m, 503.690m]$ when polynomial=3, all selected based on the data of 1903. In column (b)'s two different MSE-optimal bandwidth selectors are used: $[-273.558m, 244.677m]$ when polynomial=1, $[-323.681m, 486.363m]$ when polynomial=2, and $[-435.097m, 689.532m]$ when polynomial=3, all selected based on the data of 1903. Standard errors are noted in parentheses. * indicates statistical significance at the 10% level, ** at the 5% level, and *** at the 1% level.

and 91% higher assessed values in 1907. Such a vast premium, however, was not carried into the 1910s but shrank by more than half. In 1911, crossing the border from the French to the British side was just associated with a 41% appreciation in land value. This premium further dropped to 33% in 1916. Eighteen years later, in 1934, such gaps, if there were any, were found to be in favor of the French Concession.

Estimated Discontinuity in Land Value · · · · · · · · Robustness Check: No Discontinuity in Area
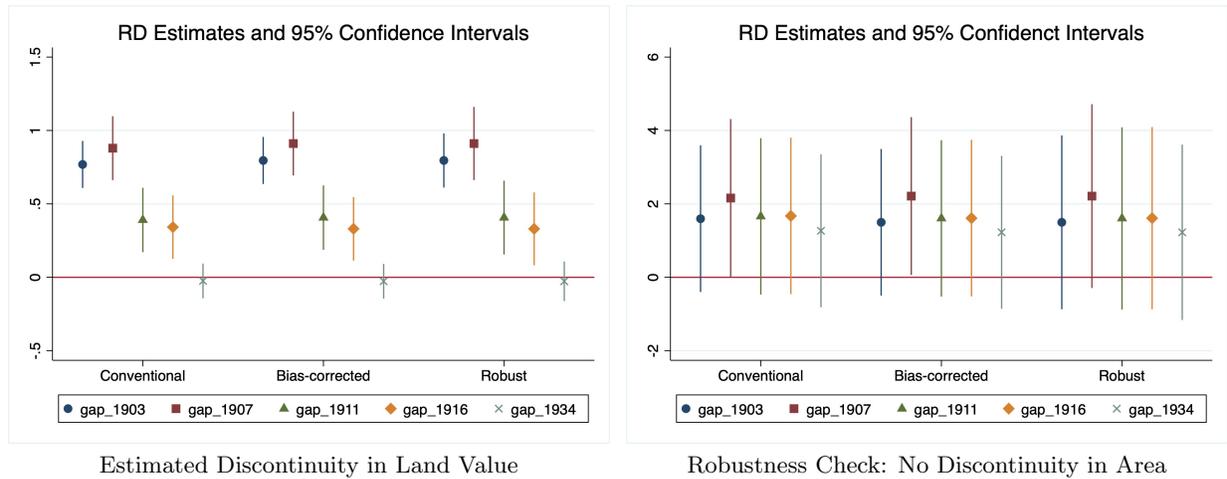
Figure 1.8: Estimated Discontinuity in Land Value and Area

Notes: The figure on the left, a visualisation of column (b) under polynomial=1 in Table 3, presents the estimated discontinuities in land value and their 95% confidence intervals. The figure on the right presents the estimated discontinuities in area and their 95% confidence intervals, which are obtained from estimating the same equation but with area as the outcome variable.

1.4.2 Robustness Checks

The identification assumption of the RD design requires that the individuals be unable to (precisely) manipulate the assignment variable. Though it sounds odd that the land lots were capable of "locating" themselves, there remains a possibility that area, the baseline covariate, changed discontinuously at the cutoff. If this is true, the boundary effect favoring the original British Settlement may simply have reflected the imbalance in this covariate: land lots in the British Settlements may be generally larger, and larger land lots tended to be more valuable.[24] In this regard, I test for the discontinuity in area at the border by estimating Equation (1) with area as the outcome variable.

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[24]This is verified with the data in either the original British Settlement or French Concession. That larger land lots had higher land value per mu may be because they were more flexible in use.

The right panel in Figure 1.8 presents the RD estimates of such discontinuity using a local linear regression with two different MSE-optimal bandwidth selectors. None of them is statistically significant at the 5% level, ruling out the possibility that the higher land value in the British Settlement was a result of generally larger size in its land lots.

Another type of robustness check is the authenticity of the discontinuity. If the discontinuities in land value found in the 1900s and 1910s were authentic, but not coincidental, they should be sensitive to the cutoff, and insensitive to the bandwidth. Therefore, I cook up some "pseudo" cutoffs (as illustrated in Figure A1.5) and "nonoptimal" bandwidths, based on which the local linear regression is reconducted.

Figure 1.9– 1.11 present the RD estimates under those false assumptions. Pseudo cutoffs are set at the 10th, 20th, and 25th percentiles on both sides in Figure 1.9 and are set as the thoroughfares closest to the border in Figure 1.10. Unlike in the baseline regression with the true cutoff, almost none of the coefficients obtained with the pseudo cutoffs is significant. Figure 1.11 shows the RD estimates with the "nonoptimal" bandwidths as 25%, 50%, 75%, 100%, 125%, 150%, 175%, and 200% of the "optimal" bandwidth selected in the favorable model. Except for the bandwidth that is 25% of the "optimal" bandwidth, at which the numbers of observations become scarce, the results are not significantly altered.

1.4.3 Heterogeneity Analysis

In the previous subsections, the discontinuities in land value at the border between the original British Settlement and French Concession in the 1900s and 1910s have been identified clearly. A natural question to ask is whether the discontinuity varied along the border. If the scale of discontinuity was the same at first and then dissipated at the same speed everywhere along the border, it is more likely that the catch-up of the original French Concession was purely an economic convergence or even an outcome of the modification in land valuation. To learn whether the development along the border was balanced or not, I choose nine crossroads as the focal points and estimate the very "local" regression discontinuity around each of them. The nine crossroads are the intersections of the border and those north-south thoroughfares, from the Bund at the eastern end to the Yunnan Road at the western end.
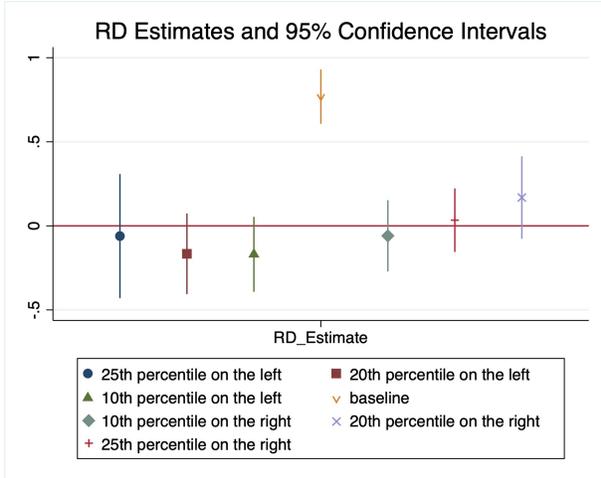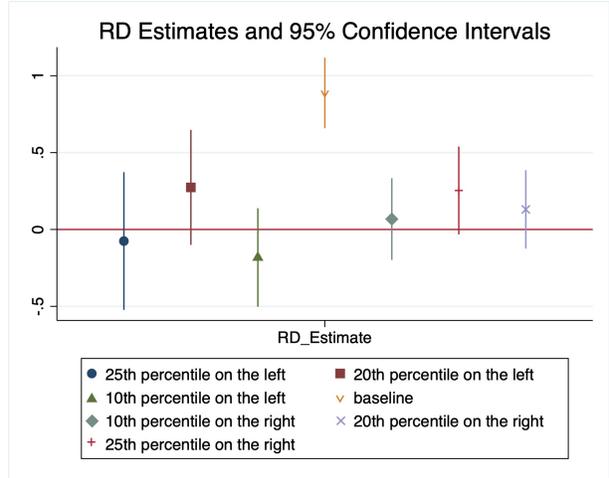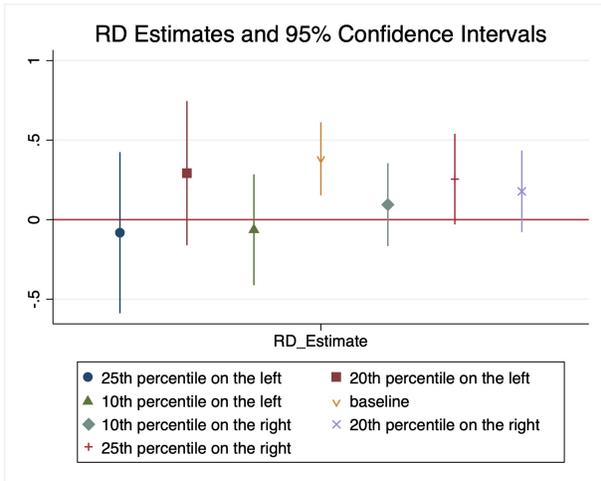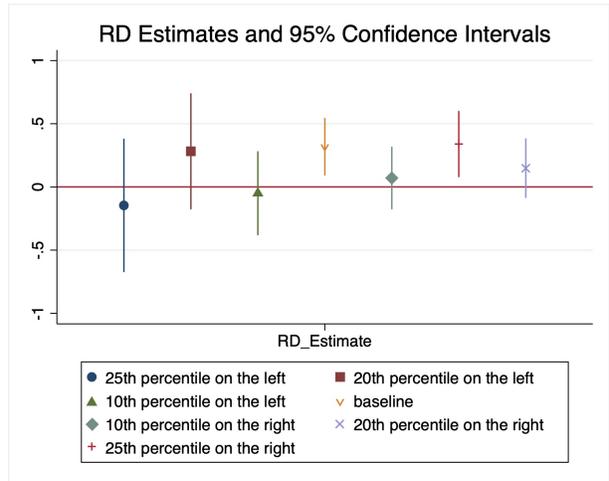
Figure 1.9: Robustness Check: Sensitivity to Cutoffs I

Notes: These figures demonstrate the sensitivity of the discontinuities to the choice of cutoff. The pseudo cutoffs are set at the 10th, 20th, and 25th percentiles of the distances to the border.

RD Estimates and 95% Confidence Intervals

Hankow Rd · Foochow Rd ■ Canton Rd ▲
baseline ∨ Rue du Consulat ◆ Boulevard des Deux Républiques ×

1903 (Original Settlements Only)

RD Estimates and 95% Confidence Intervals

Hankow Rd · Foochow Rd ■ Canton Rd ▲
baseline ∨ Rue du Consulate ◆ Boulevard des Deux Républiques ×

1907 (Original Settlements Only)

RD Estimates and 95% Confidence Intervals

Hankow Rd · Foochow Rd ■ Canton Rd ▲
baseline ∨ Rue du Consulat ◆ Boulevard des Deux Républiques ×

1911 (Original Settlements Only)

RD Estimates and 95% Confidence Intervals

Hankow Rd · Foochow Rd ■ Canton Rd ▲
baseline ∨ Rue du Consulat ◆ Boulevard des Deux Républiques ×

1916 (Original Settlements Only)

Figure 1.10: Robustness Check: Sensitivity to Cutoffs II

Notes: These figures demonstrate the sensitivity of the discontinuities to the choice of cutoff. The pseudo cutoffs are set as the thoroughfares closest to the border.
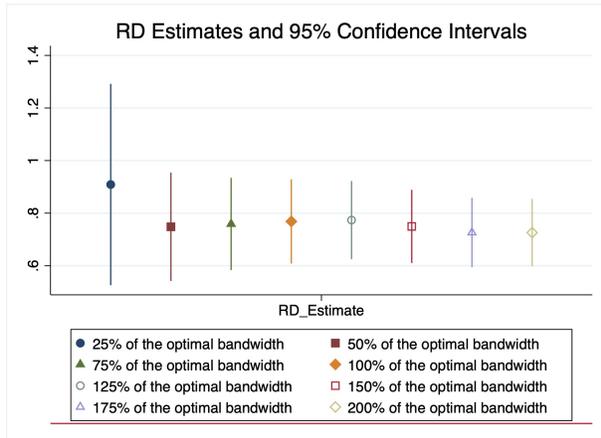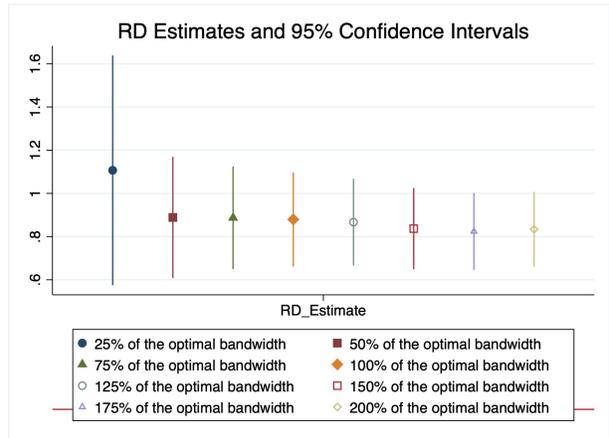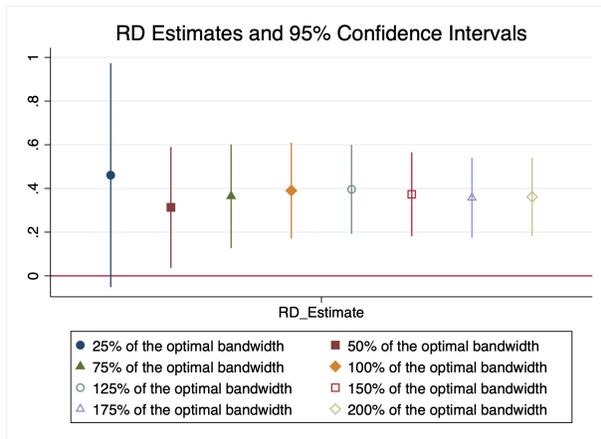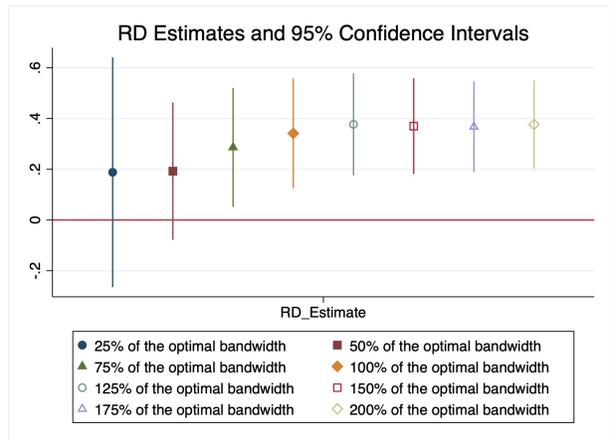
Figure 1.11: Robustness Check: Insensitivity to Bandwidth

Notes: These figures demonstrate the insensitivity of the discontinuities to the bandwidth. The "nonoptimal" bandwidths are set as 25%, 50%, ..., 200% of the "optimal" bandwidth selected in the favorable mode.
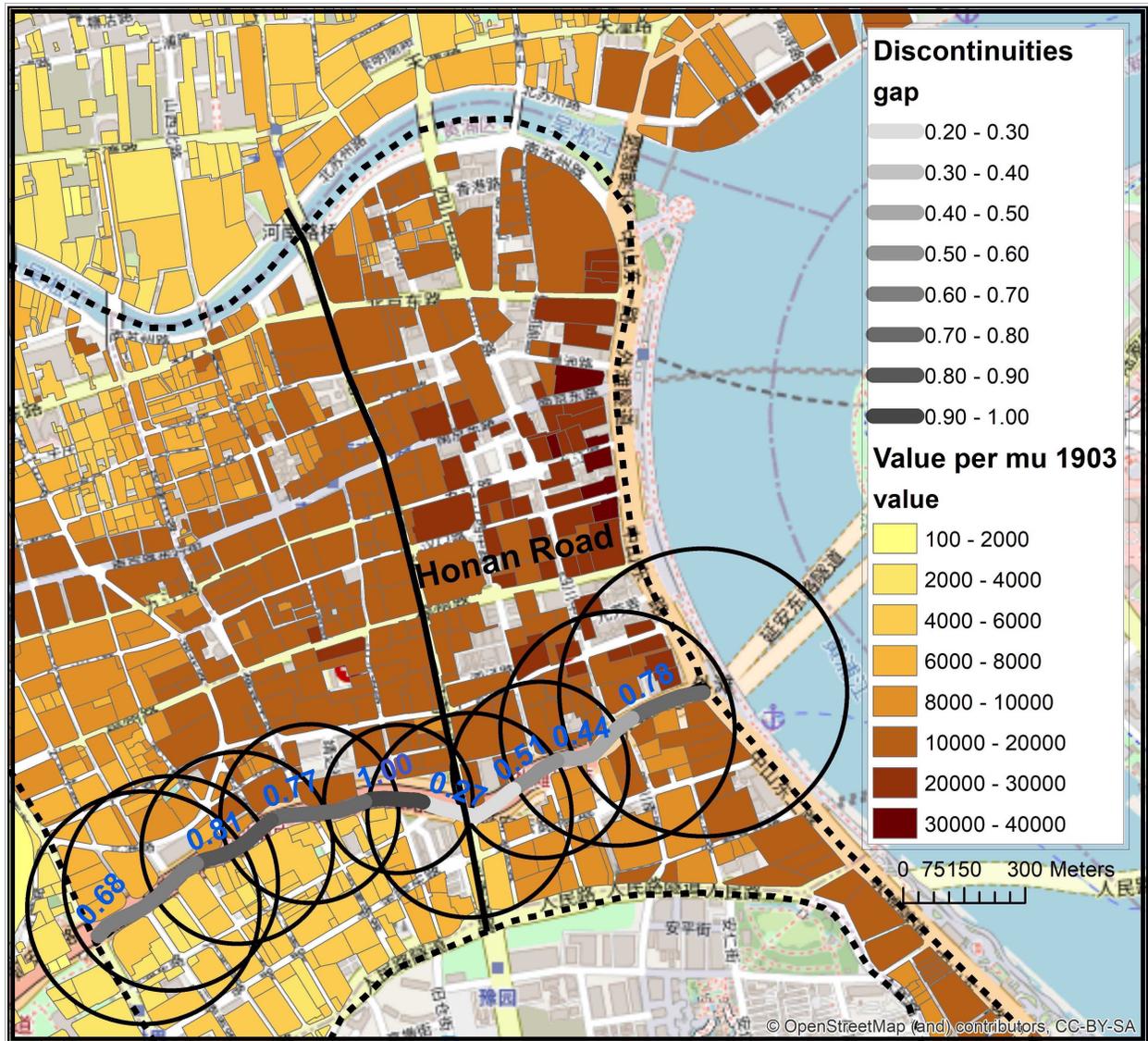
Figure 1.12: RD Estimates in Different Sections of the Border, 1903

Notes: This figure shows the heterogeneity in discontinuity along the border in 1903. RD is conducted on the land lots that are within each circle, the center of which is one of the nine crossroads along the border.

As shown in Figure 1.12, the overall discontinuity in the year of 1903, 0.80, breaks into eight discontinuities in eight segments of the border, ranging from 0.27 to 1.00. The gap between the two Settlements was more pronounced in the area to the west of the Honan Road, implying that the French Concession used to be a laggard in westward development. The Bund was another area that displayed a significant discontinuity—although the French Bund was undoubtedly the most

prosperous district within the French Concession, it still lagged behind its British counterpart that owned large banks like the Hongkong and Shanghai Banking Corporation, long-standing trading companies like the Sassoon & Co., and the first department stores like the Hall & Holtz, Limited. By and large, the scale of discontinuity varied much along the border in 1903. Not only were the land markets of the two Settlements far from integrated, but there was no sign of a universal boundary effect.

Table 1.4: RD Estimates along the Border

					West $\longrightarrow$ East				
Year	Yunnan Road	Kwangse Road	Chekiang Road	Fokien Road	Shantung Road	Honan Road	Kiangse Road	Szechuen Road	The Bund
1903 (1)	0.68***	0.68***	0.81***	0.77***	1.00***	0.27**	0.51***	0.44***	0.78***
	(0.09)	(0.07)	(0.06)	(0.11)	(0.12)	(0.13)	(0.10)	(0.14)	(0.18)
# of obs†	35, 19	38, 26	42, 24	31, 22	12, 17	29, 22	15, 20	27, 34	21, 20
1907 (1)	0.78***	0.86***	1.17***	0.84***	0.99***	0.07	0.47***	0.57***	0.84***
	(0.11)	(0.08)	(0.08)	(0.08)	(0.15)	(0.19)	(0.12)	(0.21)	(0.31)
# of obs†	35, 19	38, 26	42, 24	31, 22	12, 17	29, 22	15, 20	27, 34	21, 20
1907 (2)	0.78***	0.89***	1.15***	0.84***	0.99***	0.02	0.49***	0.54***	0.80***
	(0.11)	(0.10)	(0.08)	(0.08)	(0.15)	(0.20)	(0.13)	(0.20)	(0.29)
# of obs†	35, 23	42, 36	43, 28	32, 23	13, 18	25, 16	14, 18	29, 36	27, 29
1911 (1)	0.28	0.31***	0.60***	0.35***	0.27*	-0.47**	-0.04	0.08	0.20
	(0.18)	(0.12)	(0.10)	(0.12)	(0.15)	(0.24)	(0.10)	(0.24)	(0.30)
# of obs†	35, 19	38, 26	42, 24	31, 22	12, 17	29, 22	15, 20	27, 34	21, 20
1911 (2)	0.29*	0.36***	0.63***	0.35**	0.29*	-0.50**	-0.02	0.04	0.21
	(0.17)	(0.13)	(0.10)	(0.12)	(0.15)	(0.24)	(0.10)	(0.23)	(0.30)
# of obs†	35, 24	46, 36	47, 33	35, 26	13, 18	27, 19	14, 18	29, 37	27, 27
1916 (1)	0.29	0.19	0.54***	0.39*	0.02	-0.54*	-0.02	0.05	0.22
	(0.33)	(0.20)	(0.17)	(0.22)	(0.30)	(0.29)	(0.14)	(0.27)	(0.26)
# of obs†	35, 19	38, 26	42, 24	31, 22	12, 17	29, 22	15, 20	27, 34	21, 20
1916 (2)	0.26	0.30	0.63***	0.39*	0.07	-0.60*	-0.02	0.01	0.24
	(0.23)	(0.19)	(0.16)	(0.23)	(0.27)	(0.31)	(0.14)	(0.26)	(0.28)
# of obs†	52, 41	52, 47	53, 38	33, 24	18, 21	27, 18	16, 22	29, 38	20, 18
1934 (1)	0.1	-0.09	0.18	-0.01*	-0.09	-0.15*	-0.19	-0.20	0.11
	(0.22)	(0.13)	(0.13)	(0.13)	(0.20)	(0.09)	(0.14)	(0.22)	(0.15)
# of obs†	35, 19	38, 26	42, 24	31, 22	12, 17	29, 22	15, 20	27, 34	21, 20
1934 (2)	0.11	-0.02	0.19	-0.01	-0.11	-0.17*	-0.17	-0.17	0.10
	(0.19)	(0.14)	(0.12)	(0.13)	(0.19)	(0.09)	(0.12)	(0.14)	(0.15)
# of obs†	47, 31	48, 37	49, 37	30, 21	13, 18	27, 18	24, 33	49, 75	20, 16

Notes: This table reports the estimated bias-corrected discontinuities in land value in different sections along the border of the original British Settlement and French Concession. The dependent variable is expressed in natural logarithm so the coefficients stand for percentage changes. In each row (1) the bandwidth is selected in 1903 and remain the same across years. In each row (2) the bandwidth is selected in each corresponding year. Bias-corrected standard errors are noted in parentheses. * indicates statistical significance at the 10% level, ** at the 5% level, and *** at the 1% level.
†The first number indicates the effective # of observations on the left side of the border, while the second number indicates the effective # of observations on the right side of the border.

Table 1.4 presents the RD estimates at each crossroad from west to east in 1903, 1907, 1911, 1916, and 1934. In each row (1), the bandwidth is selected based on the 1903 data and kept consistent across years, while in each row (2), the bandwidth is selected separately for each year using the contemporaneous data. They point to a similar heterogeneity in the speed of catch-up: the land lots near the Bund closed the gap first, but all of them followed the same trend. As early as in 1911, no discontinuity could be found to the east of the Honan Road, while in the area to the west of it, crossing the border was still associated with discrete changes in land value.

Table 1.5: Uneven Development in along the Border

		Original British Settlement	Original French Concession
A: Dependent variable is the difference in the logarithm of land value between 1903 and 1907			
(1)	Distance to the Bund	-0.167***	**-0.403***
		(0.033)	(0.024)
	# of obs	121	124
(2)	Distance to the Bund	-0.152***	-0.379***
		(0.031)	(0.023)
	# of obs	139	141
B: Dependent variable is the difference in the logarithm of land value between 1907 and 1911			
(1)	Distance to the Bund	-0.019	**-0.149***
		(0.026)	(0.024)
	# of obs	121	124
(2)	Distance to the Bund	-0.020	-0.153***
		(0.023)	(0.022)
	# of obs	139	141
C: Dependent variable is the difference in the logarithm of land value between 1911 and 1916			
(1)	Distance to the Bund	0.068***	**0.066**
		(0.021)	(0.027)
	# of obs	121	124
(2)	Distance to the Bund	0.080***	0.045*
		(0.019)	(0.025)
	# of obs	139	141
D: Dependent variable is the difference in the logarithm of land value between 1916 and 1934			
(1)	Distance to the Bund	0.490***	**0.809***
		(0.034)	(0.046)
	# of obs	121	124
(2)	Distance to the Bund	0.474***	0.809***
		(0.030)	(0.042)
	# of obs	139	141

Notes: This table reports the estimated coefficients of the land value appreciation on the distance to the Bund. In each row (1) the sample is restricted to the land lots that were less than 250m to the border. In each row (2) the sample is restricted to the land lots that were less than 300m to the border. Standard errors are noted in parentheses. * indicates statistical significance at the 10% level, ** at the 5% level, and *** at the 1% level.

In Table 1.5, where the distance to the Bund is used as an explanatory variable, the heterogeneity can be viewed as two phases: from 1903 to 1911, the farther away from the Bund, the less the growth rate, while after 1911, the farther away from the Bund, the greater the growth rate. It is consistent with the fact that the French Concession sped up development in the 1910s, with three remarkable events: (1) the demolition of the wall of the old Shanghai Town in 1912, making the native city more accessible, (2) the filling-in of the Yang-king-pang in 1914 and the construction of the thoroughfare Avenue Edward VII in 1915, and (3) the significant expansion in the west in 1914. All of these events made it easier for commuters to travel from east to west, and therefore should benefit land in the west more than the well-developed land near the Bund.[25]

Figure 1.12 and Table 1.4–1.5 also indicate that the canal Yang-king-pang could not explain, at least entirely, the discontinuity in land value in the 1900s and 1910s. Before the construction of the Avenue Edward VII, in the Yang-king-pang era, there was a bridge at each thoroughfare, with the distance between every two of them approximately 200 m. Had the inconvenience caused by the canal been the entire reason for the discontinuity, the discontinuity would have disappeared every 200 m at the intersections, which is not the case shown in Figure 1.12. In addition, the fact that by 1911 there had already been no boundary effect to the east of the Honan Road shown in Table 1.4 rejects the hypothesis that the catch-up was simply a market integration introduced by the construction of Avenue Edward VII in 1914 or that the Yang-king-pang held back land value appreciation everywhere before 1914.

1.4.4 Assessed Value versus Market Value

When comparing the land value between the two Settlements using land valuation schedules, one might be concerned with determining to what extent the assessed value can represent the fair market value. Although this is exactly the goal of the two municipal councils, the discrepancy may still exist, as the valuation was conducted by different bureaus that could apply different measurements. More seriously, if one municipal council kept the assessed value lower on purpose

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[25]In the 1910 annual report of the French Council (p. 118), when discussing the problem of the heavy traffic in the French Concession, it was said that "Le seul remède complètement efficace être la couverture du Yang-King-Pang et son remplacement par une vaste Avenue (the only effective remedy is to fill in the Yang-king-pang and replace it with a thoroughfare)".

(for example, to attract businesses and residents through lower tax), a systematic discrepancy would be created, making the comparison meaningless. However, hereafter in this subsection, I will document this is not a problem with three pieces of evidence: tax collection, land expropriations, and land transaction.

First of all, according to the annual reports (1892–1933; 1893–1940) of the two municipal councils, income was adjusted through tax rates rather than tax bases. The main source of public revenue consisted of four parts: (1) land tax ("impôt foncier" in the French Concession), which was levied on the assessed values from the land renters; (2) rental tax ("general municipal rate" in the International Settlement and "impôt locatif" in the French Concession), which was levied on the assessed rentals of houses from the occupants; (3) wharfage dues ("droits de quayage" in the French Concession), which was levied on all goods passed through the Custom-house; and (4) license fees. In the early 1900s, land tax accounted for approximately 20% in the International Settlement and 10% in the French Concession of the ordinary revenue. From the late 1900s to the early 1920s, it accounted for approximately 25% and 15% in the two Settlements, respectively. Next, in the French Concession this types of income kept growing to 25% of its ordinary revenue in the 1930s. The time series of the land tax rate and rental tax rate are shown in Table 1.6.

Table 1.6: Land Tax Rate and Rental Tax Rate

Year	Land Tax Rate		Rental Tax Rate (within the settlement)		Rental Tax Rate (beyond the settlement)	
	International Settlement	French Concession	International Settlement	French Concession	International Settlement	French Concession
1900-02	0.5%	0.5%	10%	5%, 11% *		
1903-06	0.5%	0.5%	10%	8%, 12% *		
1907	0.5%	0.5%	10%	8%, 12% *	5%	5%
1908-14	0.6%	0.5%	12%	8%, 12% *	6%	8%
1915-18	0.6%	0.5%	12%	8%, 12% *	6%	**
1919	0.7%	0.6%	14%	10%, 12% *	12%	**
1920-25	0.7%	0.6%	14%	12%, 12% *	12%	**
1926-27	0.7%	0.7%	14%	12%, 12% *	12%	**
1928-29	0.8%	0.8%	16%	14%, 14% *	14%	**
1930-31	0.7%	0.8%	14%	14%, 14% *	12%	**
1932-35	-	0.8%	-	13%, 13% *	-	**

Notes: This table lists the land tax rates and rental tax rates in the two Settlements across years. The rates are obtained from the annual reports published by the two municipal councils (1892–1933; 1893–1940).
* The former was applied to the Europeans and the latter was applied to the Chinese.
** Since the last extension was officially granted in 1914 there had been no "land beyond the settlement" in the French Concession.

Because of its large scale, the land tax income was susceptible to the tax rate. For example, in the International Settlement, when the tax rate increased from 0.5% to 0.6% in 1908, the portion of annual income accounted for by land tax increased from 23.01% (tls. 456,330) to 28.51% (tls. 685,105). In the French Concession, when the tax rate increased from 0.5% to 0.6% in 1919, the portion of annual income accounted for by land tax increased from 16.13% (tls. 153,315) to 18.19% (tls. 190,256). Such sensitivity made the tax rate a convenient tool for adjusting revenue. In 1927, the Shanghai Municipal Council raised the land tax rate from 0.7% to 0.8% to balance the budget. When suffering great losses during the Anti-Japanese War (mostly due to defense and refugee relief), both municipal councils increased the land tax rate urgently, to as high as 2.5% in the International Settlement (in 1943) and 1.6% in the French Concession (in 1942). Compared with tax rates, the tax base (i.e., the assessed value of land), was not flexible enough, and in the Rate Payers' Meetings no one had ever proposed a raise or reduction of the assessed value for fiscal purposes.

The second piece of evidence is the same compensation strategy adopted by the two municipal councils when expropriating land. According to the annual reports (1892–1933; 1893–1940), both councils paid compensation at the assessed value plus 10% (at least from the 1900 to 1930) for compulsory surrender and probably less (plus) some deduction (compensation) for betterment (destruction).

In 1916, to maintain the Bund and Canton Road, part of Lot 56 in the Central District of the International Settlement was expropriated. The compensation was tls. 7,943, and it was calculated as: 0.249 $mu \times$ tls. 87,000 / mu (as assessed in the 1911 *Land Valuation Schedule*)$\times$110% (for compulsory surrender)$\times$1/3 (for betterment). In the same year, the surrender from Lot 109 in the French Concession was associated with a compensation of tls. 16,504.66 (=0.9029 $mu\times$ tls. 14,000 / $mu \times$ 110%+tls. 2600[26]).

The last piece of evidence is discerned from the actual land transactions. The only well-preserved and organized records of land transaction are the title deeds signed between the foreign buyers and the local Chinese owners when new pieces of (farm) land were sold. For each land lot, only the

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[26]Tls. 2600 is the compensation for the loss in rentals of 16 Chinese houses and the removal expense of one European house.

price of the very first transaction was recorded. A positive aspect of this type of recording is that the land transacted for the first time was generally unimproved, so the price reflected just the value of the land itself, excluding the attachment, which would absolutely generate a large variation in market price.[27] Title deeds spanning from 1847 to 1911 have been complied in the 30-volume book *Shanghai Title Deed*, which was published in 2005 (Cai, 2005), while the remainder is not publicly available. There are approximately 10,700 pieces presented, including volumes of Britain, America, France, and other countries, among which 7,500 were approved by the British consulate, 1,700 by the American consulate, and 399 by the French consulate. A typical piece of title deed contains information about (1) Shanghai Daotai and the foreign consul who were responsible for this land lease, (2) the original Chinese owner, (3) the foreign tenant and his or her nationality, (4) the acreage of the land, (5) the cash pledge (equivalent to the land price[28]), (6) the annual rental (the replacement of the land tax paid to the Chinese government), (7) the location of the land, (8) the four boundaries, and (9) the rights and obligations of the original owner and the tenant. Subsequent transactions were tracked, but new prices were not recorded.

As it was reported in both documents, the title deed number can act as a bridge connecting the title deeds and land valuation schedules. However, due to frequent combination and partition in the ensuing years, only a tiny portion of land lots recorded in the title deeds obtained or kept cadastral numbers, and thus was reported in the land valuation schedules. In the British volume of the *Shanghai Title Deed*, 1,907 land transactions between 1901 and 1908 were recorded, but only 266 of them had corresponding cadastral numbers in land assessment of 1903 or 1907. Among the 274 land transactions recorded in the French volume during the same period, only 55 had corresponding cadastral numbers in 1902, 1906, or 1908. Assuming a constant rate of change, I interpolate the assessed land values each year from 1901 to 1908 and compare them to the actual market values based on the 266 land transactions in the International Settlement and the 55 transactions in the French Concession, as shown in Figure 1.13.

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[27]Although the land offices usually considered attachments when assessing land, land with attachments was not necessarily recognized as more valuable by the market, as it may cost more to pull down the outdated buildings (Chen, 1933).

[28]The cash pledge was decided by the two parties other than the governments and therefore can be viewed as a reflection of the market price.
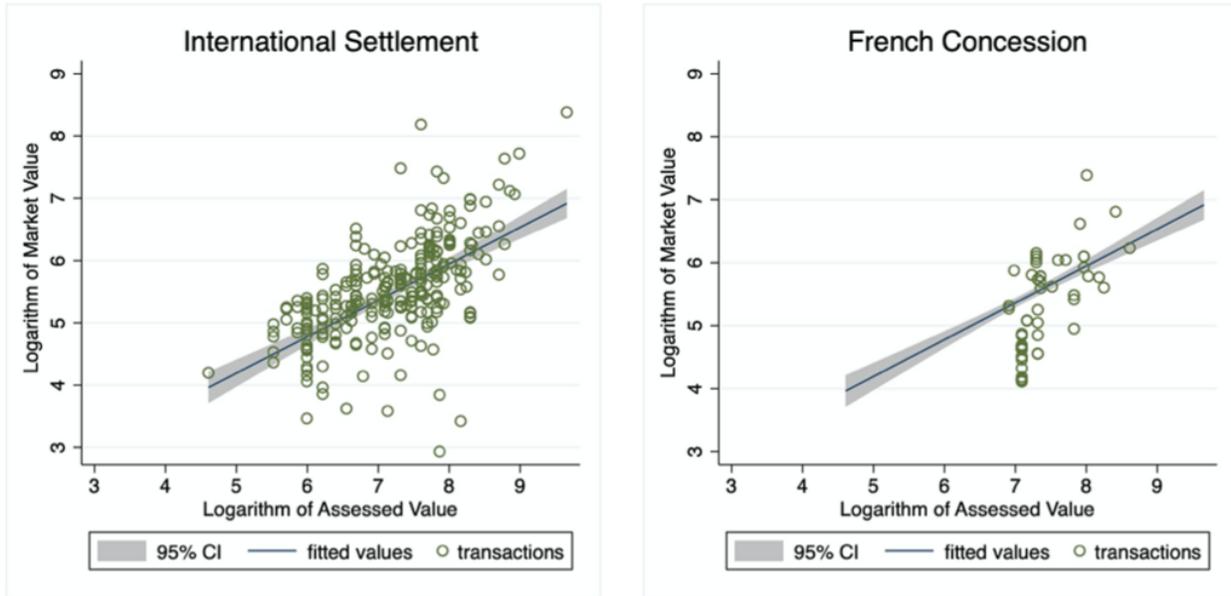
A. All
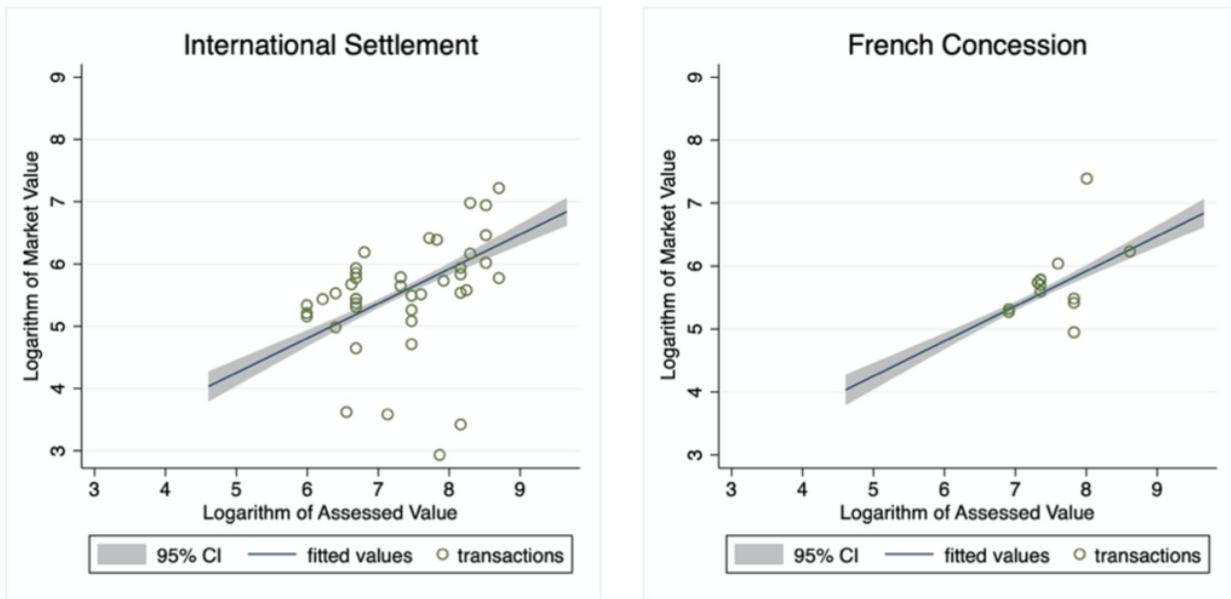
B. Subsample: Transacted and Assessed in the Same Year Only

Figure 1.13: Land Transactions between 1901 and 1908

Notes: These figures plot the log of market values against the log of assessed values of the land lots transacted (for the first time) from 1901 to 1908. The market values are obtained from the *Shanghai Title Deed* (Cai, 2005) while the assessed values are obtained from the land valuation schedules.

As plotted in Figure 1.13, the actual market values and the assessed values for land lots trans-acted between 1901 and 1908 were highly correlated in either the International Settlement or the

French Concession, and the relationship was similar. The OLS regression of market value on assessed value and acreage gives the coefficients 0.7678*** in the International Settlement and 0.7359*** in the French Concession, indicating that every 1% increase in the assessed value was associated with 0.77% and 0.74% increases in the market value in the two settlements, respectively.[29] Such similar relationships between the market values and the assessed values once again prove the common recognition of the land valuation schedules. The discrepancy, if there was any, favors the basic conclusion that there used to be a discontinuity in land value at the border and the International Settlement was superior because land valuation seemed to be slightly more conservative there. As a robustness check, Panel B presents the results obtained from a subsample containing only land lots transacted in the years when a land assessment was conducted (so that there is no need for interpolation). The numbers of observations drop sharply to 41 and 13, leading to wider 95% confidence intervals. However, the relationships still follow the same pattern. The estimated coefficients for the assessed value are 0.7556*** and 0.7607*** in the subsample.

1.5 Placebo Test

Thus far, the analysis focuses on two adjacent Settlements that had different legal origins. Did discontinuities exist between Settlements with the same legal origin? Comparison between the British and American Settlements suggests not. Besides the British and French, in the 1840s, the Americans also claimed a plot of land in Shanghai. The original American Settlement was established in 1848 and unified with the British Settlement in 1863. As early as 1854, the Shanghai Municipal Council, fueled by the threat from the Small Sword Uprising, was administrating all the three Settlements uniformly. After the exit of the French in 1862, the British and American Settlements formally combined, becoming the Central District, and the Northern and (part of) Eastern Districts of the International Settlement, respectively. This pair of adjacent Settlements with the same legal origin and even the same municipality provides a perfect placebo test for the comparison between the British and French.

Figure 1.14 presents the RD estimates and 95% confidence intervals between the original British

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[29]Unlike in the later years, when the land was always sold at the assessed value with some appreciation, in the 1900s, land prices in the first transactions were lower than the assessed values. This may be because (1) the land lots were unimproved, and (2) the local Chinese sellers always lacked information and bargaining power (Du, 2012).

and American Settlements, as an analogy to the figure on the left of Figure 1.8, but with a significant contrast: before the 1930s, there was no significant discontinuity in land value at the border at all, even though the border, the Soochow Creek, was a much wider river than the Yang-king-pang.[30]
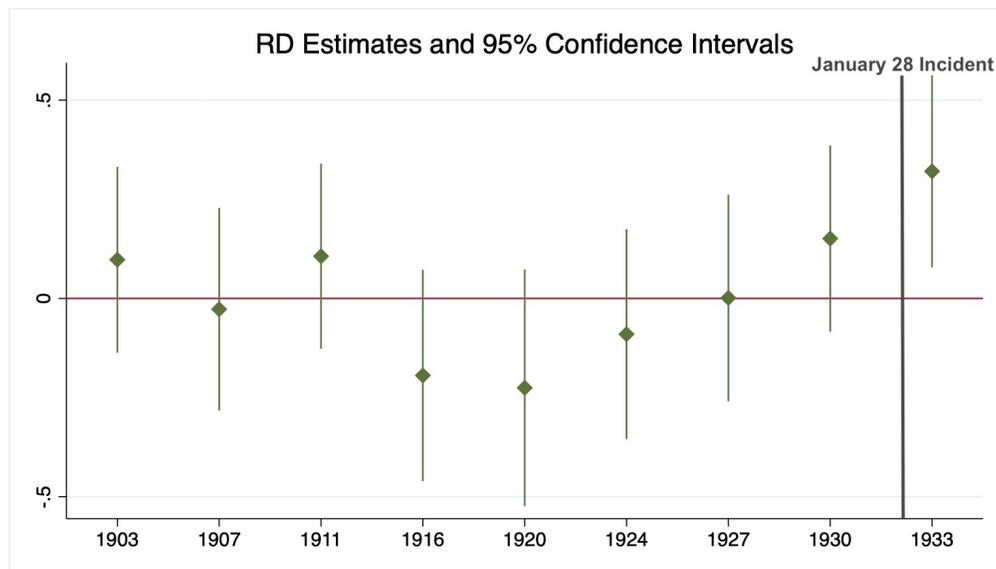
Figure 1.14: RD Estimates between the Original British and American Settlements

Notes: This figure shows the bias-corrected RD estimates with robust standard error estimator at the border between the original British and American Settlements. Distance to the border is positive for the land lots in the original British Settlement and negative for those in the original American Settlement.

The placebo test reinforces the basic results in that the river was not a major obstacle to the land market integration. In spite of the existence of the Soochow Creek between the original British and American Settlements, people connected the Settlements by constructing bridges at all the thoroughfares, and no discontinuity in land value was found at the border before the 1930s. In 1933, the lagging of the original American Settlement could be explained by the damaged factories and refugees during the January 28 incident, a battle that took place on January 28, 1932, between the Republic of China and the Empire of Japan.[31]

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[30]To fairly compare the two districts, I exclude the land lots to the east of the Hongkew Creek as they were too far away from the Soochow Creek and thus the original British Settlement (i.e., I compare land value between the Central District and the Northern District of the International Settlement).

[31]After World War I the Japanese textile industry made a significant push into Shanghai, building lots of cotton and spinning mills in the Northern and Eastern Districts of the International Settlement. A steady stream of Japanese was thereby attracted by the thriving industry. Since 1923, the influx of the Japanese had been further encouraged by the newly opened sea route between Shanghai and Nagasaki. Though the Northern District used to be the American
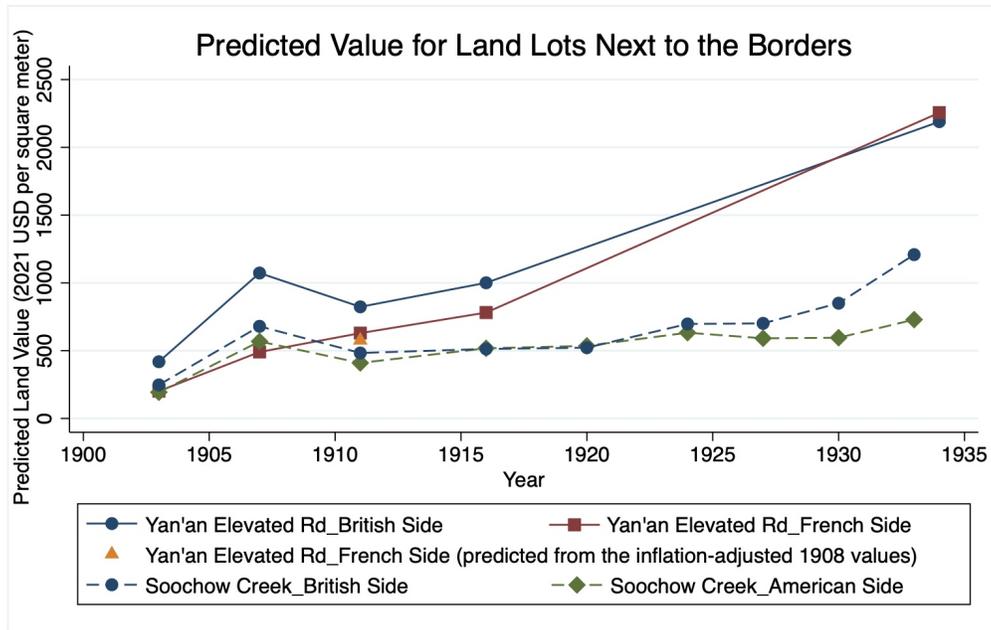
Figure 1.15: Predicted Land Value at the Borders

Notes: This figure shows the predicted land value on both sides of both borders. The solid lines denote the predicted values in the small neighborhood of Yang-king-pang/Avenue Edward VII (today's Yan'an Elevated Road), while the dashed lines denote the predicted values in the small neighborhood of Soochow Creek. The initial unit tls. per mu has been converted to 2021 USD per m^2, based on the exchange rates (Zheng, 1984) and the inflation rates.

In Figure 1.15, I present the predicted values for the land lots that were closest (on both sides) to the Yang-king-pang (Avenue Edward VII after 1914, and Yan'an Elevated Road after 1949) and Soochow Creek. They are predicted based on the coefficients obtained from the local linear regressions and therefore can be viewed as the representative land values at the borders. It is clear that the filling-in of Yang-king-pang in 1914 and the construction of the Avenue Edward VII in 1915 did not generate a significant enough impact on the French side to deviate the predicted land value from its long-run trend. To rule out the possibility that the 1911 assessed land values in

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Settlement, Japanese people soon became the majority there. In 1925, they even sent troops to this district on the excuse of "protecting" the Japanese nationals from the May Thirtieth Movement. Hostility between the Chinese and the Japanese peaked in the beginning of the 1930s, when the Wanpaoshan Incident and the Mukden Incident fueled the anti-Japanese movement and the boycott of Japanese goods in Shanghai, which eventually caused the battle in 1932. On the eve of the January 28 Incident, the Eastern and part of the Northern Districts had already been designated as the Japanese sectors (see Figure A1.6). In 1932, they became the battlefield that was greatly destroyed (see Figure A1.7). As stated in the 1933 annual report of the Shanghai Municipal Council (p. 10), "the Sino-Japanese disturbances had a marked effect on the Council's revenue and it was deemed equitable to accord relief to taxpayers in the Northern and Eastern Districts who were directly affected by these disturbances."

the French Concession, which are interpolated from the assessments of 1908 and 1916, were pulled up by the 1916 land values, I plot another prediction by replacing the 1911 interpolated values with the 1908 values adjusted for inflation. As denoted by the orange triangle, the 1911 predicted value based on the information from 1908 was only slightly lower than the previous one containing information from both 1908 and 1916 (576.73 versus 629.67 in 2021 USD per square meter). Still, the land value discontinuity dropped sharply from 1907 to 1911, at which time Yang-king-pang had not been filled in. Figure A1.8 provides additional such predicted land values at the intersections on both sides of the borders. Before the authorities decided to fill in the Yang-king-pang, the French Concession had already caught up with or even overtaken its British neighbor in some segments along the border. Overall, the transformation from the canal to the thoroughfare led to integration more from east to west, rather than from north to south.

1.6 Institutions: How the Foreigners Operated in the Settlements

Colonial Shanghai tells a story that the French, as a late mover, caught up with their British neighbor in terms of the land value in the Settlements. It provides evidence that in places where the European colonialists could safely settle and were willing to elaborately operate, the French law could do at least as well as the British. This is particularly related to the work of Acemoglu et al. (2001), where they propose a theory of institutional differences among countries colonized by the Europeans and argue that it is the conditions in the colonies, other than the identity of the colonizer or legal origin, that matter for the economic development.

Shanghai is undoubtedly one of those places that are suited for long-run development, yet whether the reason for catching up was that the different legal systems have bred similar institutions or that the differences between the institutions did not matter at all remains unanswered. Although the lack of data, especially in the French Concession, makes it unrealistic to expect a definite answer, the official records and anecdotal reports did suggest a combination of the two explanations—differences in institutions existed, but were probably limited to those that had no significant effect on economic outcomes. This is consistent with the findings in Acemoglu and Johnson (2005). In this paper about the importance of different sets of institutions, they define

"property rights institutions" as the rules and regulations protecting citizens against the power of the government and elites, while "contracting institutions" as the rules and regulations governing contracting between ordinary citizens, and find that the legal origin only significantly affects contracting institutions (e.g., the legal formalism), which do not have a first-order effect on long-run economic growth, because private contracts or other reputation-based mechanisms can, at least in part, alleviate the problems originating from weak contracting institutions.

As two adjacent Settlements competing for international reputations and residents voting with their feet, both the International Settlements and the French Concession worked diligently to establish good (at least from their own perspectives) institutions, making Shanghai the "model settlement." The two Settlements had different "city charters", in which the British pragmatism and liberalism were promoted in the International Settlement, while the Jacobin tradition of universalism was promoted in the French Concession (Aldrich, 1996). The value system of the French Concession exhibited more equal formal rights and centralization, which, as pointed out by Bergère (2002), "were not those of Anglo-American civilization" (p. 117). In the French Concession, the elections were run by more universal suffrage[32]; the French consul-general was endowed with greater power over the Concession's governance[33]; and the consular officials had a larger influence in the Mixed Court[34].

The discrepancy in legal origin led to discrepancies in institutions. The Shanghai Municipal Council acted as the representative of the common interest of all taxpayers, especially the merchant elites, who cared most about the economic profits, whereas the French Council was more cautious in the integrated planning (Bergère, 2002). For example, on Oct. 10, 1910, the French Council introduced construction regulations that any new building to the west of the Songshan Road must be constructed from bricks and stones in European style unless the French consul-general agrees not;

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[32]While suffrage was restricted to landowners and householders in the International Settlement, the right to vote was even given to non-proprietor residents in the French Concession. Chinese members had also been allowed to sit on the board of the French Council since 1914, 12 years before the International Settlement invited the Chinese to be part of their government.

[33]Among the 18 articles written in the 1866 "Règlements d'administration municipale" (Municipal Administrative Regulations), nearly half was in support of the French consul's authority.

[34]Before 1911, consuls in the International Settlement had no right to intervene the civil cases involving only the Chinese; while in the French Concession, the vice-consul took part in the joint hearing of every case, and the lawyers could only be French (Shi, Ma and Feng, 2001)

and the design plans be approved by the engineers of the French Council.[35] The regulations brought consistency of architectural style in the French Concession—as a contrast to the International Settlement. In 1916 a foreign resident wrote to the Shanghai Municipal Council asking why the International Settlement could not be planed as elaborately as the French Concession. The Council replied that it did not have the right to "constrain the building types in any place within the Settlement."

A more pronounced discrepancy lay in the judicial system. According to the consular jurisdiction and extraterritoriality codified in the treaties[36], disputes among foreigners were to be tried by the consular officials according to the foreign laws and jurisdiction in their home countries; disputes between foreigners and Chinese were to be resolved through negotiation between the consular officials and the Chinese authorities, and the foreign criminals should be punished according to foreign laws while Chinese criminals should be punished by Chinese laws. In 1869, as Chinese people had flooded in, the two Settlements set up Mixed Courts to deal with people of Chinese nationality accused of offenses or crimes committed within the Settlements. The International Mixed Court and the French Mixed Court ("Cour Mixte Française" in French) were based on different Regulations and functioned differently. Shi (2001) (p. 286–293) and Hou (2017) provide detailed comparisons between them, from which the French Mixed Court did seem to exhibit a slightly higher degree of legal formalism.

Did the different styles of administration and legal formalism affect economic growth? In *Unbundling Institutions*, Acemoglu and Johnson (2005) show that legal origins mainly influence the contracting institutions, but unlike property rights institutions, contracting institutions do not have a first-order effect on long-run economic growth, but only matter for the form of financial intermediation. In colonial Shanghai, there was no evidence that people migrate just to avoid the procedural complexity that would be experienced in court. Instead, they were more sensitive to tax rates and (the accessibility and prices of) public goods. For example, in the 1910s, Chujiu Huang, a famous Chinese businessman, intended to build a super playground ("Dashijie") in the

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[35]Due to the strong disagreement from the Chinese property owners, the French Council canceled the regulation that forbids Chinese style constructions on Dec. 28 but insisted that the building be constructed using bricks and stones.

[36]For example, the "Supplementary Treaty of the Bogue" (Humen Tiaoyue)

International Settlement, but finally changed his mind, accepting the invitation from the French Council that offered more preferential terms.

It is also noteworthy that, as the cost of migration between the Settlements was negligible, the two Municipal Councils adopted quite similar economic policies, especially in tax rates.[37] In the early years, the French Concession was in the enviable position of having low tax rates (Fredet and Maybon, 1929), but when it was able to provide comparable living conditions and business environments, the tax rates converged to those in the International Settlement (see Table 1.6). The possible consequence of losing ratepayers forced both authorities to be prudent in policy-making. For example, in a meeting on December 28, 1925, when discussing methods of improving revenue, the Representative Committee of the French Council agreed that it was better not to raise the impôt locatif (rental tax) and decided to retain the gap of 2% in the tax rate from the International Settlement as a compensation for the more expensive electricity in the French Concession. As another example, in 1927, the Shanghai Municipal Council increased the general municipal rate (rental tax rate) from 14% to 16%, with a corresponding increase in land tax from 0.7% to 0.8%. When the ratepayers' instructions were put into effect, considerable opposition was experienced, as the new tax rates incurred significant costs for tenants and landowners[38]. Although it is difficult to estimate the influence on firms and residents, annual reports (1892–1933) show that the Shanghai Municipal Council, for the first time in its history, cut back the tax rates to 14% and 0.7% in just three years.

In addition to tax rates, similar policies were also noted in aspects of social life, especially in sanitation and public goods provision. The second half of the 19th century and the first half of the 20th century happened to be the time period of increased innovation. Oftentimes, the British led the pack, but once a new technology or policy was proven efficient in the International Settlement,

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[37]Constrained by the Treaty, the authorities actually had a limited ability to legislate in the Settlements. The tools exploited most were the land tax, rental tax, and all types of license fees. There was no income tax or corporate tax, so within an industry where the license was not required, a firm needed only to pay land tax and/or rental tax to the council. License fees were often used as a means to regulate business and industries, as licensing premises entitled the police and inspectors to enter corresponding buildings to check the health and safety conditions. In many cases, the license fees were symbolic and small in scale.

[38]For example, the landowner of Lot 49 in the Central District at the Bund, where the Hongkong and Shanghai Banking Corporation were located, had an extra burden of tls. 1,816 (= tls. 190,000 / mu × 9.558 mu × 0.1%), which was equivalent to $1,253 in 1927. As a reference, the retail prices of beef (sirloin), codfish, tomatoes, and apples were $0.29, $0.27, $0.14 and $0.22 per pound, respectively.

the French immediately applied it to their own Concession. Table 1.7 shows briefly how similar their institutions were in these two aspects and therefore, how similar city lives were enjoyed by the citizens in the two Settlements.

Table 1.7: Sanitation and Public Goods Provision in the Settlements

Category	Start Time		Price	
	International	French	International	French
Sewerage System	1862	1870s	-	-
Food Inspection	1868	1896	-	-
Dairy Inspection	1882	1910	-	-
Slaughter House	1876	1903	-	-
Health Department	1898	1905	-	-
Isolation Hospital	1900	1907	-	-
Free Vaccination	1871	1871	-	-
Bacteriological Laboratory	1896	1890s	-	-
Tramway	1908	1908	-	-
Railless Trolley	1914	1926	-	-
Gas	1865*	1867**	uniform price	uniform price
Electricity	1882†	1882††	tls. 0.025/kWh (1920s–1930s)	tls. 0.04/kWh (after 1926)
Water	1883⋆	1883⋆⋆	no more than 5% of the rental for most users by the 1930s	5% of the rental before 1908, tls. $0.075/m^3$ 1908–1924, and tls. $0.0875/m^3$ after that

Notes: This table reports the start time and the prices (if applicable) of the public goods. The information is collected from Shi et al. (2001).
*supplied by the Shanghai Gas Co. Ltd.
**supplied by the French Gas Co. Ltd. before 1891, and the Shanghai Gas Co. Ltd. after that
† supplied by the Shanghai Power Co. before 1888, the New Shanghai Electric Co. Ltd. 1888–1893, the Municipal Electrical Department 1893–1929, and the Shanghai Electric Co. Ltd. after that
†† supplied by the Shanghai Power Co. before 1888, the New Shanghai Electric Co. Ltd. 1888–1893, the Power Plant of the French Council 1893–1905, and the Compagnie Française de Tramways et d' Eclairage after that
⋆ supplied by the Shanghai Water Works Co.
⋆⋆ supplied by the Shanghai Water Works Co. before 1902, the French Water Works Co. 1902–1908, and the Compagnie Française de Tramways et d' Eclairage after that

Finally, and most importantly, the property rights institutions, defined by Acemoglu and Johnson (2005) as the rules and regulations protecting citizens against expropriation by the government and powerful elites, worked equally well in both the International Settlement and the French Concession. In the Settlements, land expropriation policies were publicly available and transparent: at least from the 1900 to 1930, both councils paid compensation at the assessed value plus 10% for compulsory surrender and probably less (plus) some deduction (compensation) for betterment (destruction). Similar to the land assessment, when disputes arose, different parties would nego-

tiate at the land commission until a fair compensation was determined. The annual report 1916 (p. 30B) of the International Settlement records a case where the landowners of Lot 605 in the Central District refused to accept the compensation suggested by the council. The owners claimed that the frontage of the lot, prior to the strip being surrendered, was sufficient to admit of eight Chinese shops being built facing the Chekiang Road, a populous business street; while after the strip surrendered was deducted, the frontage would only allow of seven shops. So the surrender would cause a loss of rental, which was calculated at tls. 123 per year. They further capitalized the tls. 123 to tls. 2,050 at 6%. After adding 10% for compulsory surrender (tls. 205) and deducting the cost of building one shop (tls. 350), they asked for a payment of tls. 1,905. The acting land commissioner rejected this petition, denying the equivalence between the loss of 8 feet of Chekiang Road frontage and the loss of one shop. He emphasized that "if compensation is paid at a higher rate per *mu* than that at which the property is assessed for taxation, the assessment of the lot will automatically be increased under Resolution V of the Ratepayers passed in 1909", which meant the corresponding land tax would increase a lot in the following years. Through negotiation, the two parties eventually reached an agreement that the general betterment accruing to Lot 605 was offset by the reduction in the frontage facing the Chekiang Road and therefore the sum of Tls. 809.60 as compensation should be awarded, based on the assessed value of the area surrendered, plus 10% for compulsory surrender.

Similar petitions could be found in the annual reports of the French Concession (e.g., p. 109-112 of the 1922 *Compte-Rendu de la Gestion Pour L'exercice*). When the landowners asked for higher compensation than the one suggested by the la Commission Foncière (land commission) based on the assessed land value, they would be offered the option to comply with a new assessment and therefore pay more land tax in the ensuing years (or repay the tax over the past years). Like in the International Settlement, legal rules clearly prescribed which kinds of buildings could not be expropriated and which kinds of buildings should be subordinate to the collective interests. By this means, all the disputes that occurred during the land expropriation had been resolved properly. Although the French consul-general had the supreme power, he had never exerted his power beyond the law.

1.7 Firm Distribution

The previous section attempts to document, although based on limited data, that the discrepancies in institutions between the two Settlements, if there were any, should not result in substantial differences in market incentives. Previous literature has found that in some places the authorities with a civil law tradition tend to impose stricter regulations (Djankov et al., 2002) and worse protections (La Porta, Lopez-de Silanes and Shleifer, 1999), and therefore failed to provide a beneficial environment for industrial and commercial development, colonial Shanghai, however, provided new evidence that the civil law itself was not accountable. Instead, the French legal system could function well if interpreted and implemented properly. In this section, I use firm data to further support this conclusion.

Figure 1.16 shows the distribution of the firms whose locations can be obtained from the 1925 *Comacrib Directory of China.* The geo-location is accurate down to the block, because for most firms, it is impossible to pinpoint the exact location.[39] The discrepancy is barely discernible at the border. The two districts were more like one: a prosperous business district that had (financial) services near the Bund and trades everywhere. Firm density in the original British Settlement have been higher in general than those in the French Concession, but in the neighborhood just around the border, they were comparable.

To see whether there was indeed no discontinuity in firm density at the border, I count the numbers of firms in manufacturing, services, and trade industries, and then estimate Equation 1.1 with Y_i denoting the corresponding firm density in block i, which is calculated by dividing the the number of firms within block i by block i's area (km^2). The estimated discontinuities is shown in Table 1.8, where the discrepancy in firm densities between the two Settlements is negligible. The graphical presentation can be found in Figure A1.9.

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[39]To the best of my knowledge, all the existing street maps of Shanghai with street numbers were published after 1934, at which time the street number of the city was recoded. This significantly increases the difficulty in geo-locating firms before 1934 because, for example, "No. 24 Nanking Road" in 1925 was not the same place indicated by a 1947 street map. In practice, I first derive the complete numbering system prior to 1934 based on firms that existed both before and after 1934 and then pin down each firm accordingly.
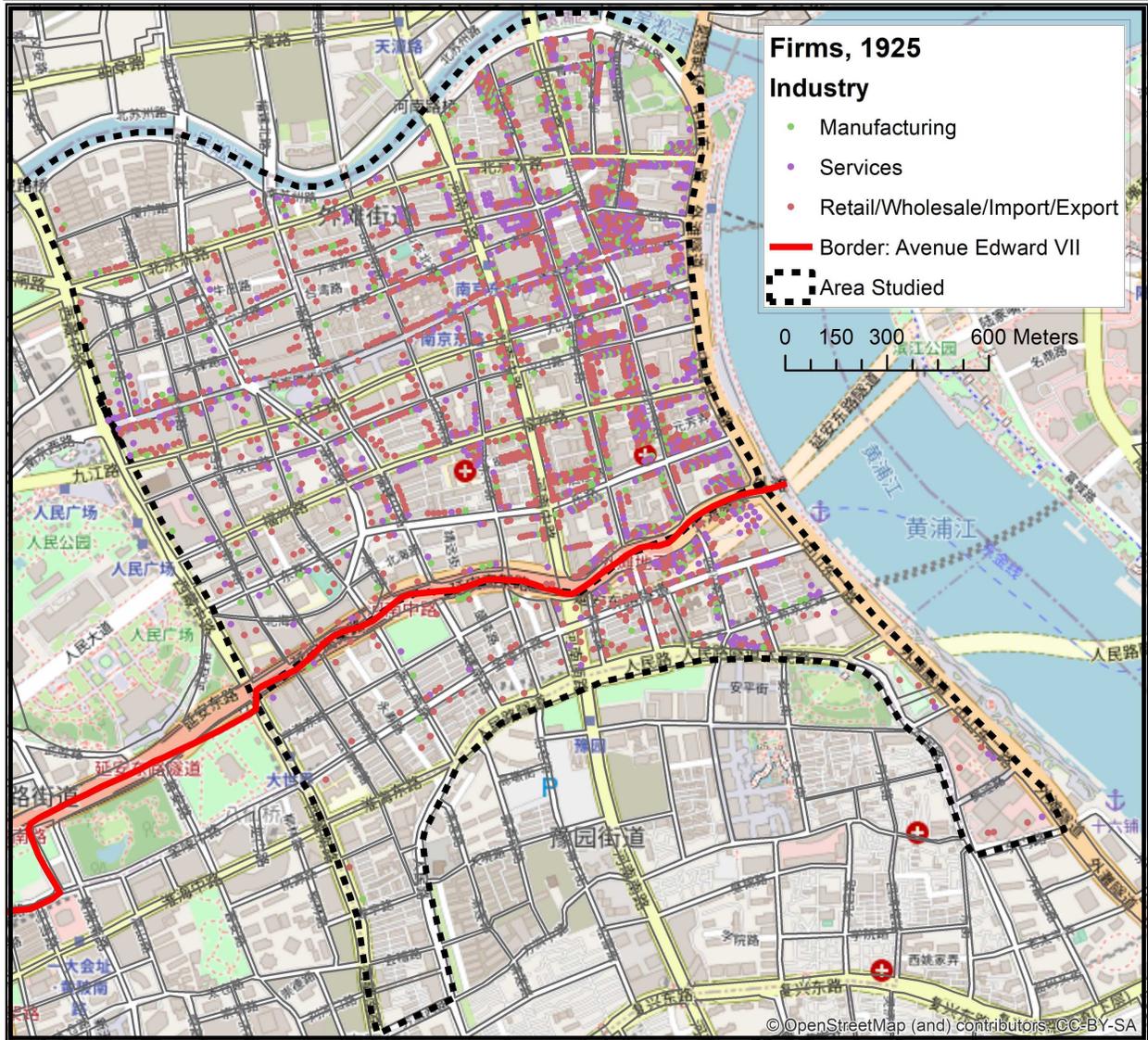
Figure 1.16: Firm Distribution in the Original British and French Settlements, 1925

Notes: This figure shows the distribution of firms in 1925 in the original British Settlement and French Concession. The addresses are collected from the 1925 *Comacrib Directory of China*.

Table 1.8: Discontinuity in Firm Density, 1925

	All	Manufacturing	Services	Trade
(1)	-486.60	-48.33	-165.14	-281.81
	(1232.00)	(159.08)	(528.77)	(602.87)
(2)	-776.31	-88.94	-419.72	-349.27
	(1232.00)	(159.08)	(528.77)	(602.87)
(3)	-776.31	-88.94	-419.72	-349.27
	(1629.10)	(204.89)	(694.23)	(804.79)
Effective # of obs	23, 27	28, 27	18, 31	26, 25

Notes: This table reports the estimated discontinuities in firm density at the border between the original British Settlement and French Concession. Row (1)'s report the conventional RD estimates with conventional standard error estimator. Row (2)'s report the bias-corrected RD estimates with conventional standard error estimator. Row (3)'s report the bias-corrected RD estimates with robust standard error estimator. Standard errors are noted in parentheses. * indicates statistical significance at the10% level, ** at the 5% level, and *** at the 1% level.

In addition to firm density, Table 1.8 also implies that the two Settlements were similar in terms of industrial structure. To determine whether this was a long-run trend, I count the number of firms in each category listed in the *Chronicle and Directory for China* in all available years between 1904 and 1925. With firms being classified into three industries, the Dissimilarity Index (Duncan and Duncan, 1955) is calculated as:

$$D = \frac{1}{2} \sum_{i=1}^{3} \left| \frac{a_i}{A} - \frac{b_i}{B} \right| \tag{1.2}$$

where $i = 1, 2, 3$ denotes manufacturing, services, and trades, respectively. a_i denotes the number of firms in industry i in the original British Settlement, while b_i denotes the number of firms in industry i in the original French Concession. A and B are the total numbers of firms in the corresponding Settlements. The following chart shows the share of each industry for both Settlements and the calculated Dissimilarity Index over time.

In Figure 1.17, the decrease in dissimilarity indicates that the two Settlements were indeed becoming more and more similar in terms of industrial structure from 1904 to 1925, especially during the second decade of the 20th century. Behind this pattern was a relative increase in the share of trading industry plus a decrease in services. The share of manufacturing industry increased slightly in both Settlements, but most of the firms were less capital-intensive and more consumer-oriented, such as hosiery factories and printing companies. Overall, the original British Settlement

and the French Concession began evolving into an integrated business district in the first half of the 20th century.

Share of Each Industry   Dissimilarity Index
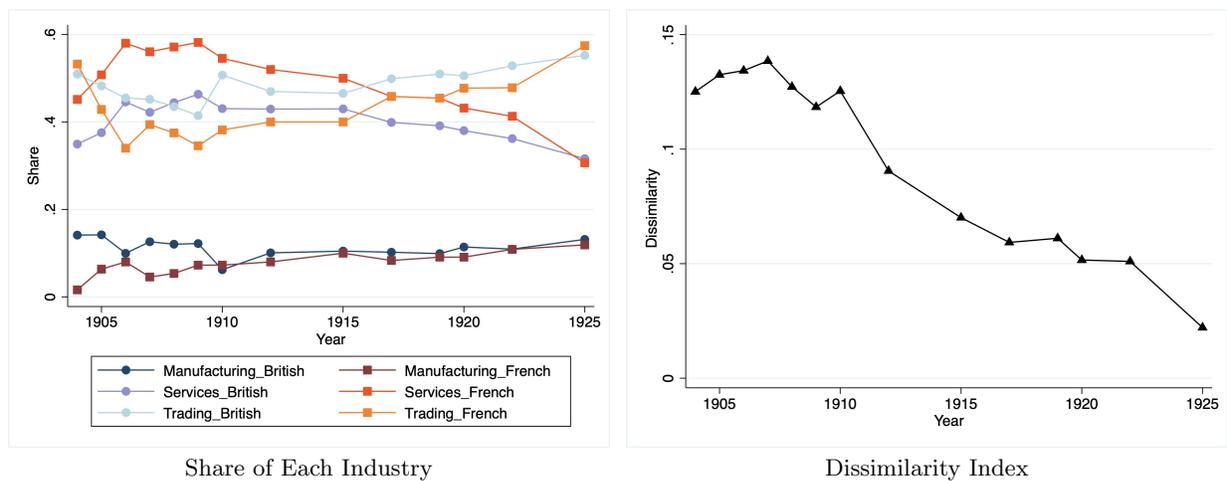
Figure 1.17: Dissimilarity between the Original British and French Settlements

Notes: The figure on the left shows the share of each industry in the original British Settlement and French Concession. The figure on the right shows the Dissimilarity Index of these two Settlements in terms of industrial structure.

To further demonstrate the above conclusion, I partition each Settlement into two districts for N times using the N thoroughfares within it, and compare the N dissimilarities between the two districts (but within each of the Settlements) to the dissimilarity between the two Settlements in 1925.

As shown in Figure 1.18, the dissimilarity (marked by the red dashed line) between the two Settlements was not significantly greater than the dissimilarities within the Settlements. The two graphs on the right indicate that the dissimilarities between the east and the west were generally greater than those between the north and the south, which was also clear in Figure 1.16. In sum, aligning with the basic results documented by the land value, the Avenue Edward VII in the 1920s has already acted as a border only politically, rather than economically.

1.8   Conclusion

Colonial Shanghai provides a perfect setting for the comparative study of the legal systems. During nearly 100 years, from the 1840s to 1940s, the International Settlement (with a common law

Figure 1.18: Dissimilarities within the Settlements
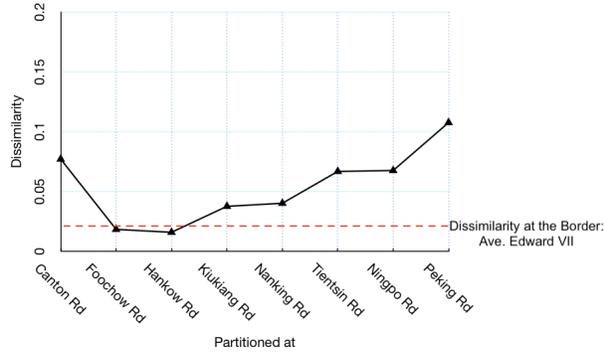
Notes: These figures show the Dissimilarity Indexes within the original British Settlements and French Concession, respectively. Each dot denotes one dissimilarity between two districts within a Settlement partitioned by one of its thoroughfares. The dissimilarity between the two Settlements is denoted by the red dashed line.

tradition) coexisted with the French Concession (with a civil law tradition). Applying the RD design to these Settlements, this paper finds a process of catching up in the French Concession from the 1900s to the 1930s, challenging the stereotype of colonial Shanghai, where the International Settlement traditionally has been regarded as more advanced. Specifically, crossing the border from the original French Concession to British Settlement was associated with a more than 80% appreciation in land value in the 1900s, but the premium vanished by more than half in the 1910s and eventually disappeared in the 1930s. This suggests that the French Concession was learning and adapting under the constant competition from the neighbouring Settlement, and thus there is

no inherent barrier in the structure of the French institutions favoring economic activities.

According to the official records and anecdotal reports, discrepancies derived from the legal origins were limited to the kind of institutions that did not have a significant effect on economic growth. Although exhibiting a Jacobin tradition of universalism (Aldrich, 1996), the French Concession became more and more like its British neighbor in the 20th century in terms of economic policies, living conditions, and industrial distribution. Via the study of colonial Shanghai, this paper emphasizes the important role of institutions, but also points out the possibly weak connection between legal origin and economic growth.

1.9   Appendix Tables and Figures

Table A1.1: Foreign and Native Population of Shanghai

Year	International Settlement		French Concession	
	Foreign	Native	Foreign	Native
1850	210	-	10	-
%	-	-	-	-
1865	2,297	30,587	460	55,465
%	6.99%	93.01%	0.82%	99.18%
1880	2,197	107,812	307	-
%	2.00%	98.00%	-	-
1890	3,821	168,129	444	41,172
%	2.22%	97.78%	1.07%	98.93%
1900	6,774	345,276	622	91,646
%	1.92%	98.08%	0.67%	99.33%
1910	13,536	488,005	1,476	114,470
%	2.70%	97.30%	1.27%	98.73%
1920	23,307	759,839	3,562	166,667
%	2.98%	97.02%	2.09%	97.91%
1930	36,471	971,397	12,341	422,466
%	3.62%	96.38%	2.84%	97.16%
1942	57,351	1,528,322	29,038	825,342
%	3.62%	96.38%	3.40%	96.60%

Notes: This table reports the foreign and native population in the International Settlement and French Concession between 1850 and 1942. Data Source: Zou (1980).

Table A1.2: Ordinary Revenue and Ordinary Expenditure

Year	International Settlement		French Concession	
	Revenue (tls.)	Expenditure (tls.)	Revenue (tls.)	Expenditure (tls.)
1891	449,279.00	442,575.00	160,629.21	141,769.60
1892	502,643.00	525,982.00	140,109.28	145,074.68
1893	517,791.00	504340.00	147,623.30	142,765.69
1894	562,504.00	551,593.00	150,319.21	145,323.68
1895	582,814.00	581,990.00	154,167.43	132,687.13
1896	734,741.00	853,497.00	160,422.35	155,517.07
1897	640,006.00	592,900.00	-	-
1898	753,270.00	753,098.00	196,638.55	315,254.19
1899	916,611.00	797,464.00	214,098.45	177,500.55
1900	1,045,177.16	916,885.55	274,929.20	369,157.98
1901	1,097,719.71	938,661.34	321,803.83	483,105.99
1902	1,209,175.24	1,016,058.85	343,447.82	294,321.26
1903	1,341,570.03	1,194,020.12	375,072.18	329,660.39
1904	1,505,402.00	1,185,475.00	411,606.22	339,152.03
1905	1,780,414.00	1,295,885.00	456,351.18	390,944.15
1906	1,866,398.01	1,525,844.34	490,712.38	498,252.69
1907	1,983,431.83	1,611,038.37	510,888.29	649,648.25
1908	2,403,164.00	1,987,652.56	547,650.99	559,699.74
1909	2,521,600.00	2,101,009.92	-	-
1910	2,555,056.00	2,200,154.46	581,442.42	741,900.67
1911	2,589,628.00	2,347,690.11	592,217.26	773,278.42
1912	2,734,245.00	2,372,766.71	664,638.92	761,205.02
1913	2,858,006.00	2,484,282.59	735,286.65	782,790.02
1914	2,934,382.00	2,700,218.93	754,708.00	943,397.26
1915	3,051,017.00	2,781,734.20	798,789.35	746,221.02
1916	3,333,151.00	2,905,572.51	970,081.57	843,866.47
1917	3,455,128.00	3,379,440.34	901,001.97	964,562.29
1918	3,864,576.00	3,596,795.91	950,674.51	1,035,782.93
1919	4,419,961.00	4,568,917.45	1,045,890.63	1,080,890.56
1920	4,823,483.00	4,829,895.41	1,344,196.46	1,346,369.43
1921	5,951,258.00	5,651,239.89	3,351,156.19	2,529,077.87
1922	6,391,200.00	6,474,580.17	1,726,370.55	1,626,696.61
1923	7,203,797.00	7,027,737.96	1,885,101.94	1,828,704.31
1924	8,028,824.00	7,963,324.68	2,163,754.70	2,065,936.16
1925	9,152,409.00	9,488,482.92	2,382,925.21	2,332,228.72
1926	10,100,856.00	10,250,648.21	2,812,860.60	2,775,513.18
1927	11,161,792.35	11,713,011.86	3,195,724.37	3,126,200.10
1928	12,691,714.00	11,620,593.00	3,691,436.95	3,338,208.00
1929	12,473,292.00	9,440,066.00	4,330,847.76	3,724,567.86
1930	12,679,208.00	13,942,470.00	4,920,906.17	4,736,881.83
1931	14,795,038.00	16,715,099.00	5,622,301.38	5,659,085.78
1932	21,216,158.00	22,949,578.00	6,038,521.68	5,680,698.89
1933	22,111,660.00	24,107,357.00	6,809,594.62	6,229,539.16

Notes: This table reports the ordinary revenue and expenditure of the two Settlements 1881–1933. Data Source: annual reports of Shanghai Municipal Council and French Council (1892–1933; 1893–1940).

Table A1.3: RD Estimates Between the original British and French Settlements, with Different Bandwidth across Years

Year		Polynomial=1		Polynomial=2		Polynomial=3	
		(a)	(b)	(a)	(b)	(a)	(b)
1903	(1)	0.7687***	**0.769*****	0.783***	0.746***	0.762***	0.728***
		(0.083)	(0.082)	(0.097)	(0.098)	(0.114)	(0.115)
	(2)	0.782***	**0.796*****	0.795***	0.742***	0.759***	0.713***
		(0.083)	(0.082)	(0.097)	(0.098)	(0.114)	(0.115)
	(3)	0.782***	**0.796*****	0.795***	0.742***	0.759***	0.713***
		(0.096)	(0.094)	(0.107)	(0.111)	(0.123)	(0.127)
Effective # of obs (l, r)		117, 119	127, 116	144, 187	134, 238	157, 248	152, 344
1907	(1)	0.881***	**0.876*****	0.884***	0.839***	0.906***	0.837***
		(0.1102)	(0.1078)	(0.1264)	(0.1242)	(0.1519)	(0.1536)
	(2)	0.899***	**0.904*****	0.892***	0.845***	0.759***	0.830***
		(0.110)	(0.108)	(0.126)	(0.124)	(0.152)	(0.154)
	(3)	0.899***	**0.904*****	0.892***	0.845***	0.911***	0.830***
		(0.129)	(0.125)	(0.141)	(0.140)	(0.164)	(0.170)
Effective # of obs (l, r)		125, 125	129, 126	151, 208	148, 264	159, 259	155, 350
1911	(1)	0.378***	**0.380*****	0.357***	0.287**	0.336**	0.272*
		(0.115)	(0.115)	(0.139)	(0.138)	(0.156)	(0.158)
	(2)	0.373***	**0.381*****	0.337**	0.270**	0.328**	0.253
		(0.115)	(0.115)	(0.139)	(0.138)	(0.156)	(0.158)
	(3)	0.373***	**0.381*****	0.337**	0.270*	0.328*	0.253
		(0.135)	(0.132)	(0.157)	(0.157)	(0.169)	(0.174)
Effective # of obs (l, r)		117, 115	117, 108	138, 153	131, 238	156, 239	152, 352
1916	(1)	0.259**	**0.204*****	0.163	0.026	0.167	0.080
		(0.120)	(0.121)	(0.145)	(0.156)	(0.157)	(0.158)
	(2)	0.199*	**0.168**	0.109	0.002	0.136	0.040
		(0.120)	(0.121)	(0.145)	(0.156)	(0.157)	(0.158)
	(3)	0.1987	**0.168**	0.109	0.002	0.136	0.040
		(0.140)	(0.140)	(0.164)	(0.175)	(0.169)	(0.173)
Effective # of obs (l, r)		105, 93	96, 105	128, 129	112, 214	154, 220	146, 352
1934	(1)	-0.086	**-0.158*****	-0.167*	-0.205**	-0.168**	-0.281***
		(0.070)	(0.072)	(0.089)	(0.085)	(0.085)	(0.089)
	(2)	-0.141**	**-0.188*****	-0.212**	-0.225***	-0.184**	-0.312**
		(0.069)	(0.072)	(0.089)	(0.085)	(0.085)	(0.089)
	(3)	-0.141*	**-0.188*****	-0.212**	-0.225**	-0.184**	-0.312***
		(0.079)	(0.082)	(0.103)	(0.097)	(0.092)	(0.095)
Effective # of obs (l, r)		92, 75	57, 88	109, 98	102, 194	147, 195	134, 314

Notes: This table reports the estimated discontinuities in land value at the border of the original British Settlement and French Concession. It differs from Table 1.3 in that it allows the bandwidth to change across years, i.e., to be selected based on the contemporaneous data. The dependent variable is expressed in natural logarithm so the coefficients stand for percentage changes. Row (1)'s report the conventional RD estimates with conventional standard error estimator. Row (2)'s report the bias-corrected RD estimates with conventional standard error estimator. Row (3)'s report the bias-corrected RD estimates with robust standard error estimator. In column (a)'s one common MSE-optimal bandwidth selector is used. In column (b)'s two different MSE-optimal bandwidth selectors are used. Standard errors are noted in parentheses. * indicates statistical significance at the10% level, ** at the 5% level, and *** at the 1% level.
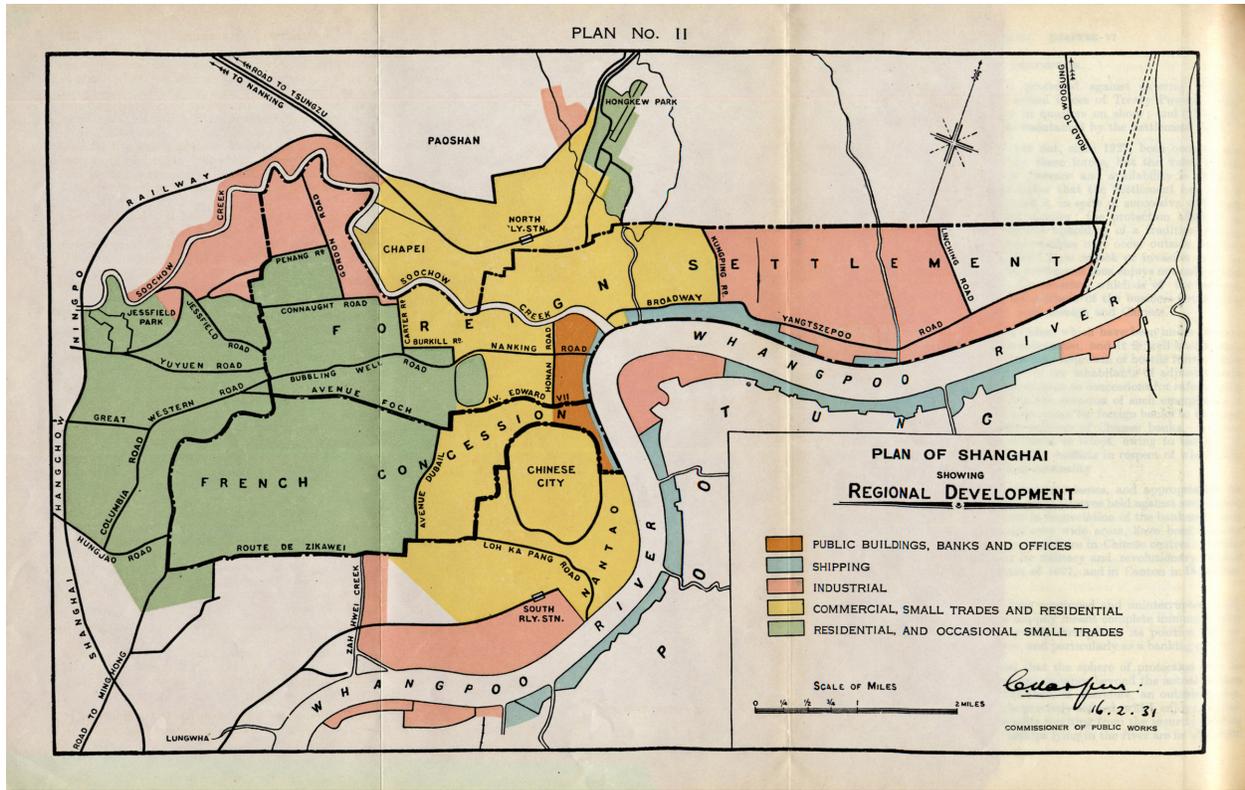
Figure A1.1: Plan of Shanghai, 1931

Notes: This map shows the regional development of Shanghai in 1931. Source: virtualshanghai.net, ID404.
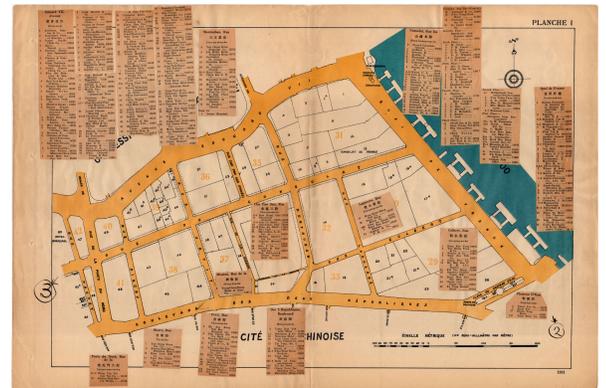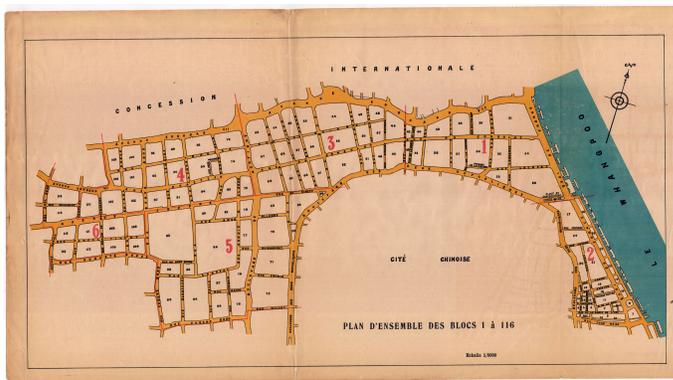
Figure A1.2: Cadstral Map of The French Concession, 1931

Notes: These figures show part of the 1931 cadastral map of the French Concession. The figure on the left shows the entire original French Concession while the figure on the right shows the land lots located in the north-east (as indexed by 1).

CENTRAL
LAND ASSESSMENT SCHEDULE, 1911

Number of Lot.			REGISTERED OWNER.	Area for Taxa-tion.	Value per Mow.	Total Value.	
Consular.	Cad-astral.			Mow.	Tls.	Tls.	Tls.
1012	Brit.	223	Drummond, W. V.	1.370	17,000	23,290	
910	,,	482	,,	0.683	16,000	10,928	
262	,,	340	Drummond, W.V. and White-Cooper, A. S. P.	4.700	17,000		34,218 / 79,900
6322	,,	344B	Drummond, W. V., White-Cooper, A. S. P., and Phillips, T. M.	0.563	15,000		8,445
552	,,	573	Dudgeon, Sir C. J. and Ander-son, F.	19.105	13,000		248,365
553	,,						
1078	,,	695	Dudgeon, Sir C. J. and Porter, E. E.	8.703	11,000		95,733
58A late	,,	160	Dyer, E. S. and F. E.	3.360	50,000		168,000
22B	,,	99	Ehlers & Co., A..............	2.555	45,000		114,975
1274	,,	597	Ellert, P. E., Keble, J. A. and Ellert, J. A.	2.970	14,000	41,580	
1279	,,	613	,,	3.736	16,000	59,776	
		618	,,	1.174	15,000	17,610	118,966
1337	,,	163	Ezra, I. (estate)	0.918	50,000		45,900
731	,,	185	Ezra, Mrs. K. (estate)	1.881	32,000		60,192
92	,,						
166	,,	278	Ford, C.	9.420	30,000	282,600	
167	,,						
270	,,	531	,,	8.244	18,000	148,392	
208	U.S.						
1678	Brit.	532	,,	1.333	24,000	31,992	462,984
961	,,	371	Fowler, Mrs. M. A.	2.639	15,000		39,585
201	Ger.	52	German Government	2.133	53,000		113,049
252	Brit.	274	Graham, M. C., Ewart, S. J. B., Currie, W. E., Currie, W. B., Dean, B., Paul, J. B., and Currie, M. H. B.	2.793	35,000		97,755
1732	,,	550	Gratton, F. M..................	0.687	17,000		11,679
487	,,	287	Gregson, R. E. S.	3.548	34,000	120,632	
7300	,,	449D	,,	0.211	11,000	2,321	
1679	,,	503	,,	0.925	15,000	13,875	136,828

NORTHERN

EASTERN

Figure A1.3: Land Assessment of the International Settlement, 1911

Notes: This picture shows one page of the *Land Valuation Schedule* of 1911 in the International Settlement.
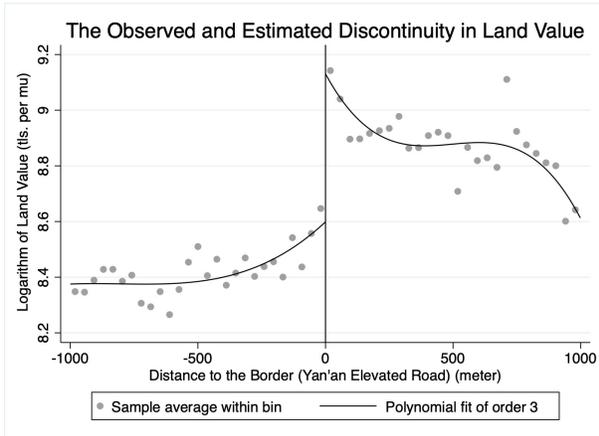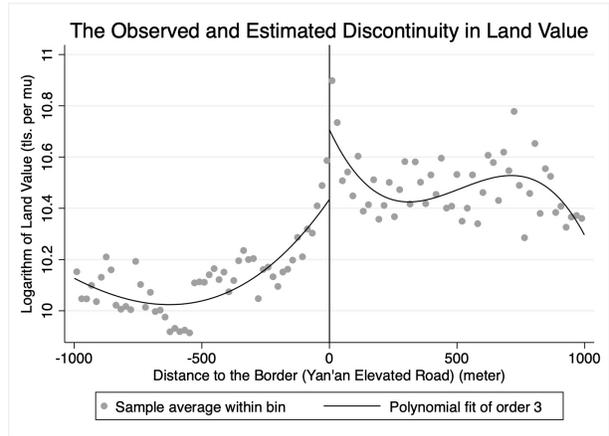
Figure A1.4: Discontinuity between the Extensions

Notes: These figures show the changing discontinuity in land value at the border of the extensions of the International Settlement and French Concession. Distance to the border is positive for the land lots in the International Settlement and negative for those in the French Concession.
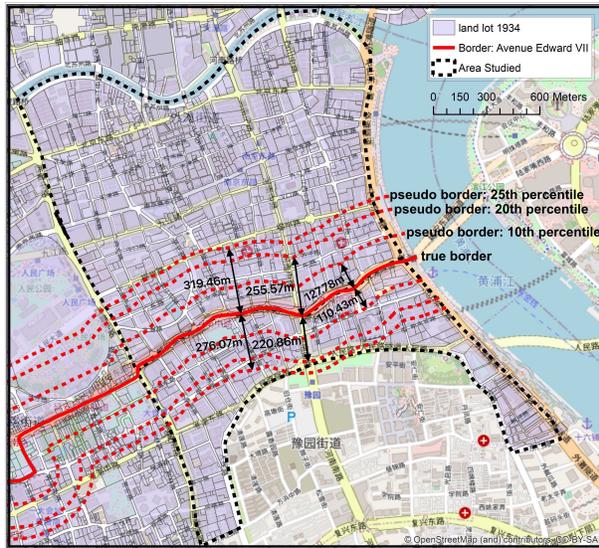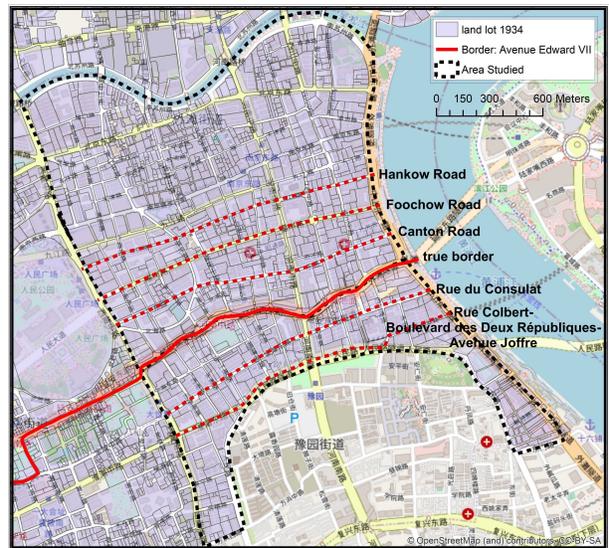
Figure A1.5: Pseudo Borders

Notes: These figures illustrate the pseudo cutoffs employed in the robustness checks.

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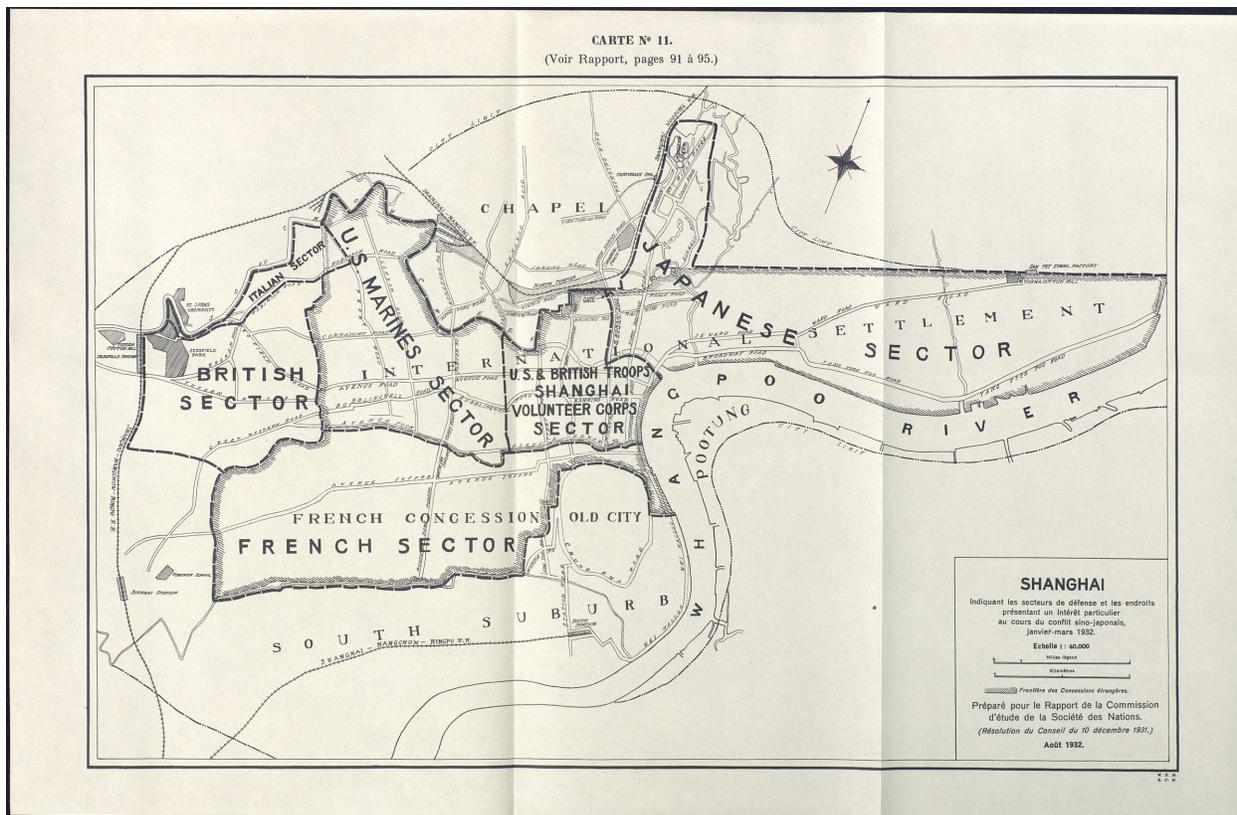
Figure A1.6: Defense Areas, 1932

Notes: This map shows the defense areas in 1932. Source: virtualshanghai.net, ID1857.
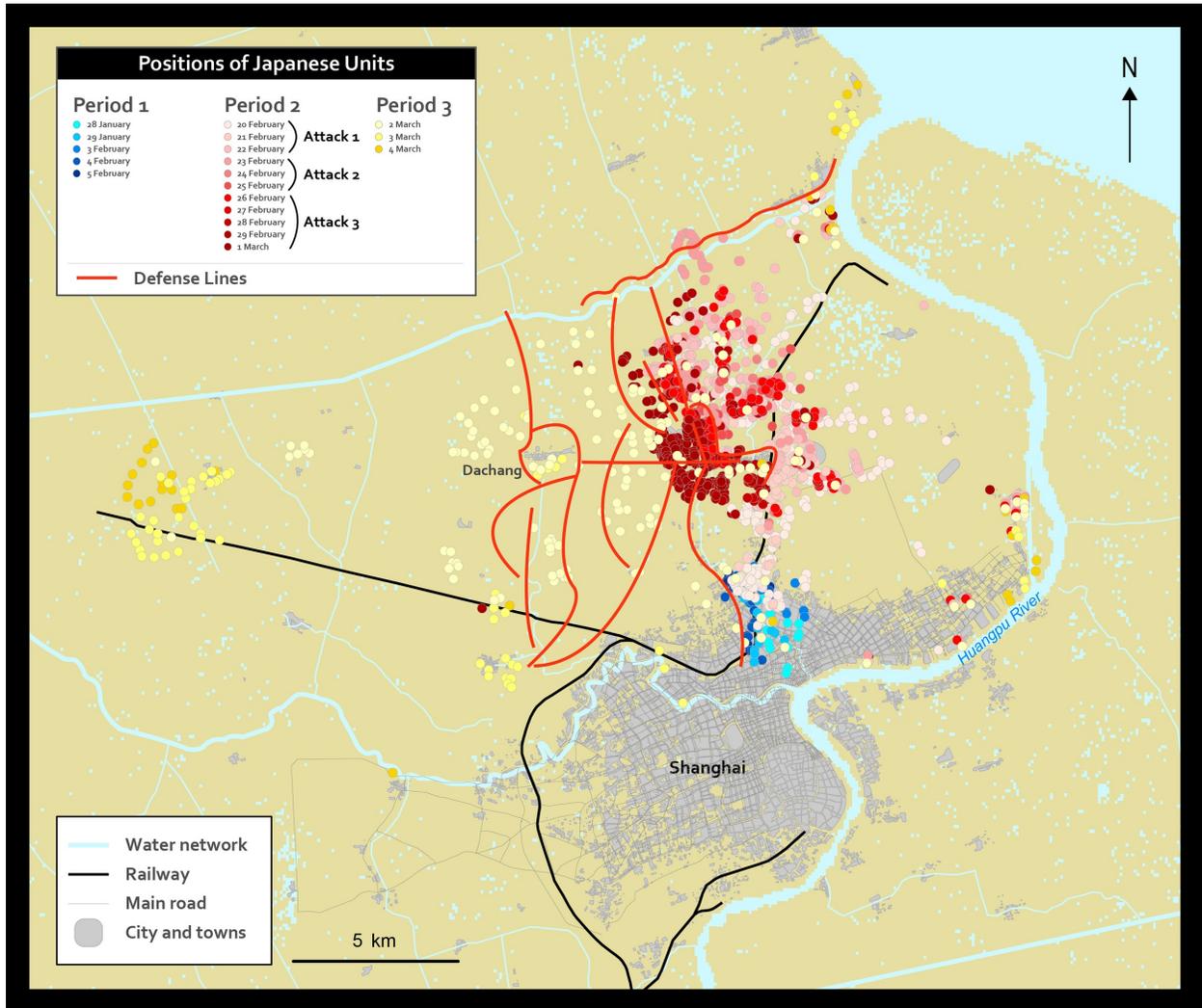
Figure A1.7: Space-Time of the 1932Shanghai Battle

Notes: This map shows the space-time of the 1932 Shanghai Battle. Source: virtualshanghai.net, ID2181.
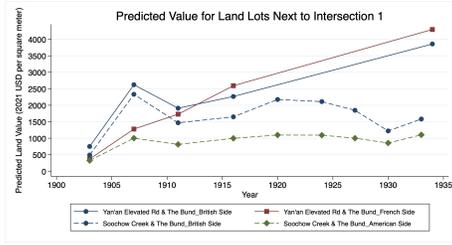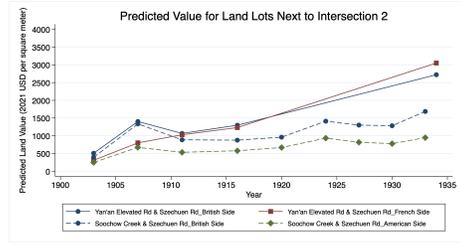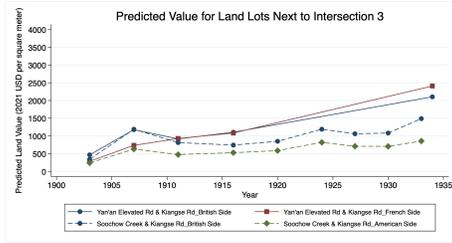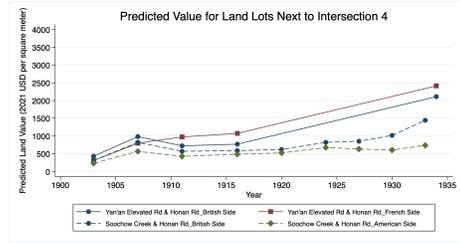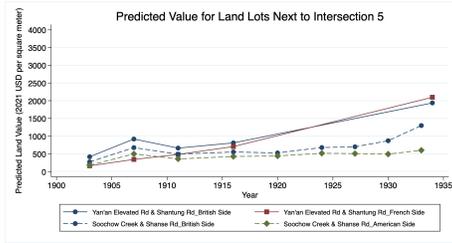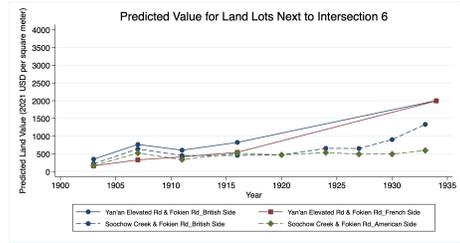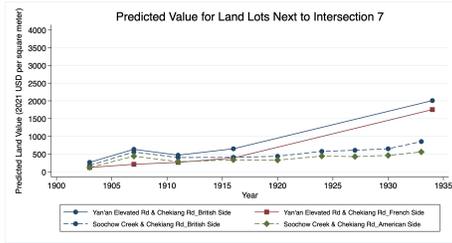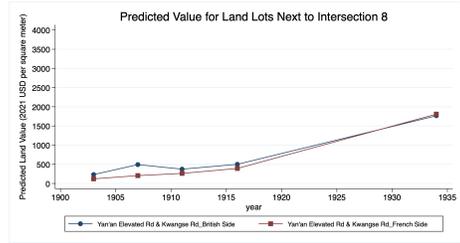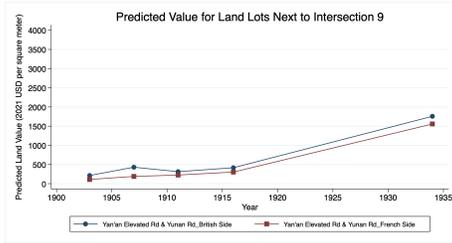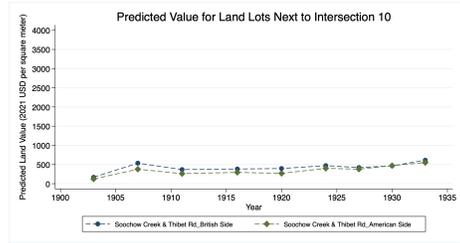
Figure A1.8: Predicted Land Value at the Crossroads

Notes: These figures show the predicted land values at the intersections on both sides of the borders.
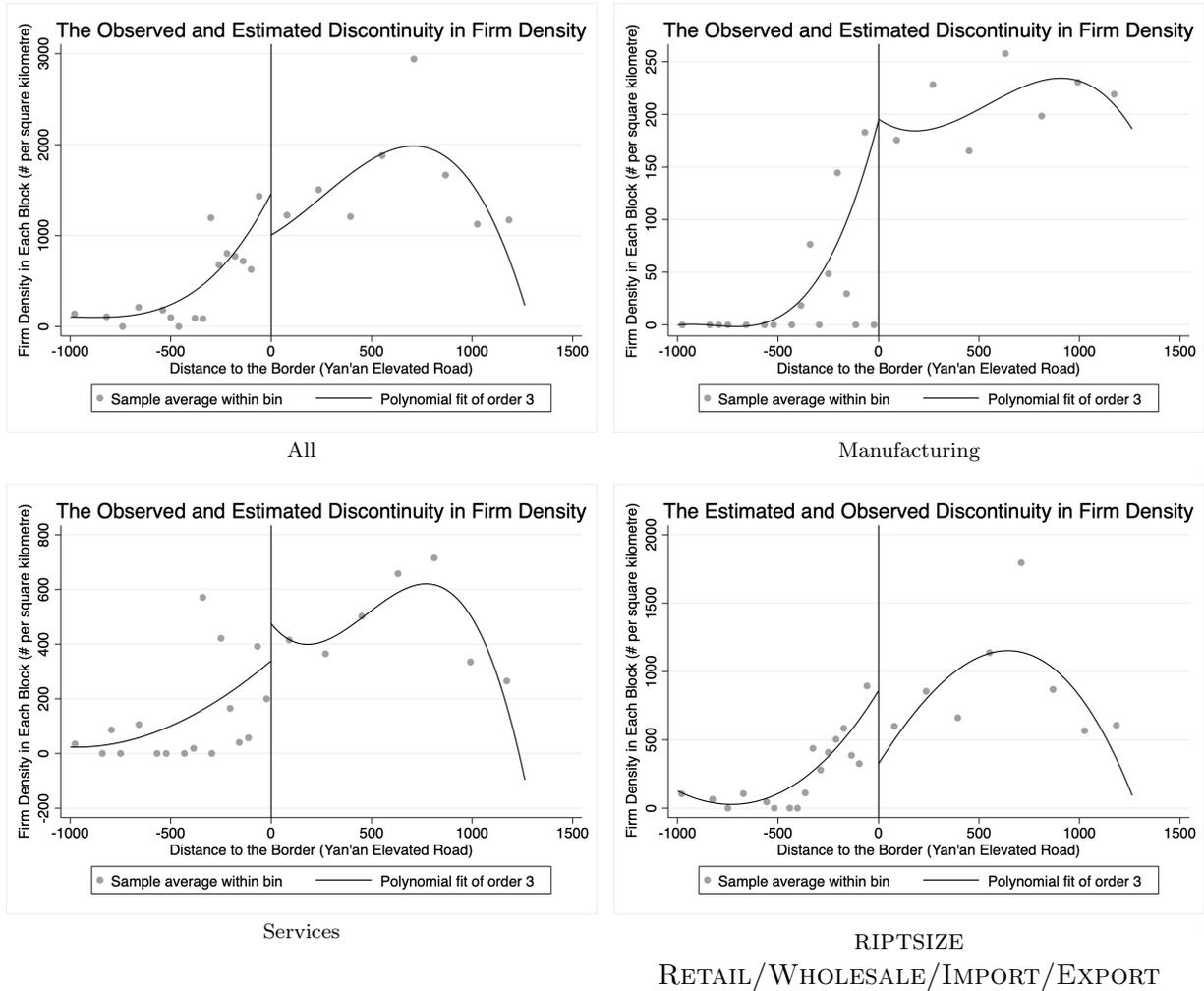
Figure A1.9: Discontinuity in Firm Density, 1925

Notes: These figures show the discontinuities in the density of firms in different industries between the original British Settlement and French Concession in 1925.

Chapter 2

Path Dependence in Shanghai:

How did the Old Tramway Shape the City

2.1 Introduction

Public transportation is believed to have a profound influence on city formation and evolution by restructuring the accessibility to market places and employment centers. With classic assumptions that the only concentration of employment is in the central business district (CBD) and that per mile transportation costs to the CBD are identical from all suburban locations, monocentric models predict a negative relationship between distance to CBD and rents (and density as well) (Mills, 1967; Muth, 1969; Jackson, 1979; McDonald, 1989). In the meantime, locations that have specific transportation advantages, such as proximity to a bus stop or railway station, are valued more by property owners than locations of similar distances to the CBD because of the reduced commuting costs. Therefore, the monetary value of additional accessibility provided by a good transit system should be reflected in the property value (Voith, 1991; Gibbons and Machin, 2005; NEORail, 2001).

However, empirical studies have found contradictory results over the years. The effects of public transportation on property value range from a negative (Landis, 1995; Bowes and Ihlanfeldt, 2001; Ibeas et al., 2012; Diao, Qin and Sing, 2016) or a positive (Alonso, 1964; Muth, 1969; Dewees, 1976; Damm et al., 1980; Bajic, 1983; Voith, 1991; Gibbons and Machin, 2005; Dubé, Thériault and Des Rosiers, 2013; Donaldson and Hornbeck, 2016) to an insignificant (Gatzlaff and Smith, 1993) one, due to the interplay of multiple conflicting forces. The positive forces include commuting

cost savings, accessibility to the market place, and transportation-induced facilities, while the negative forces could be station externalities (e.g., congestion, accident, noise, and smoke), and specific crime taking advantage of the better transportation (Diao, Qin and Sing, 2016). Beyond that, different types of transportation may have different effects. For example, the effects on property value brought by the commuter railways is always greater than that brought by the light rail/rapid transit/metro rail, as the former primarily operates within a metropolitan area and connects commuters to a central city from adjacent suburbs or commuter towns. Compared to light rail, commuter rail is often larger in scale and involves longer distances with scheduled services (Cervero, 1984; NEORail, 2001).

Among the cities with newly constructed transport networks, colonial Shanghai stands out in three aspects. First, tramway had been the only mode of intra-city public transportation until the late 1910s, and dominated until the 1930s—there were no private cars, and even bicycle was a luxury. Second, tramway was specifically designed to bring suburban residents to the downtown area. And last, colonial Shanghai was fairly centralized with the highest market value found at the intersection between the Bund and Nanking Road (see Figure A2.2). All these facts contribute to a perfect setting where the effects of public transportation on property value could be singled out.

Taking advantage of this historical context, I look at the changes in the assessed land values between 1902 and 1916 as a function of the land parcels' accessibility to the city center (defined as the intersection between the Bund and Nanking Road). I sort land parcels into treatment and control groups based on their proximities to the tramway lines that opened in 1908. Using a triple difference strategy, I find strong evidence that the value of the tramway was capitalized into land value—land lots that were farther away from the city center benefited more from the tramway. In particular, going $100m$ away from the nearest tramway line was associated with a 4.5% more decrease in land value for suburban land lots than for urban land lots. In this sense, tramway brought land market integration by connecting geographically dispersed areas.

Besides the contemporary effects of public transportation, this paper contributes to another strand of literature on the persistent effects of historical events, especially at a micro scale. Evidence of spatial persistence has been documented at all scales from the largest to the smallest (Acemoglu,

Johnson and Robinson, 2001; Nunn, 2008; Bleakley and Lin, 2012; Jedwab and Moradi, 2016; Brooks and Lutz, 2019; Siodla, 2017). At the city level, for example, Brooks and Lutz (2019) find that in Los Angeles County the now-extinct streetcars' influence remains readily visible in the current pattern of urban density; and Siodla (2017) finds that the impacts of the 1906 San Francisco fire are still evident today in that the nonresidential land shares have been higher on burned blocks.

Similarly to the previously mentioned literature, this paper finds a significantly positive effect of the Shanghai tramway, which retired in the 1970s, on housing price today, but only for residential complexes that are located outside the former Settlements and the Old Shanghai Town—in the former Settlements or the Old Shanghai Town, being close to the extinct tramway lines does not make a difference in housing price; while outside of these early developed regions, in the "periphery", among residential complexes with a distance between $400\ m$ and $800\ m$ from any extinct tramway line, going $100\ m$ away from the tramway line is associated with an approximately 2% decrease in housing price. The limited persistent tramway effect could be largely explained by the follow-on public investments. Given the fact that in the colonial era, land parcels in the vicinity of the tramway always enjoyed a premium, no matter whether they were in the urban or the suburban area, the limited long-run effect revealed by the modern housing price implies decay of the tramway effects. By assessing the effects of tramway both in the short-run and long-run, this paper confirms the persistent effect of public transportation, but also adds a caveat to the existing persistence literature that when the economic environment is evolving over time, evidence found at some single point of time could be just a random "snapshot" that paints only a partial picture.

The remainder of this paper proceeds as follows: Section II provides backgrounds of both modern Shanghai and colonial Shanghai, as well as a brief history of Shanghai tramway. Section III introduces the data used in the short-run and long-run. Section IV and V report the short-run and long-run effects of the tramway on property value, respectively, and Section VI concludes.

2.2 Background

2.2.1 Modern Shanghai

Shanghai, the economic and financial center of China, lies on China's east coast roughly equidistant from Beijing and Guangzhou, and is bisected by the Huangpu River, a man-made tributary of the Yangtze River (see Figure 2.1). It covers an area of 6,340 km^2 and has a total population of 24,870,900 in 2020, about 90% of which are urban. In 2020, Shanghai's GDP came in at CNY 3,870.058 billion (USD 619.209 billion), with a GDP per capita of CNY 155,606 (USD 24,911).
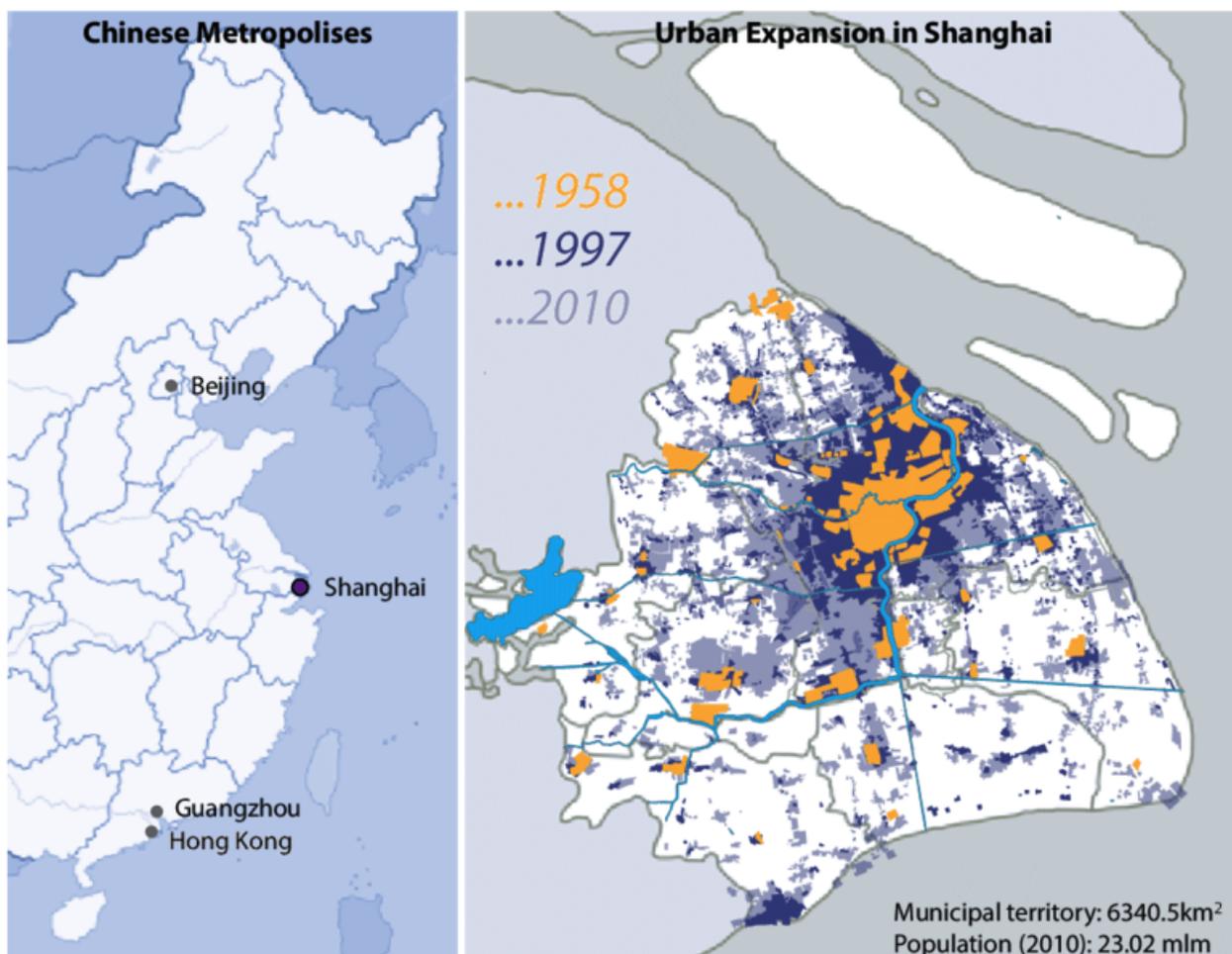
Figure 2.1: Location of Shanghai and Its Urban Expansion

Notes: This figure shows the location and expansion of Shanghai. Source: He (2015).

As illustrated in Figure 2.2, the city is divided into 16 districts, seven of which form its central part—Huangpu, Hongkou, Yangpu, Jing'an (including the former district of Zhabei), Putuo, Changning, and Xuhui. They are located to the west of the Huangpu River and therefore are known as Puxi, which means "the west bank of the Huangpu River". These seven districts have remained the residential, cultural, and commercial center of Shanghai for more than 100 years, accommodating approximately 30% of the city's residents according to the 2021 Shanghai Census. Generally considered as the center of the city, Huangpu District is where the city hall, the Bund, and many shopping areas such as the Nanjing Road, Huaihai Road, and Xintiandi located. Across the Huangpu River, Pudong, whose name refers to "the east bank of the Huangpu River", is a newly developed area since its formation in 1992.
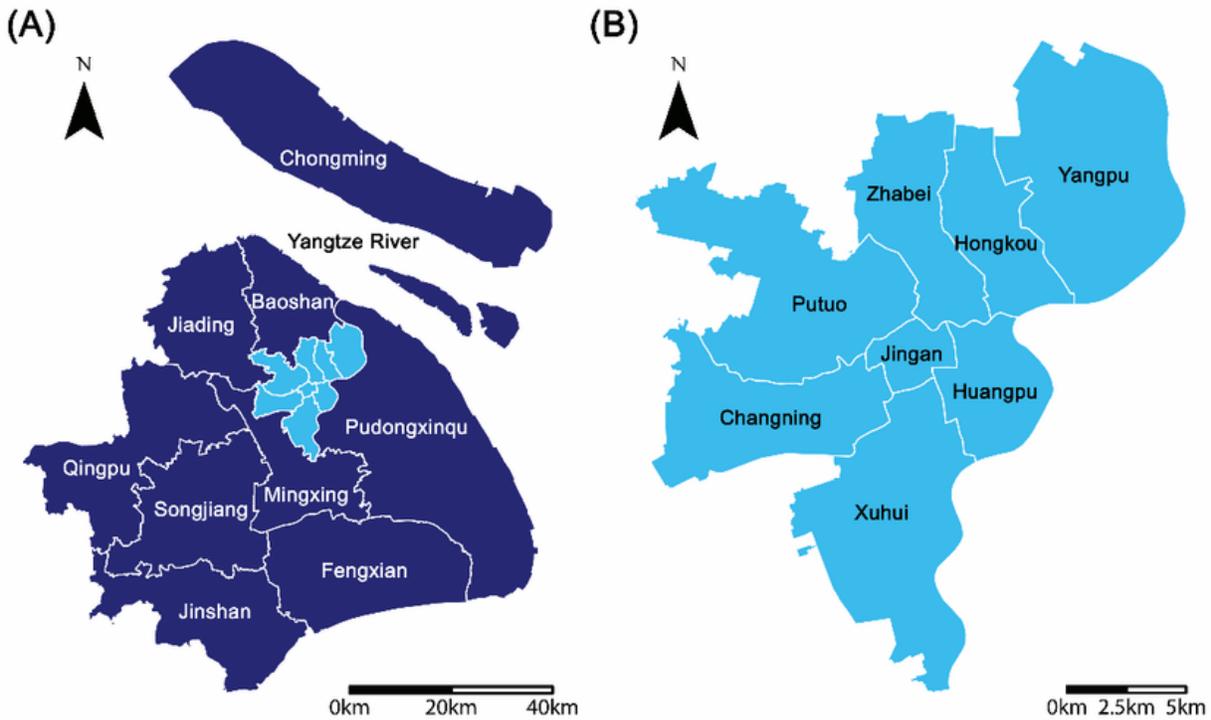
Figure 2.2: Division of Shanghai: (A) Administrative Districts, (B) Inset Map of the Central Part (i.e. Puxi of Shanghai)

Notes: This figure shows the 16 districts of Shanghai, with emphasis on the central part. Source: Xu et al. (2018).

Due to its distinguished economic, educational, and medical resources, the cost of living in Shanghai is among the highest in China and perhaps in the world. According to an article posted on Forbes in 2017, an average 1,000 square foot apartment in Shanghai was going for USD 725,000, or around CNY 5,000,000, while Shanghai's average salary was CNY 7,108 (USD 1,135) per month or CNY 85,300 (USD 13,620) per year. As a contrast, in New York, the most expensive city in the United States, the median income was around USD 52,000 a year and an average 1,000 square foot apartment would cost USD 1,756,000 based on square foot prices of USD 1,756. By that measure, housing prices in New York City were 34 times salaries of the average New Yorkers whereas the index was as high as 53 in Shanghai.

Studies focusing on Shanghai have found that structural attributes, transport infrastructure, amenities such as parks, schools, hospitals as well as shopping and entertainment areas significantly shape the real estate market (Li et al., 2019; Shen and Karimi, 2017). Due to the centralized distribution of transport infrastructure and amenities in Shanghai, housing price follows a monocentric pattern (see Figure 2.3). Other research also suggests that land use and land policy strongly affect the land as well as housing prices in Shanghai (Shi and Xie, 2013; Tu and Zhang, 2005; Xiao and Zhou, 2018).

2.2.2 Historical Shanghai

Shanghai became a city in 1291 during the Yuan dynasty (1271–1368). In 1553, the city wall was built around the Old Shanghai Town (Nanshi), the earliest area of economic activities in the Shanghai region. Benefited from its geographical conditions (i.e., near both the Huangpu River and the sea), Shanghai developed some handicraft and trading industries during the Ming and Qing dynasties but remained just a county of Songjiang Prefecture until its open-up.

In 1840, China was forced to open to the world by Opium War I. Located at the mouth of the Yangzi River, Shanghai was picked as one of the first "trading ports" under the Treaty of Nanjing in 1842, and formally opened on November 7, 1843. Foreign firms like Dent & Co., Gibb Livingston & Co., and Jardine Matheson flocked to Shanghai, seizing the best sections of land by the Huangpu River. To avoid chaos and conflicts, foreigners were confined within a specific district known as "settlement". Their request to buy land was rejected, but a "perpetual lease" was employed. In
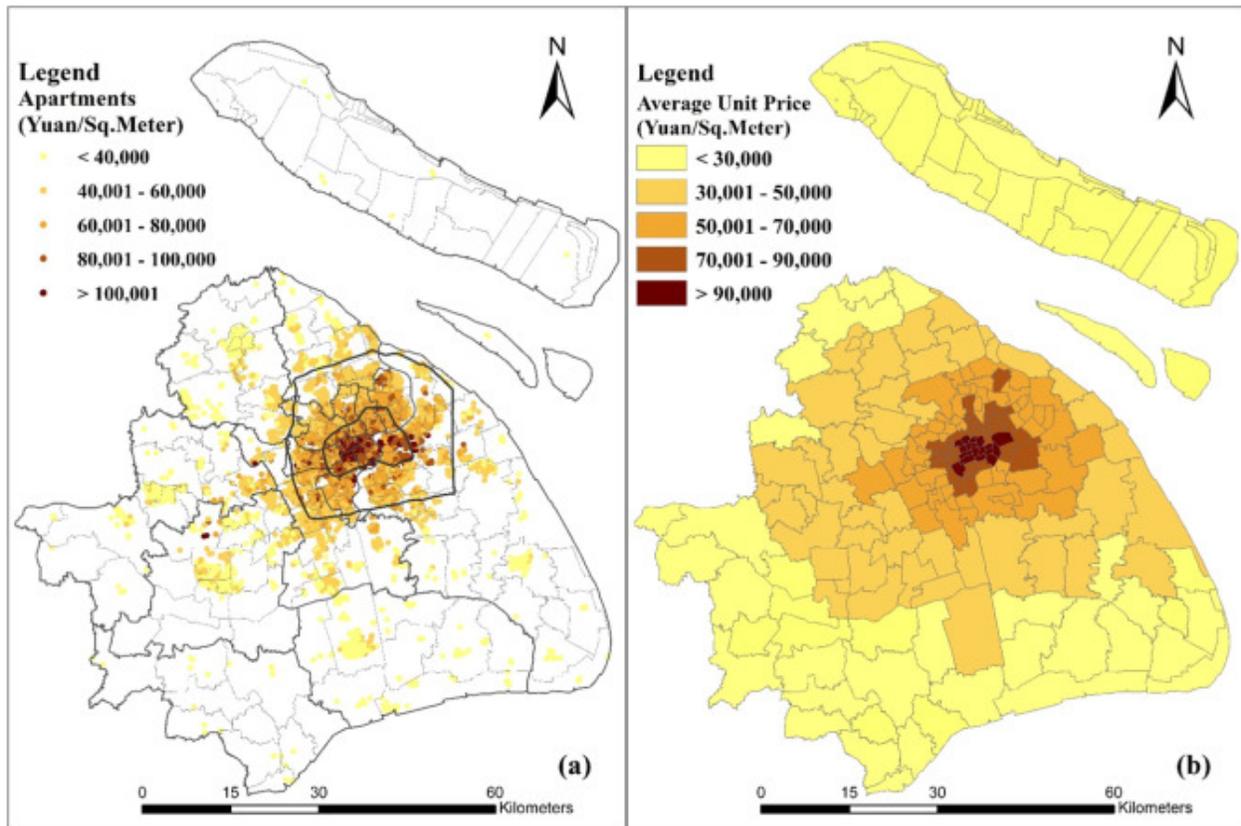
Figure 2.3: Housing Price Distribution

Notes: This figure shows the distribution of housing price in Shanghai. Source: Li et al. (2019).

1854 the first general Land Regulations—the city charters, as they may be called, were arranged between the British consul-general and the local authorities, acting under Imperial instruction. Through these regulations, foreign persons were allowed to rent land within defined limits; and a foreigner of any nationality could lease land in any of the settlements. The tenancy period was listed as "forever," as the original owners were not allowed to recover the land unless the foreign tenants returned it. By these types of land leases, or to some degree, the land sale[1], a large amount of land was developed, and a real estate market was thereby established.

Between the 1840s and 1940s, there were mainly three Settlements in Shanghai: the British

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[1]In the land lease process, the foreign businessperson and the original landowner signed a contract after they reached an agreement on the rental. Next, the foreigner would send their application to a foreign consulate; the title deed went into effect after it passed audits by both the foreign consul and Shanghai Daotai (an administrator in Shanghai).
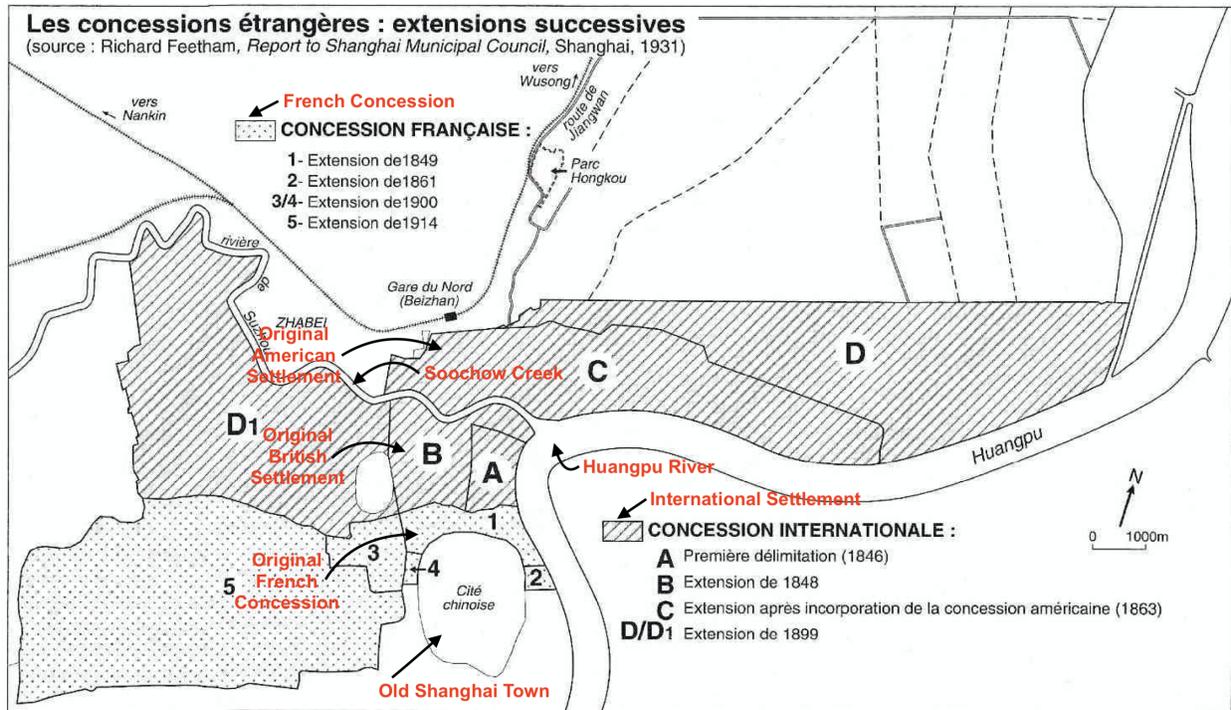
Figure 2.4: Expansion of Settlements in Shanghai

Notes: This figure shows the territory of the Shanghai Settlements at different times. Source: Marie-Claire Bergère, Historie de Shanghai (History of Shanghai).

Settlement, the American Settlement, and the French Concession. The British Settlement, located to the west of the Huangpu River and south of the Soochow Creek, was officially set up at the end of 1845. Its initial area was 0.56 km^2 (Region A in Figure 2.4) and then increased to 1.88 km^2 (Regions A and B in Figure 2.4) in 1848. The American Settlement, located to the north of the original British Settlement, was set up in 1848 with an initial area of 1.86 km^2, and its boundary was officially defined in 1863 (Region C in Figure 2.4). The French Concession, located between the British Settlement and the old Shanghai town, was built in 1849 with an initial area of 0.66 km^2 (Region 1 in Figure 2.4). The British Settlement and the American Settlement combined to form the International Settlement in 1863, becoming its Central District and Northern and (part of) Eastern Districts, respectively. The largest expansions (Regions D, D_1 and 3, 4, 5 in Figure 2.4) occurred at the turn of the century. As illustrated in Figure 2.5, hereafter I will refer to the four

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districts of the International Settlement using the terms "Central District", "Northern District", "Western District", and "Eastern District", and the two districts of the French Concession "Old French Concession (the original French Concession, the 1861 extension, and the 1900 extension)", and "New French Concession (the 1914 extension)".
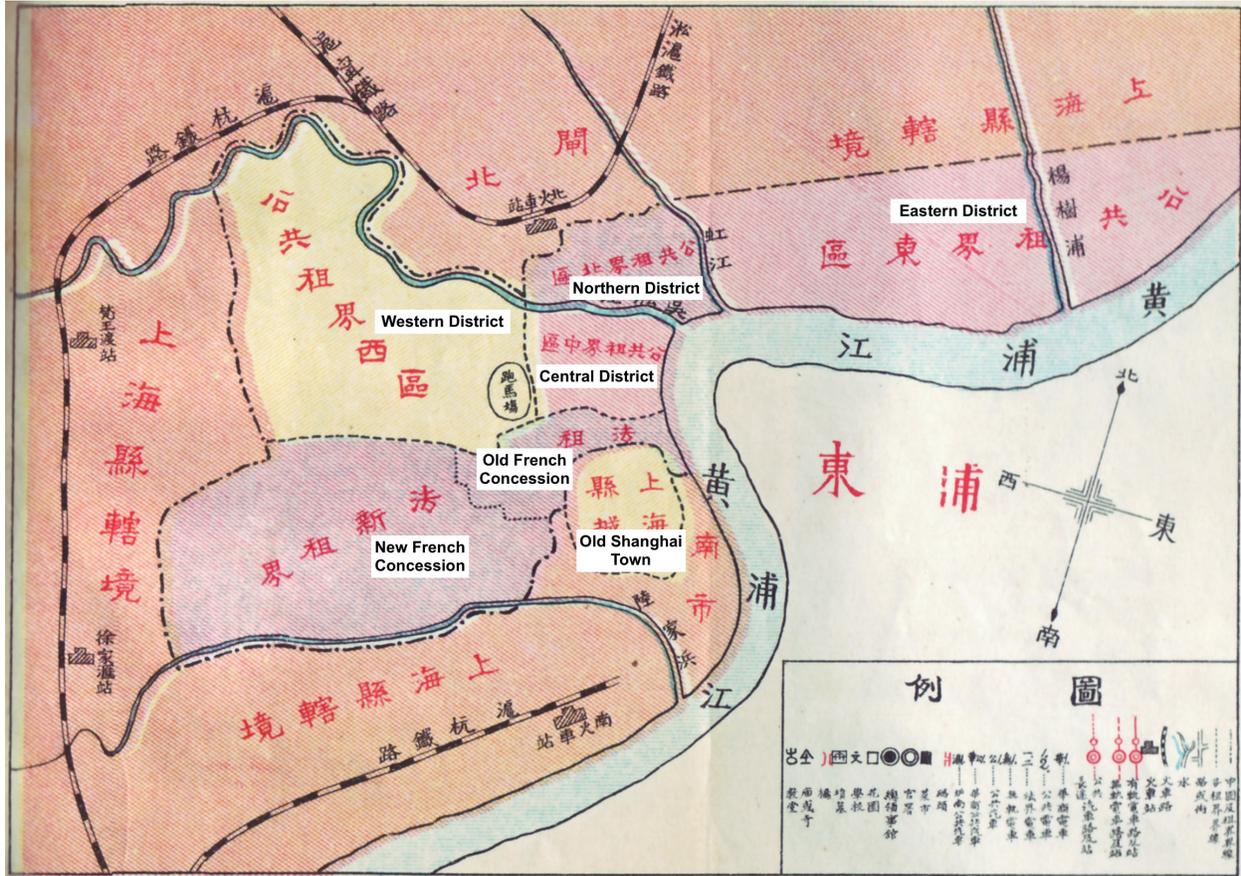
Figure 2.5: Districts of the Shanghai Settlements

Notes: This figure shows the four districts of the International Settlement and the two districts of the French Concession. Source: virtualshanghai.net, ID208.

In the beginning, the Chinese were not permitted to lease land in the foreign Settlements, and neither the foreign consuls nor the Chinese government anticipated them living there. However, in the 1850s, the Small Sword Uprising and Taiping Rebellion motivated Chinese people living in the old Shanghai Town and its surrounding cities to seek shelter in the Settlements. Figure 2.6 shows the logarithm of foreign and native people in the two Settlements between 1850 and 1942. The

Chinese people remained a majority for nearly 100 years.
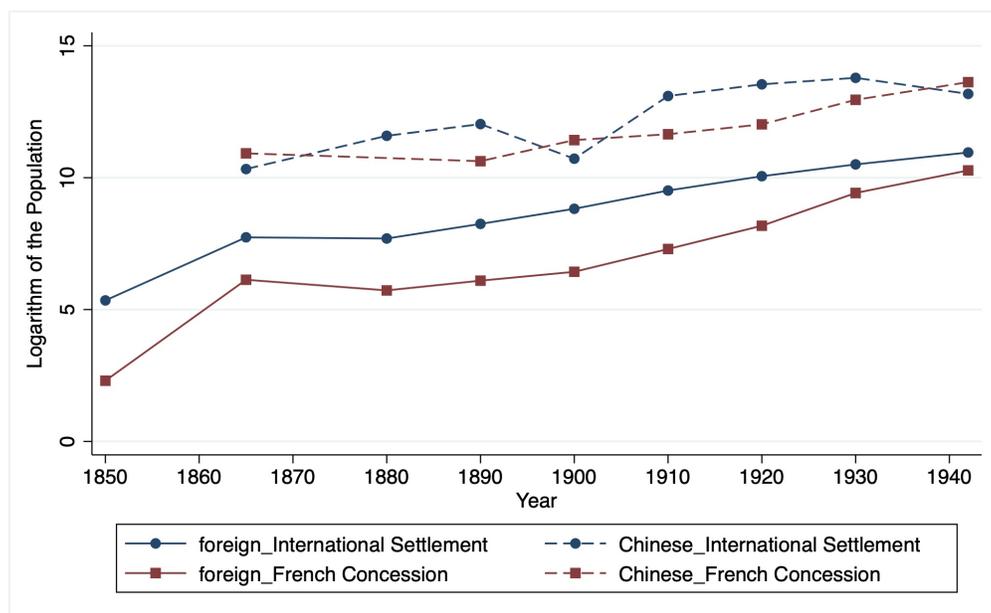
Figure 2.6: Foreign and Chinese Population in the Shanghai Settlements

Notes: This figure shows the log of the population in the International Settlement and French Concession. The numbers are obtained from the annual reports published by the two municipal councils (1892–1933; 1893–1940).

In local affairs, the foreign residents governed themselves and the natives within the Settlements by means of the municipal councils (Shanghai Municipal Council in the International Settlement and French Council in the French Concession), which existed under the authority of the "Land Regulations." They also had legislative institutions (at first the Land Renters' Meeting and then the Rate Payers' Meeting) and judicial institutions (the Consular Courts for the foreigners, and the Mixed Courts for the Chinese and unrepresented foreigners), replicated from their home countries. The institutions and public goods they introduced to Shanghai soon made it the most progressive city in China, and even the whole Asia.

During the treaty port era, Shanghai was very active in connecting foreign markets with China's hinterland, accounting for roughly half of China's foreign trade between the years 1870 and 1930 (Keller, Li and Shiue, 2013). In the early stage, foreign companies were mainly engaged in international trading. Manufacturing activities were limited to only small shipyards for ship repair and

maintenance. However, since Chinese government was obliged to ease restrictions on direct invest-ment in industry by the Shimonoseki Treaty in 1895, modern enterprises had sprung up in large numbers, helping Shanghai become China's economic center in the 1900s. A complete industrial system together with various industry clusters was constructed. Factories in all kinds of industries were set up in the Eastern, Western, and Northern districts of the International Settlement, to a great extent because commercial and financial establishments had already conquered the Cen-tral District by the end of 19th century. Unlike in the International Settlement, industries were not encouraged in the French Concession, leaving the French Concession mostly a commercial and residential district (see Figure 2.7).
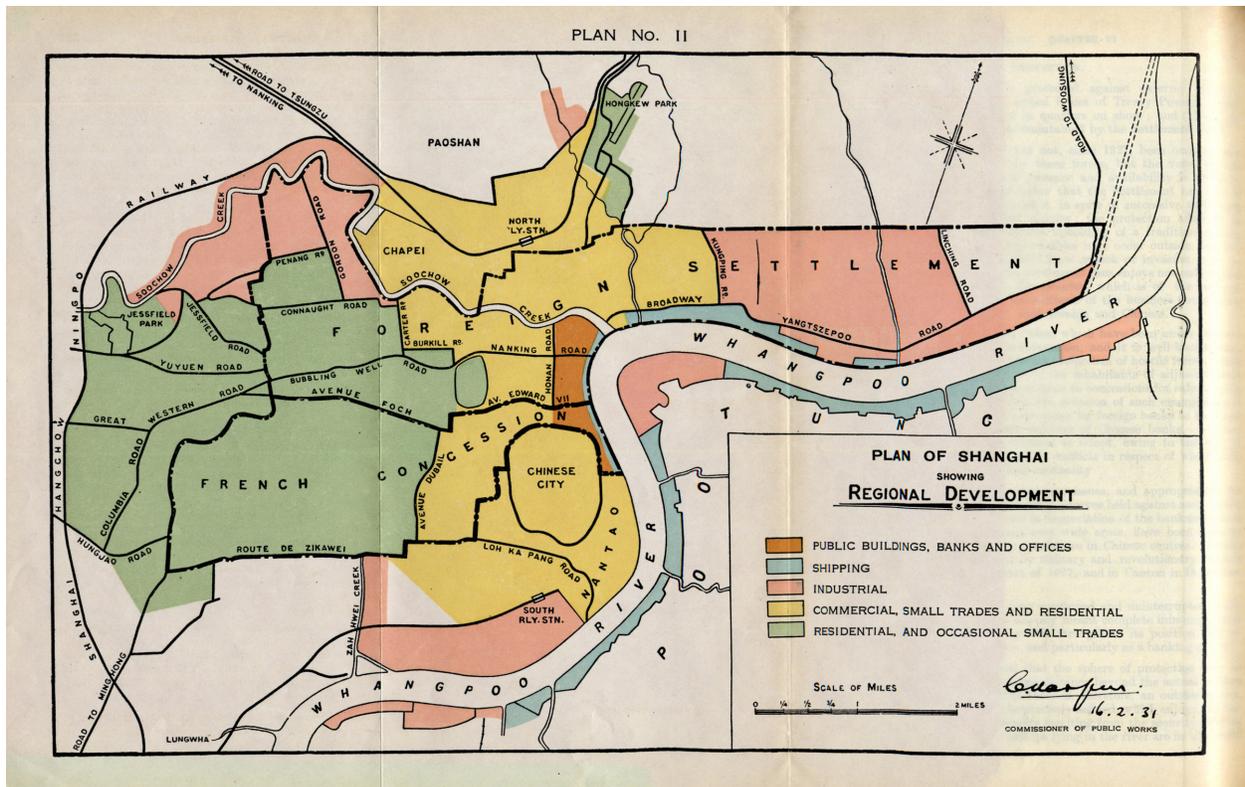
Figure 2.7: Plan of Shanghai, 1931

Notes: This map shows the regional development of Shanghai in 1931. Source: virtualshanghai.net, ID404.

2.2.3   Shanghai Tramway

The fast-growing city considered building tramway as early as in the 1880s, at which time jinrik-isha and Chinese wheelbarrow were the only means of locomotion—besides walking in Shanghai, and most of the public thoroughfares were nothing but lanes. Even on the newly macadamized roads within the foreign Settlements, clumsy jinrikisha and wheelbarrow were inadequate to supply the want of daily conveyance of the growing population. As stated in the *Monthly Summary of Commerce and Finance of the United States* (1894), "rents and values of real estate have trebled (since the Sino-Japanese War), but wages and profits have not increased proportionally", causing "an immediate need for means by which the suburban territory can be brought within reach of the business center." Shanghai was becoming a manufacturing center, while a clerk with an average salary could afford neither living within walking distance from his work nor commuting every day via the slow and relatively expensive jinrikisha, leaving the city desperately in need of an efficient public transportation.

The earliest discussion of the tramway system in Shanghai was found in 1881 when a special meeting of ratepayers was held in the International Settlement, with the goal to "discuss the proposed introduction of tramways, and to deliberate and decide upon a request for permission to construct and work such tramways by a proposed company" (Yokohama-shi, 1881). The very first tramway scheme put forward there includes two proposed routes (see Figure A2.3), but was shelved because the opponents worried about the legal authority of the Council[2] and the narrowness of the streets[3].

In May 1895, as the city was getting more and more crowded with the erection of numerous mills and filatures, as well as the consequent influx of Chinese labor, a new scheme for electric tramway was submitted to the Shanghai Municipal Council and the French Council by an engineer Mr. Leigh Hunt and then was printed and circulated among the ratepayers. This proposal, whose routes in the International Settlement are shown in Figure A2.4, is more ambitious compared to

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[2]The Municipal Council was considered "not competent to grant the permission required without the consent of the owner of land surrendered for public roads along the proposed line" (Yokohama-shi, 1881).

[3]"The streets, which only average 23 feet, of which the tramway would take up 9, were too narrow"(Yokohama-shi, 1881).

the one raised in 1881, as laying out tracks on so many narrow streets was undoubtedly challenging. Later in the same year, Charles Mayne, C. E., the engineer of the Shanghai Municipal Council, prepared full notes on tramways in connection with Mr. Hunt's scheme. To deal with the generally more narrow streets in Shanghai, Mayne suggested that rails be laid for a limited distance where a street is narrow for a short distance only; and that in streets less than 22 feet wide, the rail be laid at one side, instead of in the middle. In addition, meter gauge (1 meter), as opposed to standard gauge (5 feet), was recommended.

In August 1898, the Shanghai Municipal Council formally published an advertisement for the proposed tramway, the routes of which are shown in Figure A2.5, inviting tenders for a concession for constructing about 23 miles of electric tramways. It was proposed to give a franchise for thirty, forty, or fifty years, but the tender accepted by the council must afterward be ratified by the ratepayers. A deposit of 10,000 pounds is required with the bid as evidence of good faith. As the first tramway system in China, this proposal attracted extensive attention worldwide (*Consular Reports*, 1899), but the negotiation among three parties—tramway company, Municipal Council, and landowners lasted for many years. At different times several English companies obtained the necessary concession but were unable to raise enough money to ensure the successful completion of their schemes, and one firm as a result forfeited the 5,000 pounds that they had deposited (Wright and Cartwright, 1908).

In 1905, Messrs. Bruce, Peebles & Co., electric contractors, of Edinburgh, obtained, through their agents in Shanghai, Messrs. S. H. Shorrock & Co., the concession for thirty-five years. They then floated "Shanghai Electric Construction Company", with a capital of 320,000 pounds (Wright and Cartwright, 1908). The construction work was commenced on April 24, 1905, and was completed in three years. The route mileage of the tramway was approximately 16 miles, including $6\frac{1}{2}$ miles of double track, and $9\frac{1}{2}$ miles of single track, with loops at frequent intervals.

In the French Concession, the construction of tramway almost started at the same time. The Compagnie Francaise de Tramways et d'Eclairage Electriques de Shanghai, having its head office in Paris, was floated in June 1906, with a capital of 3,200,000 francs—increased in the following year by 1,000,000 francs. It owned and operated the tramway system as well as the electric light and

water supply in the French Concession. By 1908 the company had laid about 3.07 miles of double track and about 6.88 miles of single track, traversing the French Bund, Rue du Consulat, Avenue Pal Brunat, Rue Hue, and Route Francaise de Zikawei (Wright and Cartwright, 1908).

International Settlement's network was officially opened on March 5, 1908, followed by the French Concession's network on May 8 (see Figure 2.8 and Figure A2.6). Although built independently, the two networks used the same gauge track and were designed to connect. In 1912 the joint service between the two systems via the Bund and Checking Road Bridges was finally achieved (Denison and Ren, 2006). As laying tracks incurred high fixed costs, the tramway lines remained almost unchanged (but with some expansions) over time (see Figure A2.7).
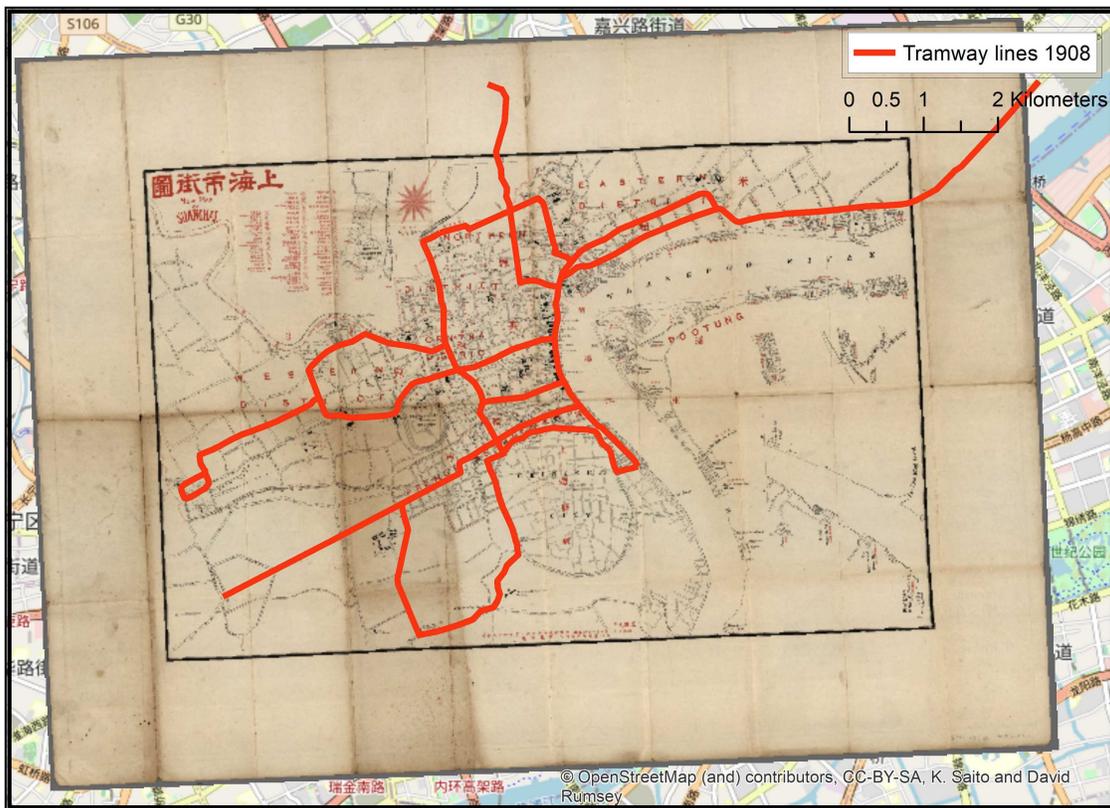
Figure 2.8: Tramway Lines in 1908

Notes: This map shows the actual tramway lines in the International Settlement and the French Concession in 1908. The information is obtained from the annual report published by the Shanghai Municipal Council and the French Council (1892–1933; 1893–1940).

Construction of tramway in the Old Shanghai Town commenced in 1912 when the Chinese Tramway Company (Chinese Electric Power Co. Ltd.) was incorporated. From 1913 to 1918 four routes opened, which can be seen in Figure 2.9.
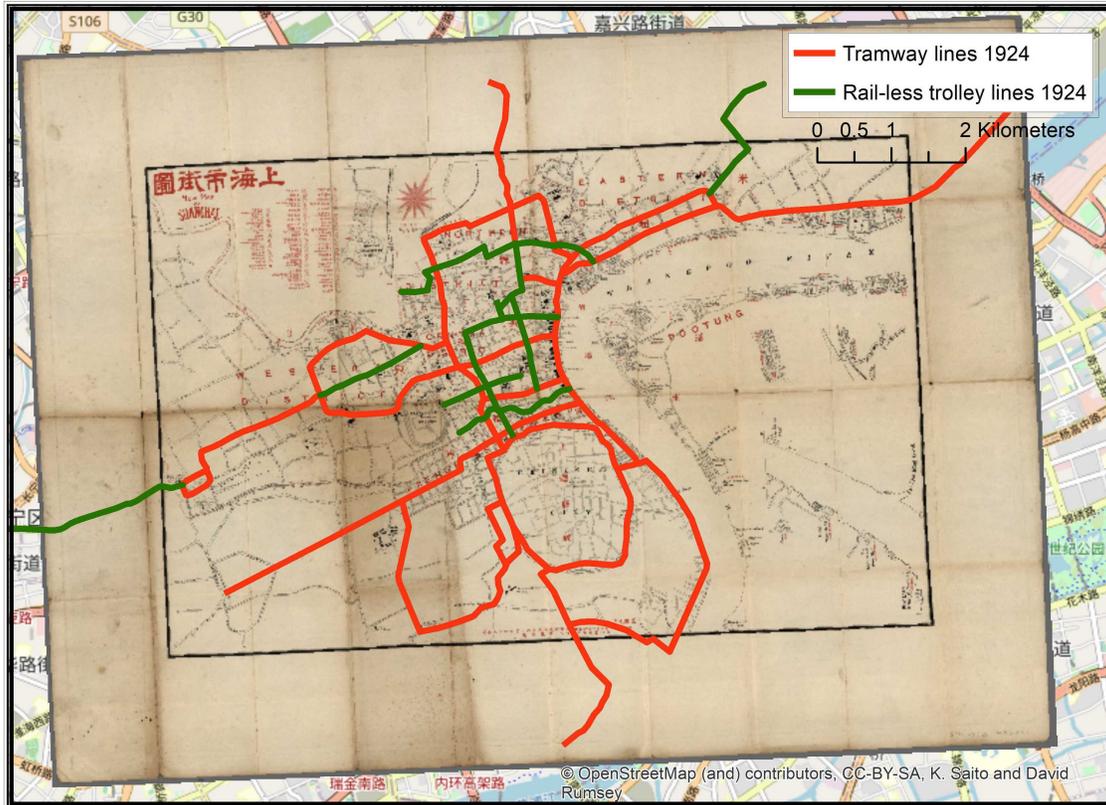
Figure 2.9: Tramway Lines and Proposed Rail-less Trolley in 1924

Notes: This map shows the actual tramway lines (in red) and the proposed rail-less trolley lines (in green) in Shanghai in 1924. The information is obtained from the annual report published by the Shanghai Municipal Council and the French Council (1892–1933; 1893–1940).

The convenient tramway soon brought a problem of overcrowding, which stimulated the construction of the rail-less trolley. In the International Settlement, such service was first established in July 1915 over a 0.7-mile route and was extended in 1916 to one mile from the Peking Road to the Honan Road Bridge (*Electric Railway Journal*, 1920). Since 1917 the Shanghai Municipal Council had been considering a proposal for a very considerable extension (about 9 miles) of the rail-less trolley service, but it was not until the end of 1920 that the extension plan was officially discussed

(as shown in Figure 2.9). The Tramway Extension Agreement was finally signed on May 17, 1924 (*The Minutes of the Shanghai Municipal Council*, 1899, 1902, 1903, 1904, 1905, 1906, 1912, 1913, 1916, 1920, 1921). Due to the flexibility, the routes of rail-less trolley underwent several changes in the following years (Shen and Chen, 1934; Leng, 1946; Wang, 1934). As an example, Figure A2.8 shows a different rail-less trolley bus route in 1936. Unlike the tramway that retired in the 1970s, the rail-less trolley is still in use today.

Omnibus was even more flexible. On October 9, 1924, the General Omnibus Co. of China, Ltd. inaugurated such service, which was recognized as "clean, comfortable and efficient" (*The Minutes of the Shanghai Municipal Council*, 1899, 1902, 1903, 1904, 1905, 1906, 1912, 1913, 1916, 1920, 1921). Unlike tramway and rail-less trolley, target customers of omnibus in Shanghai were mainly foreigners and high-income tourists. In a meeting of the Shanghai Municipal Council in 1921, the chair of the board suggested to position the omnibus as a "luxury service", for the fares asked by the Tramway Company were extremely low, making it hard for the petrol-based omnibus to compete (*The Minutes of the Shanghai Municipal Council*, 1899, 1902, 1903, 1904, 1905, 1906, 1912, 1913, 1916, 1920, 1921). According to the *Guide of Shanghai* (Shen and Chen, 1934), the fares for omnibus were $1.5 \sim 2$ times of those for the tramway.

In sum, tramway had been the only mode of intra-city public transportation in Shanghai until the late 1910s, and dominated until the 1930s. Its rapid development can be seen from the continually growing numbers of passengers carried and the rolling stocks owned by the Tramway Company shown in Table 2.1(in the International Settlement only).

2.3   Data

2.3.1   Land Valuation Schedule by the Municipal Councils

To measure the instant effects brought by the tramway on property value I employ the assessed land value from the land assessments conducted every few years by the Shanghai Municipal Council and the French Council between the 1860s and 1940s, which were served as a basis for the councils to collect land tax. The goal, as defined in the preface of the land valuation schedules, was to "place the properties as near as possible to their fair market value," and thereby to provide a more

Table 2.1: Number of Passengers and Rolling Stocks of the Tramway Company

Year	Passengers	Tram Cars	Trailers	Rail-less Cars
1909	11,800,000	65	30	-
1910	18,751,215	65	30	-
1911	27,257,250	65	30	-
1912	40,734,233	65	30	-
1913	47,686,648	67	40	-
1914	55,647,238	-	-	-
1915	59,749,710	90	55	7
1916	69,089,432	90	70	7
1917	73,461,492	90	70	7
1918	78,683,690	90	70	7
1919	95,038,701	90	85	7
1920	-	90	85	7
1921	-	90	90	10
1922	-	90	90	12
1923	-	90	90	14
1924	-	90	90	15
1925	104,893,221	100	91	25
1926	120,174730	100	100	77
1927	93,807,726	100	100	85

Notes: This table presents the numbers of passengers carried and the rolling stocks owned by the Tramway Company over time in the International Settlement. The information is obtained from the annual report published by the Shanghai Municipal Council (1892–1933).

reasonable tax base than the initial sale price. If the assessed value was thought to be unfair, the landowner had the right to raise an objection and ask for a revaluation. The revised result would be published and presented to the ratepayers for their final approval.

Land assessments acted as fundamental reference sources in land transactions. According to a comprehensive guide for property investment in Shanghai published in 1933, the most common method of property evaluation was to borrow from the land assessment schedules posted by either the Shanghai Municipal Council or the French Council: "Empirically, the market price was always set as the assessed value with a 25% appreciation, subject to rentals in the neighborhood (Chen, 1933)."

Generally, the outputs of a land assessment included the following: (1) the cadastral maps showing the location of each land lot, and (2) the land valuation schedule, recording the name of the renter, cadastral number, area, land value, and taxation assessment for each land lot. Figure A2.1 shows one part of the 1931 cadastral maps in the French Concession, from which the location of land lots with cadastral numbers 1 through 49 can be noted. Figure A2.9 shows one page of the

1911 *Land Assessment Schedule* in the International Settlement, from which information of the cadastral number, registered owner, area, and value per *mu* can be obtained. Relatively complete and detailed data of land assessments in the International Settlement are well preserved in the Shanghai Municipal Archive[4]. The author, together with Fusheng Luo[5], have digitized all the land valuation schedules between 1900 and 1933, which are available upon reasonable request. The availability of land assessments in the French Concession is much more limited. The latest ones are kept in the Shanghai Municipal Archive, while some of the earlier ones can be found only in the French archives, with the total number of them unknown. Christian Henriot (An Keqiang)[6] and his team have made great efforts in collecting, organizing, and digitizing these French land assessments. The author is grateful for their admirable work and generous sharing.

Based on the cadastral number, each land lot can be geo-located in ArcGIS; next, the distance to the tramway lines and other geographic features can be calculated. The general geo-coding process is demonstrated in Figure 2.10, where a cadastral map showing a piece of land in the French Concession near the Bund is geo-referenced; next, 49 land lots on the map are drawn as features by hand. In this manner, the author has recorded the spatial information of nearly 15,000 land lots.

Land assessments were not conducted simultaneously in the two Settlements. In most of the years, land value schedules were published in one Settlement but not in the other. As tramway opened in 1908 in both Settlements, and the rail-less trolley was introduced around 1916, data of the years 1903, 1907, 1911, and 1916 in the International Settlement, and of the years 1902, 1906, 1908, and 1916 in the French Concession are employed in this paper to assess the effect of tramway on property value. The numbers of observations within the area studied in the 1902/1903 and 1916 assessments are 2,859 and 3,760, respectively. Figure 2.11 shows the locations and values of the land lots that were assessed in 1916, the only year when the Municipal Councils in both Settlements published a land valuation schedule. At that time the newly developed 1914 Extension

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[4]Namely, land valuation schedules in 1867, 1869, 1874, 1876, 1880, 1882, 1889, 1892, 1897, 1900, 1903, 1907, 1911, 1916, 1920, 1922, 1924, 1927, 1930, and 1933, to which the cadastral maps of each district were attached after the 1900s

[5]https://lsa.umich.edu/history/people/graduate-students/fusheng.html

[6]https://ankeqiang.org
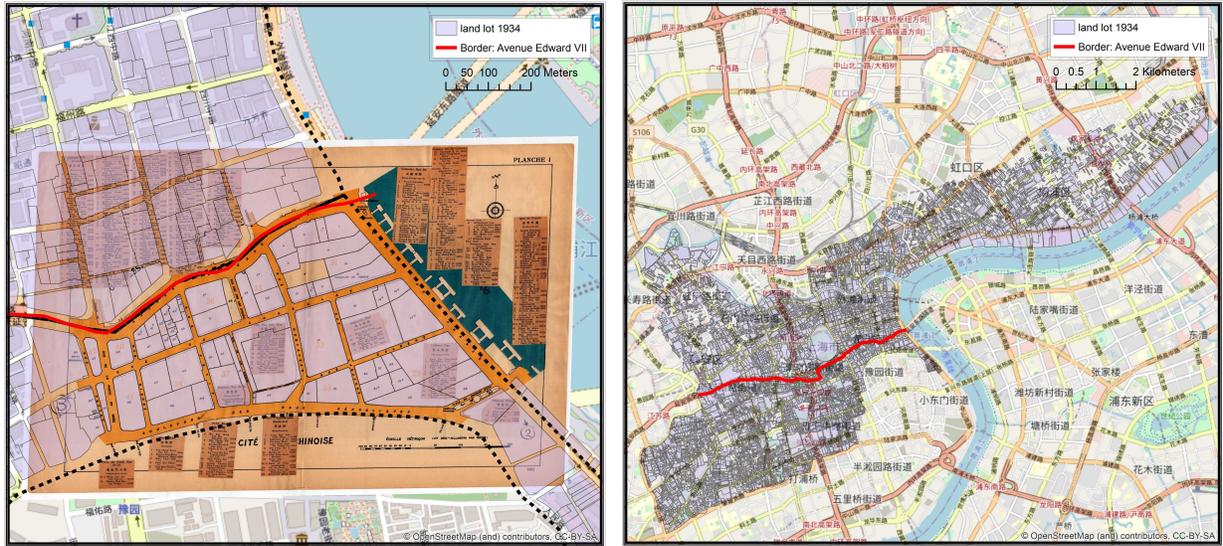
| Geo-referencing and Creating Land Lots | All Land Lots Assessed in 1934 |

Figure 2.10: Geo-coding of the Land Lots

Notes: These figures demonstrate how the location information of the land lots are obtained from the cadastral maps and recorded into ArcGIS.

of the French Concession (the New French Concession) had not been assessed yet. As a result, this paper just focuses on five districts: The Central, Northern, Western, and Eastern Districts of the International Settlement, and the Old French Concession. According to Figure 2.11, the Central and Northern Districts in the International Settlement, and the original French Concession, which had been developed by the 1860s, had the highest land value, whereas the land value in the newly developed Western and Eastern Districts was more moderate.

Summary statistics for 1902, 1903, and 1916 are reported in Table 2.2. The unit for area is mu[7], for value is tls. per mu[8], and for distance to tramway lines and city center is m. The city center is defined as the intersection of the Nanking Road and the Bund, which had the highest market value as demonstrated in Appendix Figure 1. According to Table 2.2, it is clear that from the early 1900s to the mid-1910s, plenty of new land was developed in the Western and the Eastern Districts of the International Settlements, but the strongest growth in land value still occurred in

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[7]Unit for area was recorded in *mu, fen, li*, with 1 *mu* = 10 *fen* = 100 *li*= 674.45 m^2 = 0.1667 *acre*.

[8]According to *Zhongguo de Duiwai Maoyi he Gongye Fazhan: 1840-1948 (Foreign Trade and Industrial Development in China: 1840-1948)* (Zheng, 1984), tls. 1=$0.630 in 1902, $0.640 in 1903, $0.800 in 1906, $0.790 in 1907, $0.650 in 1908, $0.650 in 1911, $0.790 in 1916.
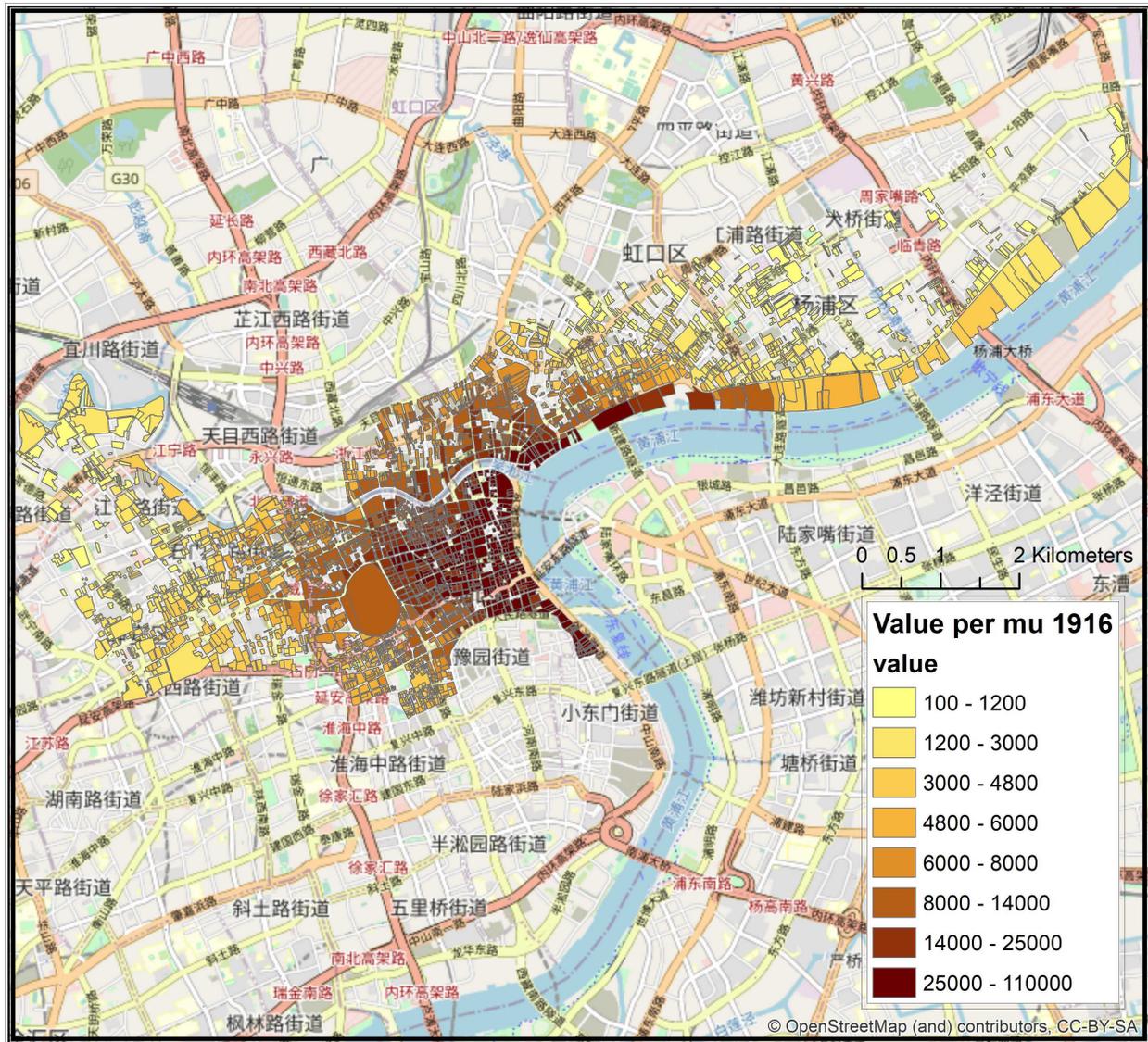
Figure 2.11: Land Value Gradient 1916

Notes: This figure plots the land lots that were assessed in 1916.

the Central District and the Old French Concession that were set up much earlier in the 1840s.

Table 2.2: Summary Statistics of Land Lots

	1902/1903*				1916			
	Value (tls. per mu)	Area (mu)	Distance to tram (m)	Distance to center (m)	Value (tls. per mu)	Area (mu)	Distance to tram (m)	Distance to center (m)
Central District								
Min	4,000.00	0.05	0.00	23.80	10,000.00	0.03	0.00	23.80
Mean	11,844.22	3.26	113.46	861.73	29,150.21	3.03	113.22	847.81
Max	37,500.00	48.65	374.81	1,542.26	110,000.00	48.65	374.81	1,542.26
Std. Dev	5,717.80	4.11	96.72	347.33	17,160.34	3.57	95.78	349.72
Obs	666	666	666	666	699	699	699	699
Northern District								
Min	1,250.00	0.07	0.00	521.21	4,000.00	0.04	0.00	521.21
Mean	4,378.45	3.50	121.50	1,217.42	10,911.65	3.47	127.70	1,262.48
Max	25,000.00	53.12	465.81	1,913.06	50,000.00	51.90	480.05	1,913.06
Std. Dev	2,546.00	4.38	117.69	308.92	6,366.01	5.12	119.39	299.71
Obs	471	471	471	471	532	532	532	532
Western District								
Min	400.00	0.05	0.00	1,528.06	400.00	0.02	0.00	1,528.06
Mean	2,122.48	5.17	328.77	2,876.52	4,725.36	4.85	443.34	3,056.27
Max	12,000.00	56.34	2574.58	5,371.27	25,000.00	430.00	2,605.91	5,371.27
Std. Dev	1,367.64	7.53	454.57	868.94	3,154.92	15.19	573.25	965.76
Obs	616	616	616	616	1,053	1,053	1,053	1,053
Eastern District								
Min	100.00	0.01	0.00	910.48	100.00	0.05	0.00	910.48
Mean	2,046.05	7.13	279.30	2,734.87	2,911.48	6.08	412.57	3035.45
Max	15,000.00	215.88	1,765.46	7915.58	32,000.00	255.09	1765.46	7915.58
Std. Dev	2,101.26	15.15	328.63	1385.73	3,233.56	14.52	387.19	1401.80
Obs	493	493	493	493	885	885	885	885
Old French Concession								
Min	1,000.00	0.02	0.00	679.31	3,000.00	0.00	0.00	679.25
Mean	3,619.17	2.29	109.43	1785.84	11,496.62	2.08	110.95	1794.05
Max	15,500.00	44.40	399.94	2578.29	80,000.00	33.86	399.94	2578.29
Std. Dev	3,676.12	3.72	102.39	447.40	12,159.46	3.13	103.24	451.18
Obs	613	613	613	613	591	591	591	591

Notes: This table presents the summary statistics of the land lots in the International Settlement and the Old French Concession. The unit for area is *mu*, and for value is tls. per *mu*. Data are collected from the corresponding land valuation schedules.
*Data of 1902 are for the French Concession, while data of 1903 are for the International Settlement.

2.3.2 Housing Price 2008

To assess the persistent effect (if there is any) of the extinct tramway on current property value, I scrape housing prices data of 2018 from Anjuke, a real estate rental and sale platform in China. For each residential complex, information of name, address, longitude and latitude, average transaction

price per square meter, year built, number of buildings and houses, and whether it is close to a subway line is recorded. Summary statistics are shown in Table 2.3.

Table 2.3: Summary Statistics of Residential Complexes in 2018

	Price (yuan/m^2)	Year Built	# of Buildings	# of Houses	distance to tram (m)	distance to metro (m)
Central District						
Mean	85548.00	1979.26	4.45	135.59	167.14	370.10
Std. Dev	26310.86	25.77	6.86	200.99	94.99	98.50
Obs	44	35	44	44	44	44
Northern District						
Mean	81911.50	1989.31	5.79	280.43	200.06	412.94
Std. Dev	28874.87	26.83	11.10	320.45	145.62	161.40
Obs	28	26	28	28	28	28
Western District						
Mean	89513.34	1985.75	9.42	229.27	740.97	444.80
Std. Dev	25880.97	24.43	16.96	270.20	624.79	177.07
Obs	317	283	317	317	317	317
Eastern District						
Mean	67368.26	1993.74	10.31	316.78	807.68	542.60
Std. Dev	12102.99	11.38	12.68	322.34	450.33	294.99
Obs	257	249	257	257	257	257
Old French Concession						
Mean	95146.10	1984.40	3.60	239.10	92.24	333.84
Std. Dev	28175.10	22.19	3.66	219.58	76.65	123.48
Obs	10	10	10	10	10	10
New French Concession						
Mean	101029.40	1965.27	8.36	96.62	674.13	429.25
Std. Dev	31869.01	29.59	12.73	143.82	468.37	175.88
Obs	526	439	526	526	526	526
Old Shanghai Town						
Mean	87010.85	1985.53	6.42	174.68	216.65	530.42
Std. Dev	16938.04	23.17	8.35	179.14	166.14	191.76
Obs	60	57	60	60	60	60
Others						
Mean	54609.87	1995.80	43.60	601.37	12245.59	2576.08
Std. Dev	22234.22	12.87	79.62	744.64	12211.00	5276.22
Obs	10,439	9,949	10,439	10,439	10,439	10,439

Notes: This table presents the summary statistics of the complexes that had transaction records on Anjuke in 2018.

Among the 11,681 observations presented in Table 2.3, only 10.63% are within the former Settlements or the Old Shanghai Town. The difference between them and the others is evident: complexes located in the areas that were developed earlier tend to be more expensive, built earlier, smaller in scale, and better connected with public transportation both in the past and at present. Comparing Table 2.3 with Table 2.2, it is also evident that the internal differences of the former Settlements had been narrowed—in 1916 the average land value in the Central District was three

times as high as that in the Northern District and the Old French Concession, and nearly ten times as high as that in the Western District and the Eastern District; yet now housing prices are comparable in these areas. Another point worth noting is that the complexes located in the former French Concession now have the highest average transaction price per square meter, whereas in the colonial era the Central District used to be the most expensive area of Shanghai.

2.4   Short-Run Effects

As introduced in Section 2.3, the primary objective of the tramway system in colonial Shanghai was to "bring suburban territory within reach of the business center" (Denison and Ren, 2006) so that a clerk with an average salary was able to work in the business districts while living in the suburbs at a low rent. To this end, the fares were kept low deliberately by the Municipal Councils, and for the first several years the Tramway Companies had been even operating at a loss. As depicted in the *Special Agents Series* (1919), "the riding on tramways in the city is largely confined to the ordinary class of Chinese, as wealthy Chinese and foreigners as a rule travel in jinrikishas or other conveyances." Even in the 1930s, when the rail-less trolley and omnibus had already been widely in use, tramway remained a significant consideration in property evaluation (Chen, 1933). "In places where no tramway passes through, one should find out whether the authority has a plan of laying tracks there (p. 194)."

For businesspeople and residents in the urban area, the tramway may have brought more annoyance than convenience—according to the *Minutes of the Shanghai Municipal Council* (1899, 1902, 1903, 1904, 1905, 1906, 1912, 1913, 1916, 1920, 1921), soon after the operation of the tramway, the Municipal Council was deluged with complaints about the danger of accident, damage to roads, traffic jam, smoke and noise, etc. For example, as soon as the tramway in the Canton Road was finished and opened to traffic in 1909, the owners and agents of properties fronting the road proposed to remove the tramway, stating that "owing to the laying of the tram lines and the passage of cars business there has so fallen off that a large number of shops are now vacant, and the tenants of those shops still occupied find the greatest difficulty in paying their rents." In addition, the property owners believed the removal of the trams "would also be in the interest of the general public" be-

cause the tramway was very dangerous to pedestrians as well as vehicles, "with the result that those who possibly can avoid using this road preferring to take other though less direct thoroughfares" (Shanghai Municipal Gazette, 1906, 1909, 1911, 1913, 1914, 1915). Nevertheless, the Municipal Councils, when dealing with tramway issues, always tried to take a stand safeguarding the common interest of all taxpayers as a whole. In an announcement of 1909, the Shanghai Municipal Council claimed that "the right of the millions of people who benefit by the increased speed and area of public motor traffic may fairly be regarded as outweighing the increased disturbance within reason of those who have elected to reside or carry on business in main thoroughfares" (*Annual Report of the Shanghai Municipal Council*, 1892–1933).

To see if the tramway system fulfilled its mission of connecting geographically dispersed areas (i.e., suburban territory benefited more from the tramway than the city center), I conduct a difference-in-difference-in-difference (DDD) estimation where the treated group is defined as "the suburban land lots that were close enough to a tramway line after 1908." Specifically, I estimate:

$$
\begin{aligned}
\ln Value_{ist} =& \beta_0 + \beta_1 dist_{ist} + \beta_2 Suburb_{ist} + \beta_3 dist_{ist} \times Suburb_{ist} \\
& + \delta_0 Post_{ist} + \delta_1 Post_{ist} \times dist_{ist} + \delta_2 Post_{ist} \times Suburb_{ist} \\
& + \delta_3 Post_{ist} \times dist_{ist} \times Suburb_{ist} + \sigma area_{ist} + \gamma_s + \lambda_t + u_{ist}
\end{aligned}
\tag{2.1}
$$

In Equation 2.1, $Value_{ist}$ denotes the assessed land value (tls. per mu) of land lot i in neighborhood s in year t. $dist_{ist}$ denotes the distance to the nearest tramway line ($100 \ m$) from the land lot. $Suburb_{ist}$ denotes whether the land lot was in the suburb or not. Because the median of the distance to the city center in 1916 was $1939 \ m$, I assign $Suburb_{ist} = 0$ to the observations with a distance to the city center less than $1939 \ m$ and $Suburb_{ist} = 1$ to those greater than $1939 \ m$. As shown in Table 2.2, all the land lots in the Central and Northern Districts, and most in the Old French Concession are classified as "urban" while more than half of them in the Western and Eastern Districts are classified as "suburban". After such classification, the longest distance to the nearest tramway line from an "urban" land lot was $599 \ m$. So to fairly assess the effect of the tramway, I exclude "suburban" land lots whose distance to the nearest tramway line was greater than this figure when comparing the two groups. $Post_{ist} = 1$ for $t > 1908$ while $Post_{ist} = 0$

otherwise. The coefficient of interest is δ_3, which captures the effect of the tramway on suburban land lots relative to urban land lots in places that were close to a tramway line. Tramway stop-specific neighborhood fixed effects γ_s and year fixed effects λ_t are included to control for the average differences across neighborhoods and years, respectively.[9]

Table 2.4: Short-Run Effect of Tramway on Land Value

Dep. Variable: $\ln Value$	(1)	(2)	Suburb=0, Post=0	Suburb=1, Post=0	Suburb=0, Post=1	Suburb=1, Post=1
β_1: $dist$	-0.1637***	-0.3244***	-	-	-	-
	(0.0326)	(0.0325)	-	-	-	-
β_2: $Suburb$	-0.2826***	-0.4063***	-	-	-	-
	(0.0772)	(0.1093)	-	-	-	-
β_3: $dist \times Suburb$	-0.0054	0.1334***	-	-	-	-
	(0.0417)	(0.0429)	-	-	-	-
δ_0: $Post$	1.3029***	0.7305***	-	-	-	-
	(0.0739)	(0.0560)	-	-	-	-
δ_1: $Post \times dist$	0.0247*	0.0594***	-	-	-	-
	(0.0138)	(0.0159)	-	-	-	-
δ_2: $Post \times Suburb$	0.0389	0.0621	-	-	-	-
	(0.0420)	(0.0543)	-	-	-	-
δ_3: $Post \times dist \times Suburb$	**-0.0446****	-	-	-	-	-
		0.0727**				
	(0.0171)	(0.0183)	-	-	-	-
Average Marginal Effect	-	-	-	-	-	-
			0.1029**	**0.1250****	**0.0945****	**0.1463****
	-	-	(0.0054)	(0.0067)	(0.0060)	(0.0048)
neighborhood fixed effects	Y	Y	Y	Y	Y	Y
year fixed effects	Y	Y	Y	Y	Y	Y
obs	12,267	5,221	3,700	2,518	3,444	2,605
E(Kernel obs)	-	-	1,480	1,007	1,378	1,042
R^2	0.8961	0.7850	0.1299	0.2021	0.1214	0.2883

Notes: This table reports the tramway effect in the short run. The dependent variable is expressed in natural logarithm so the coefficients stand for percentage changes. Columns (1)-(2) report the estimated coefficients based on the DDD regression. Column (1) contains the whole sample in all the five districts; while column (2) contains only the subsample of the relatively "suburban"Western and Eastern Districts. Standard errors are clustered at the tramway stop-specific neighborhood level and noted in parentheses. Columns (3)-(6) report the estimated marginal effects of the distance to tramway lines based on the semiparametric regression for the four subgroups. * indicates statistical significance at the 10% level, ** at the 5% level, and *** at the 1% level.

The baseline result is shown in column (1) of Table 2.4, where the significantly negative coefficient on $Post_{ist} \times dist_{ist} \times Suburb_{ist}$ implies that the land lots that were farther away from the city center benefited more from the tramway (i.e., the difference in the tramway effect between land lots closed to and far away from a tramway line in the suburb was greater than the difference

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[9]γ_s's are the location-specific time-invariant unobservables with $s = 1, ..., 70$ denoting the nearest tramway stop of 1936, and λ_t's are the common time effects for all locations with $t = 1902, 1903, 1906, 1907, 1908, 1911, 1916$.

in the urban area; or, the difference in the tramway effect between suburban and urban land lots that were closed to a tramway line was greater than the difference between those land lots that were far away from a tramway line). In particular, -0.0446** indicates that on average, going 100 m away from the nearest tramway line was associated with a 4.5% more decrease in land value for suburban land lots than for urban land lots.

The unbalanced effects of tramway between the urban and suburban area can be further confirmed by focusing on the land lots in the relatively "suburban" Western and Eastern Districts, where the DDD estimation generates even larger effects as shown in column (2). Now going 100 m away from the nearest tramway line was associated with a 7.3% difference in land value between suburban and urban land lots. This means that the tramway indeed worked as desired in playing a more important role in the suburb.

In Equation 2.1, the effect of the tramway on land value is implicitly assumed to be linear. To test if it is realistic, I divide the sample into four groups and then conduct semiparametric regressions on them respectively. The four groups are:

- observations in the urban area before the construction of tramway
  ($Suburb_{ist} = 0$ and $Post_{ist} = 0$)

- observations in the suburban area before the construction of tramway
  ($Suburb_{ist} = 1$ and $Post_{ist} = 0$)

- observations in the urban area after the construction of tramway
  ($Suburb_{ist} = 0$ and $Post_{ist} = 1$)

- observations in the suburban area after the construction of tramway
  ($Suburb_{ist} = 1$ and $Post_{ist} = 1$)

For each group, I fit a semiparametric partially linear regression model of the logarithm of land value on the distance to tramway (100 m), area (mu), neighborhood fixed effects, and time fixed effects:

$$\ln Value_{ist} = g(dist_{ist}) + \sigma area_{ist} + \gamma_s + \lambda_t + e_{ist} \tag{2.2}$$

85

In Equation 2.2, only the variable of interest, $dist_{ist}$, enters the equation in the form of an unknown function $g(\cdot)$, indicating that the conditional mean is linear in the other variables but possibly non-linear in $dist_{ist}$. In Figure 2.12, I estimate σ, γ, and λ first to obtain the residuals, and then plot these residuals against the distance to tramway $(100\ m)$ to obtain information on the function form of $g(\cdot)$.

urban area, before the construction of tramway   suburban area, before the construction of tramway

urban area, after the construction of tramway   suburban area, after the construction of tramway
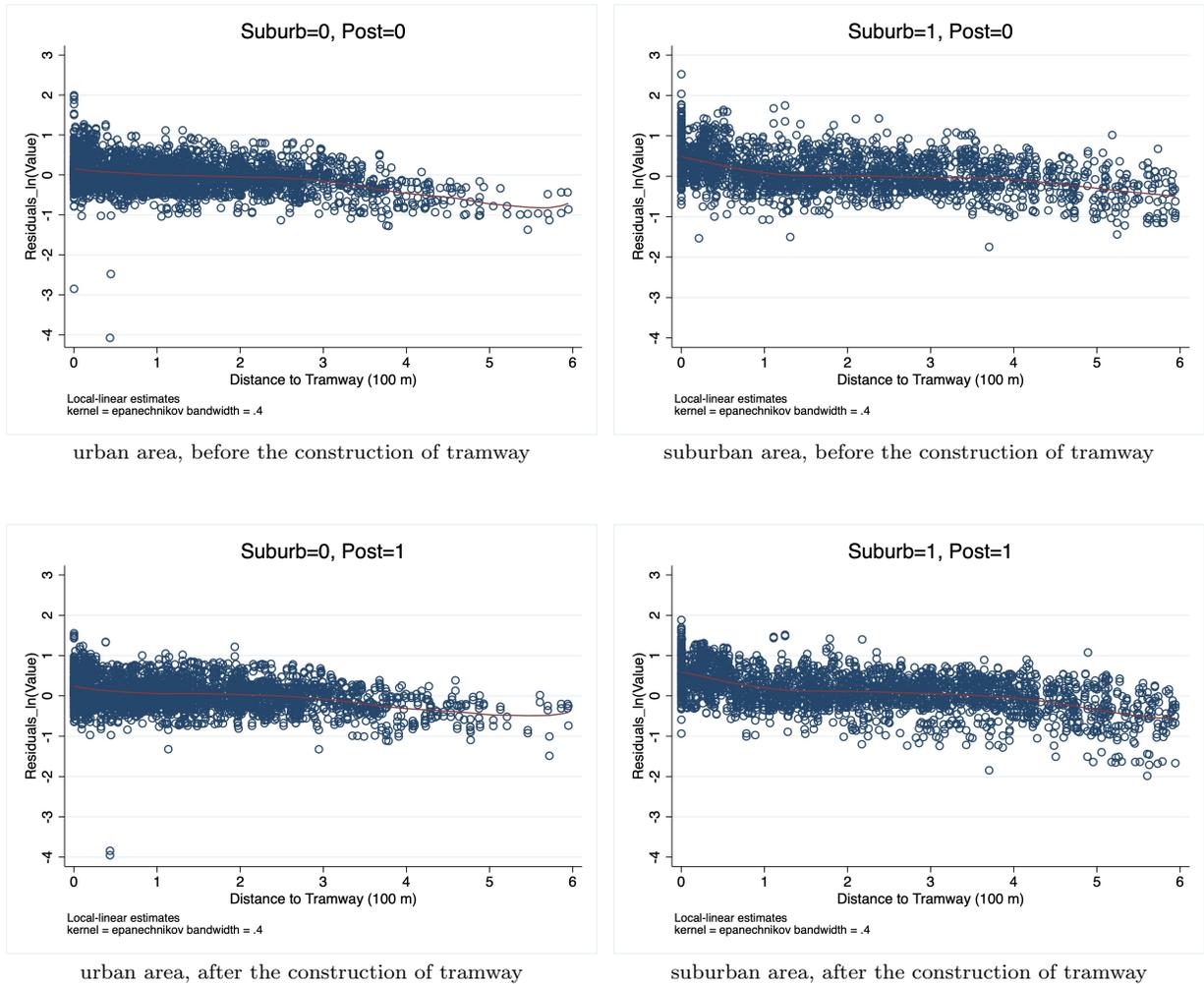
Figure 2.12: Residuals against the Distance to Tramway

Notes: These figures plot the residuals obtained from regressing the logarithm of land value on area, district fixed effects and time fixed effects against the distance to tramway lines.

According to the graphs, the relationship between the land value and distance to tramway should be well captured by the linear regression. It is also clear that being close to the tramway

line was associated with even higher economic interests in the suburban area after the construction of tramway, because the difference in the "slope" of the red lines before and after 1908 is larger for the two subgroups with $Suburb = 1$ than the two subgroups with $Suburb = 0$. This is confirmed by the last four columns of Table 2.4 that report the estimated average marginal effects of tramway lines (before 1908, it captures the effect of being close to the selected roads) based on the semiparametric partially linear regression—for the urban land lots, the *negative* effect of being far away from the tramway decreased from -0.1029*** to -0.0945***, while for the suburban land lots, it increased from -0.1250*** to -0.1463***.

2.5 Long-Run Effects

In addition to the different impacts of the tramway on the urban and suburban areas, Table 2.4 and Figure 2.12 in the previous section also indicate that, in colonial Shanghai, being closed to tramway (or the selected roads before 1908) was always equivalent to a higher property value. This is self-evident in the suburb (significantly negative estimates of $\beta_1 + \beta_3$ and $\beta_1 + \beta_3 + \delta_1 + \delta_3$, and especially their difference: $\delta_1 + \delta_3$ in columns (1) and (2) of Table 2.4[10]), as tramway there meant connection to the downtown, and therefore less commuting time and better access to market places and employment centers. In the urban area, the tramway may have brought more nuisance effects such as traffic jams, accidents, smoke and noise, so its net effect was ambiguous (the net effect was probably negative according to the significantly positive estimates of δ_1 in columns (1) and (2) of Table 2.4), but over time land lots closed to the tramway lines (or the selected roads before 1908) stayed more expensive, too (significantly negative estimates of β_1 and $\beta_1 + \delta_1$ in columns (1) and (2) of Table 2.4[11]), simply because the tramway traversed the most prosperous roads—the Bund, the Nanking Road in the Central District, the North Szechuen Road in the Northern District, and

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[10]Suppose $dist$ is a discrete variable and $dist = 1$ stands for being far away from the tramway lines while $dist = 0$ stands for being close to the tramway lines, then $\beta_1 + \beta_3 = E[\ln Value|dist = 1, Suburb = 1, Post = 0] - E[\ln Value|dist = 0, Suburb = 1, Post = 0]$ measures the discrete effect of being far away from a tramway line in the suburb prior to the tramway, and $\beta_1 + \beta_3 + \delta_1 + \delta_3 = E[\ln Value|dist = 1, Suburb = 1, Post = 1] - E[\ln Value|dist = 0, Suburb = 1, Post = 1]$ measures the discrete effect of being far away from a tramway line in the suburb after the tramway.

[11]Suppose $dist$ is a discrete variable and $dist = 1$ stands for being far away from the tramway lines while $dist = 0$ stands for being close to the tramway lines, then $\beta_1 = E[\ln Value|dist = 1, Suburb = 0, Post = 0] - E[\ln Value|dist = 0, Suburb = 0, Post = 0]$ measures the discrete effect of being far away from a tramway line in the urban area prior to the tramway, and $\beta_1 + \delta_1 = E[\ln Value|dist = 1, Suburb = 0, Post = 1] - E[\ln Value|Tram = 0, Suburb = 0, Post = 1]$ measures the discrete effect of being far away from a tramway line in the urban area after the tramway.

the Rue du Consulat in the Old French Concession, all of which were constructed by the 1870s and had been flourishing since then.

Given the land lots along the tramway lines stayed more expensive during the colonial era, it is interesting to know whether being close to those extinct lines today still lead to higher property values—that is, whether the tramway effect persists for decades even after the tramway completely retired in 1975. To assess this long-run effect I collect the modern housing price data and estimate:

$$\ln Price_{is} = \alpha_0 + \alpha_1 dist_{is} + \alpha_2 Periphery_{is} + \alpha_3 dist_{is} \times Periphery_{is}$$
$$+ \theta settlements_{is} + X_{is}\sigma + \gamma_s + \epsilon_{is}$$

(2.3)

where $Price_{is}$ denotes the average housing price of the residential complex i in district s—unlike denoting the nearest 1936 tramway stop in Equation (1), s now stands for the modern district that contains complex i.[12] $dist_{is}$ denotes the distance to the nearest extinct tramway line (100 m). $Periphery_{is}$ is an indicator variable equal to 1 if the residential complex i in district s is outside of the former Settlements and the Old Shanghai Town. $settlements_{is}$ denotes the distance to the former Settlements and the Old Shanghai Town (both urban and suburban areas in the previous sections are classified as non peripheral in modern Shanghai). X_{is} is a set of residential complex's characteristics including the year built, dwelling type, number of buildings, number of houses, and whether it has a valuable historic building. As the dependent variable is the logarithm of average transaction price per square meter of a residential complex, I weight the observations by the number of houses. The coefficient α_3 on the interaction term therefore measures the difference in the long-run tramway effect between the "Periphery" and the early developed former Settlements and Old Shanghai Town.

In Table 2.5, I look at residential complexes with a distance between 400 m and 800 m from any extinct tramway lines. Transit use literature has found that the typical transit riders are willing to walk between 1/4 and 1/2 mile ($\sim$400 m to 800 m) to a bus stop or train station, and sites within 1/4 mile of a transit area have significantly higher rates of transit use (Dill, 2003; Dittmar and Ohland, 2012). As shown in Table 2.5, in this range, the weighted least squares (WLS) estimation

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[12]γ_s's are the location-specific time-invariant unobservables with $s = 1, ..., 17$ denoting the 16 modern Shanghai districts plus the "peripheral Shanghai".

does not find any persistent effect of the now-extinct tramway system on housing price in either the former Settlements or the Old Shanghai Town (insignificant estimates of α_1), but does find positive ones outside these regions (significantly negative estimates of $\alpha_1 + \alpha_3$).

Table 2.5: Long-Run Effect of Tramway on Land Value

Dep. Variable: $\ln Price$	(1) within 400 m of the tramway	(2) within 500 m of the tramway	(3) within 600 m of the tramway	(4) within 700 m of the tramway	(5) within 800 m of the tramway	(6) within 900 m of the tramway
α_1: $dist$	0.0004	0.0141	0.0075	0.0009	-0.0050	-0.0033
	(0.0134)	(0.0097)	(0.0078)	(0.0059)	(0.0050)	(0.0042)
α_2: $Periphery$	-0.0025	0.0116	0.0094	0.0306	0.0174	-0.0069
	(0.0481)	(0.0432)	(0.0397)	(0.0366)	(0.0346)	(0.0326)
α_3: $dist \times Periphery$	**-0.0115**	**-0.0331****	**-0.0272****	**-0.0259*****	**-0.0194****	**-0.0092**
	(0.0202)	(0.0149)	(0.0112)	(0.0092)	(0.0077)	(0.0065)
district fixed effects	Y	Y	Y	Y	Y	Y
R^2	0.3141	0.3461	0.3810	0.3657	0.3553	0.3325
obs	745	886	1,046	1,182	1,299	1,423
obs in the periphery	250	305	386	445	502	564

Notes: This table reports the estimated coefficients of the WLS estimation in the long run. The dependent variable is expressed in natural logarithm so the coefficients stand for percentage changes. The observations are weighted by the number of houses in each residential complex. Standard errors are noted in parentheses. * indicates statistical significance at the 10% level, ** at the 5% level, and *** at the 1% level.

The insignificant estimates of α_1 in Table 2.5 contrast with what has been found in the previous section—proximity to the tramway lines used to be valued by the property owners in the colonial era, but now such premium has faded away. In modern Shanghai, within the former Settlements or the Old Shanghai Town, being close to an obsolete tramway line does not bring extra value to a property. The significant estimates of $\alpha_1 + \alpha_3$, by contrast, reveal the positive impact of tramway in the "periphery": outside of the early developed regions, the effect of the tramway manifests when the distance from any extinct line exceeds 400 m (equivalent to a 5-minute walk), and remains considerable until 800 m (equivalent to a 10-minute walk). Generally, going 100 m away from the tramway line is associated with an approximately 2% decrease in housing price. When the range is expanded to include observations that are within 900 m of any extinct tramway line, the long-run effect drops sharply and turns insignificant.

The difference between the central city and periphery, α_3, implies decay of the effect of public transportation: profound changes have taken place in the central city over the past century, erasing the tramway effect; in the periphery, however, such effect is lingering. To study the role of tramway

in this area, I plot the locations of 1,432 residential complexes in Figure 2.13. The persistent tramway effect is only detected outside the former Settlements and the Old Shanghai Town (but within the grey area). These influenced complexes are located (a) to the north of the former Northern District, (b) to the west of the former Western District, and (c) to the South of Old Shanghai Town.
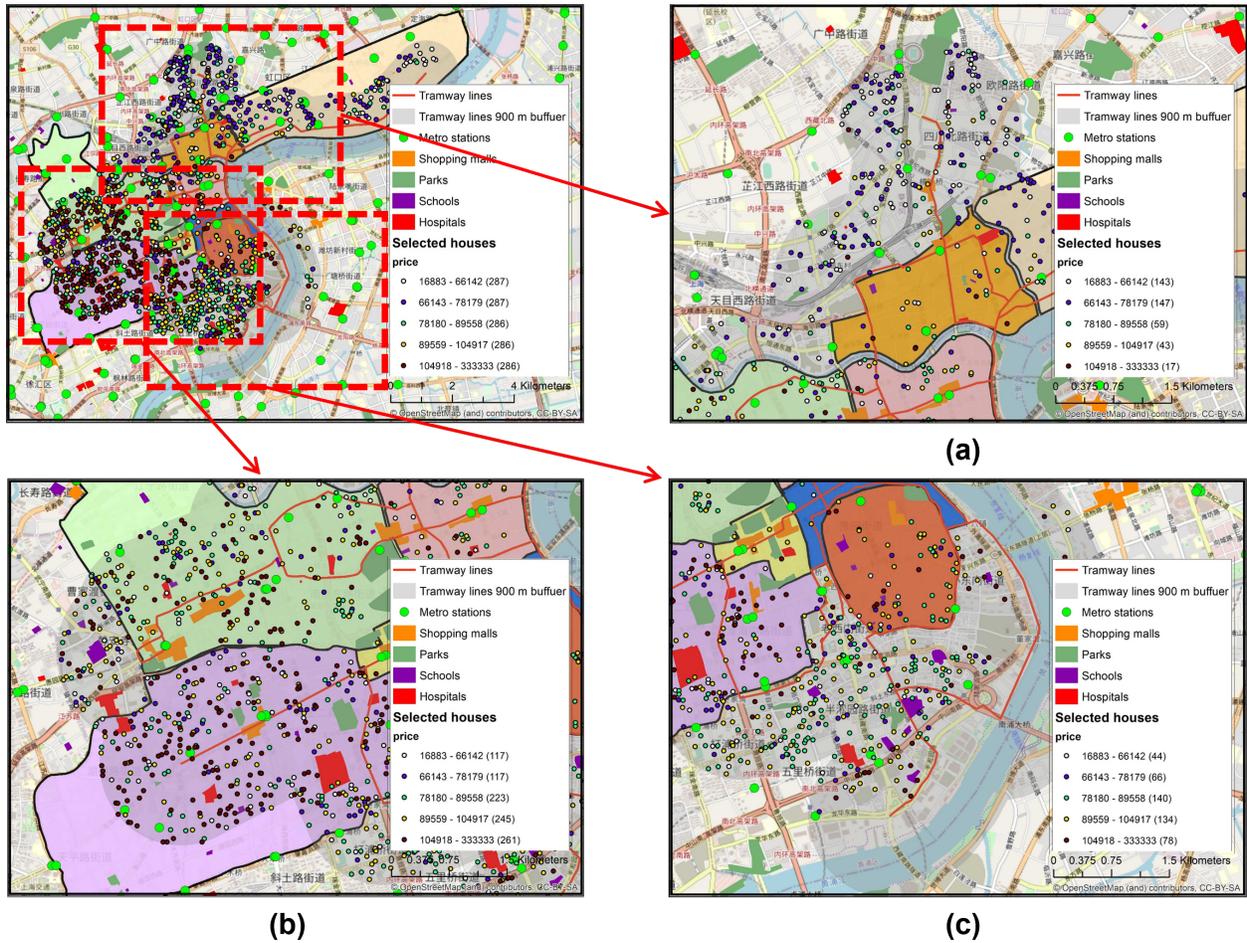
Figure 2.13: Residential Complexes, Obsolete Tramway, and Amenities

Notes: This figure shows the selected residential complexes that are within the 900 m buffer of the obsolete tramway lines and the distributions of metro stations, shopping malls, parks, hospitals, and schools around the former Settlements and the Old Shanghai Town.

Region (a) was outside the former International Settlement, but became an "extra-settlement road" area as early as in the 1890s. In 1905, when the tramway tracks were laid along the North

Szechuen Road, they were allowed to be extended to "Bazichang" (the shooting range), which was close to today's Luxun Park. This "extra-settlement road" area was nominally governed by the Chinese government, but the authority of the International Settlement provided public goods and levied "special rates" (colloquially known as "water rates" or "police rates") on residents living there. In this sense, Region (a) used to be a "semi-settlement". Region (b) is within the reach of the Jing'an Temple, an important transit station both in the past and in the present. In 1902, when discussing the laying of tracks on the Avenue Road (nowadays the West Beijing Road), the board of the Shanghai Municipal Council believed it would bring prosperity to the underdeveloped west part of the Western District (*The Minutes of the Shanghai Municipal Council*, 1899, 1902, 1903, 1904, 1905, 1906, 1912, 1913, 1916, 1920, 1921). As they expected, shopping centers soon grew along the east-west road, which are still flourishing today. Region (c) was the Chinese area that was to the south of the Old Shanghai Town. To disentangle the persistent tramway effect, I look at these three peripheral regions respectively in Table 2.6.

Table 2.6: Long-Run Effect of Tramway on Land Value in the Periphery

Dep. Variable: $\ln Price$	Region (a) within 500 m of the tramway	Region (a) within 800 m of the tramway	Region (b) within 500 m of the tramway	Region (b) within 800 m of the tramway	Region (c) within 500 m of the tramway	Region (c) within 800 m of the tramway
A: Without controls for amenities						
distance to tramway	-0.0059	-0.0126	0.1594	-0.0126	-0.0235**	-0.0286***
	(0.0456)	(0.0170)	(0.1298)	(0.0315)	(0.0096)	(0.0071)
preexisting amenities	N	N	N	N	N	N
modern amenities	N	N	N	N	N	N
R^2	0.1338	0.0843	0.6335	0.2601	0.2947	0.2473
B: With controls for preexisting amenities						
distance to tramway	0.0029	-0.0202	0.0283	0.1360	-0.0344***	-0.0416***
	(0.0527)	(0.0256)	(0.6781)	(0.1168)	(0.0090)	(0.0058)
preexisting amenities	Y	Y	Y	Y	Y	Y
modern amenities	N	N	N	N	N	N
R^2	0.1991	0.0998	0.9189	0.4520	0.4203	0.3801
C: With controls for both preexisting and modern amenities						
distance to tramway	-0.0286	-0.0090	-	-0.2737	-0.0149	-0.0084
	(0.0575)	(0.0456)	-	(0.5703)	(0.0193)	(0.01757)
preexisting amenities	Y	Y	Y	Y	Y	Y
modern amenities	Y	Y	Y	Y	Y	Y
R^2	0.4628	0.2516	-	0.9179	0.5204	0.4644
obs	105	202	17	39	182	260

Notes: This table reports the estimated coefficients of the WLS estimation in the long run for the periphery. The dependent variable is expressed in natural logarithm so the coefficients stand for percentage changes. The observations are weighted by the number of houses in each residential complex. Standard errors are noted in parentheses. * indicates statistical significance at the 10% level, ** at the 5% level, and *** at the 1% level.

According to Table 2.6, the persistent tramway effect only exists in Region (c), yet it is still unknown how the extinct tramway exerts influence half a century later. One possible explanation could be that the tramway was built in locations with persistently valuable amenities, such as proximity to natural amenities (e.g., the Huangpu River) or access to man-made facilities (e.g., parks, hospitals, and schools), and the tramway effect persists just because these amenities continue to exert influence. In Panel B I control for the distance to the amenities that predate the arrival of tramway—river, shopping malls, parks, schools, and hospitals, but the long-run effect of the tramway on the housing price in Region (c) ends up being even larger. This means that the persistence does not come from the Huangpu River, or the parks, hospitals, or schools that existed before the construction of the tramway; but on the contrary, these amenities mask the persistent effect of the tramway.

Alternatively, the routes of the tramway may happen to overlap with the modern amenities, especially the modern metro lines and shopping malls that were very likely to be shaped by the historical tramway, and it is these subsequent investments that cause the persistence. So in Panel C, besides the amenities that predate the arrival of tramway, I also control for the accessibility to the modern amenities including the metro stops, shopping malls, parks, schools, and hospitals that were built after 1908 but exist until today. For modern schools I identify whether a complex is within a school district or not, while for the other amenities I calculate the corresponding distances. The estimated coefficients on the distance to tramway for Region (c) fall by half and turn insignificant, implying the persistent tramway effect in this area could be explained by the subsequent investments along the tramway lines. As shown in Figure 2.13, the most expensive complexes are located near the metro stations, the park, the schools, and the hospital. The larger park, "Penglai Park", and the schools that are around it ("Datong High School" and "Datong Junior High School"), were built on the site of the "Utopia University" (1912-1952). The hospital, "Shanghai Ninth People's Hospital", is the successor of the "Bethel Hospital" (1920-1952). These establishments were likely to be brought by the tramway, and has benefited the surrounding houses even to this day.

2.6   Conclusion

Taking advantage of the dominant role of tramway in the monocentric colonial Shanghai, this paper assesses the short-run and long-run effects of public transportation on property value. The contemporary findings are consistent with the predictions made by the monocentric models in Urban Economics: Land values decreased with the distance from the city center; and the value of the newly built tramway system was capitalized into the land values, especially in the suburban areas. In the long-run, although the whole tramway system had retired in the 1970s, residential complexes near the extinct tramway lines still exhibit a higher housing price today. But this pattern is only seen in the "periphery" outside the former Settlements and the Old Shanghai Town. Within the former Settlements or the Old Shanghai Town, the once strong tramway effects have vanished entirely, indicating the influence of the Shanghai tramway is decaying over time.

2.7   Appendix Tables and Figures
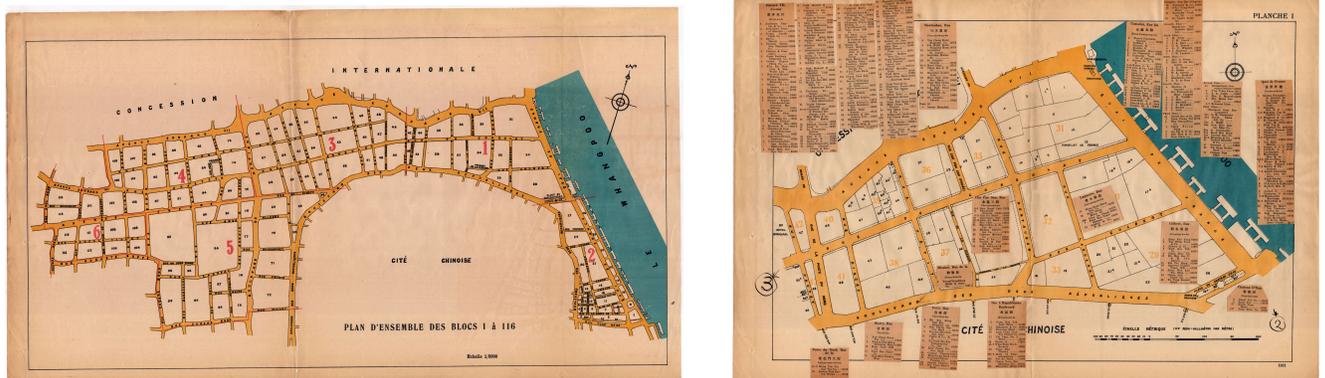
Figure A2.1: Cadastral Map of The French Concession, 1931

Notes: These figures show part of the 1931 cadastral map of the French Concession. The figure on the left shows the entire original French Concession while the figure on the right shows the land lots located in the north-east (as indexed by 1).
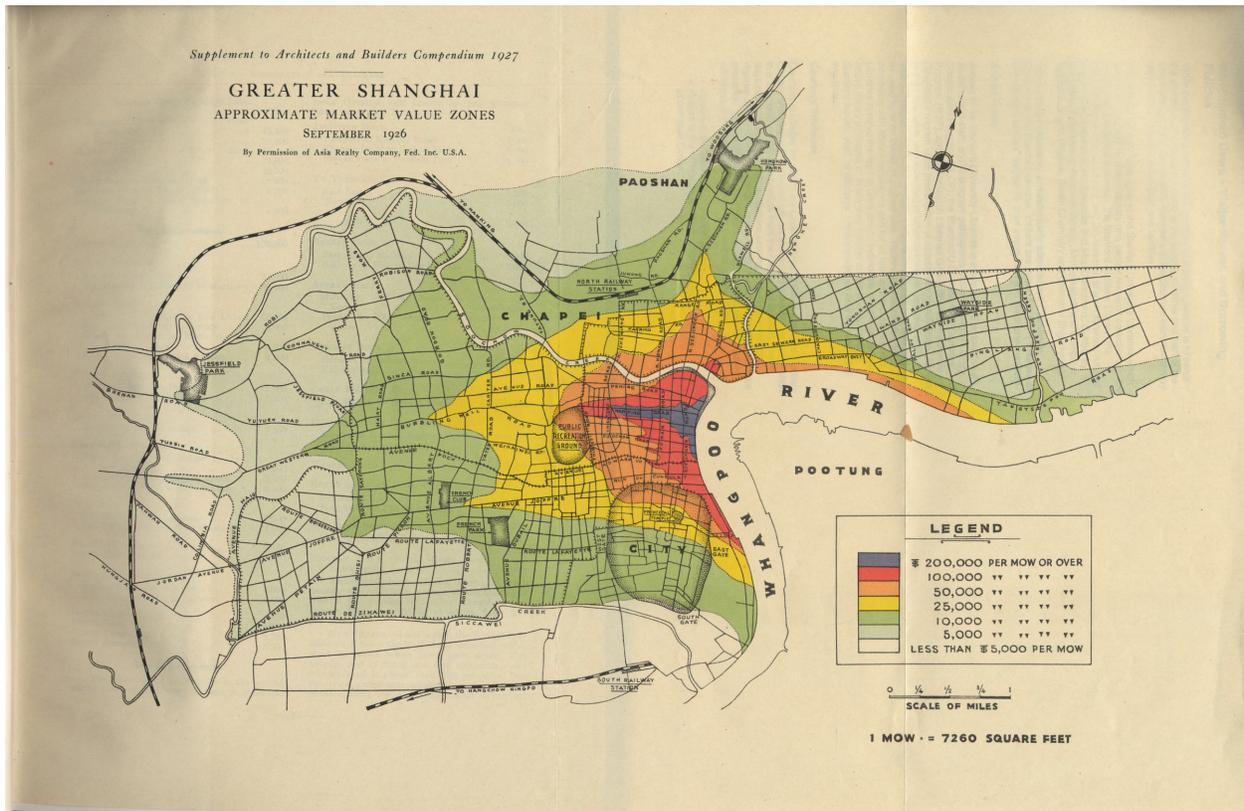
Figure A2.2: Approximate Land Value Zones, September 1926

Notes: This map shows the approximate market value zone of Shanghai in 1926. The city was monocentric, and the highest market value was found at the intersection between the Bund and Nanking Road. Source: virtualshanghai.net, ID439.
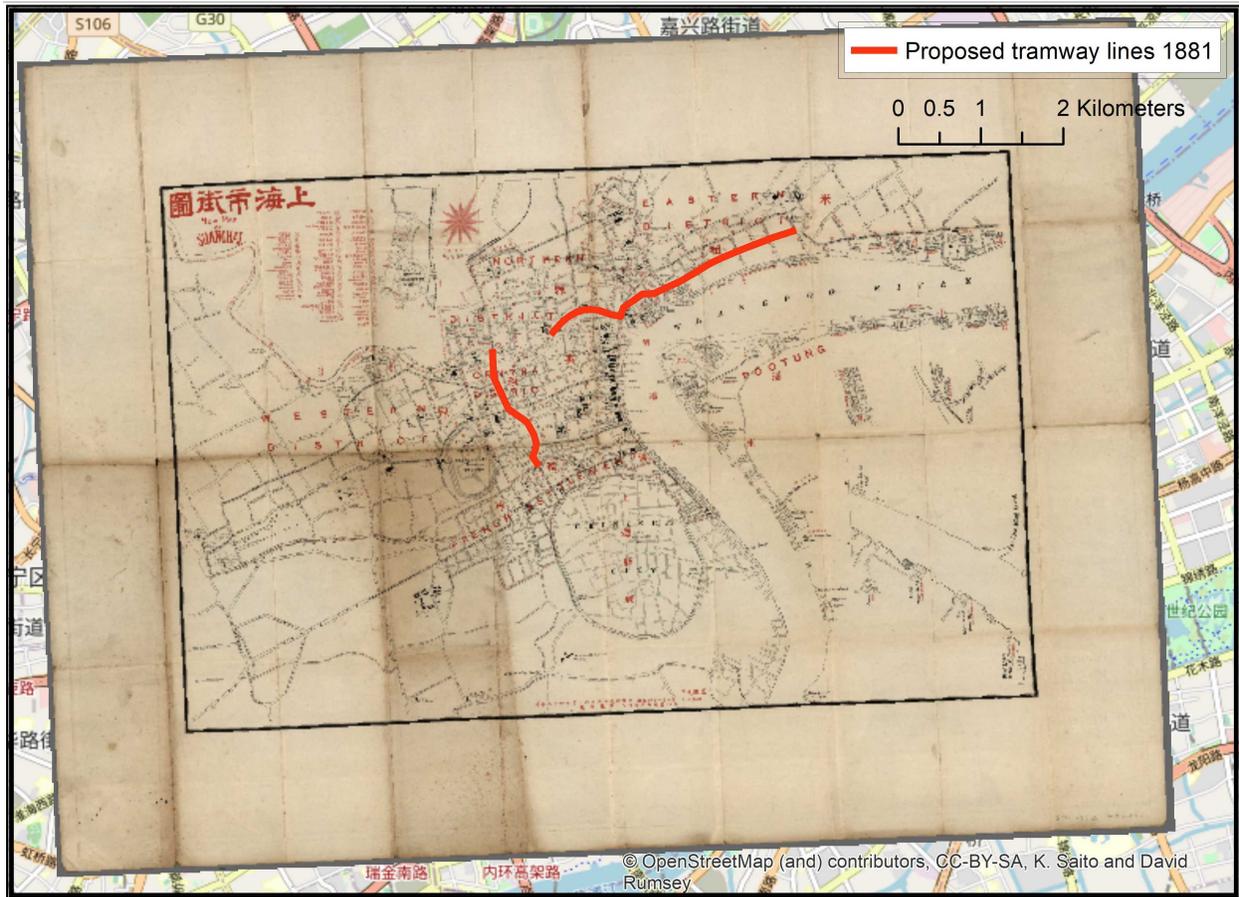
Figure A2.3: Proposed Tramway Lines in 1881

Notes: This map shows the proposed tramway lines put forward in the special meeting of ratepayer of the International Settlement in 1881. The information is obtained from *The Japan Gazette* (1881).
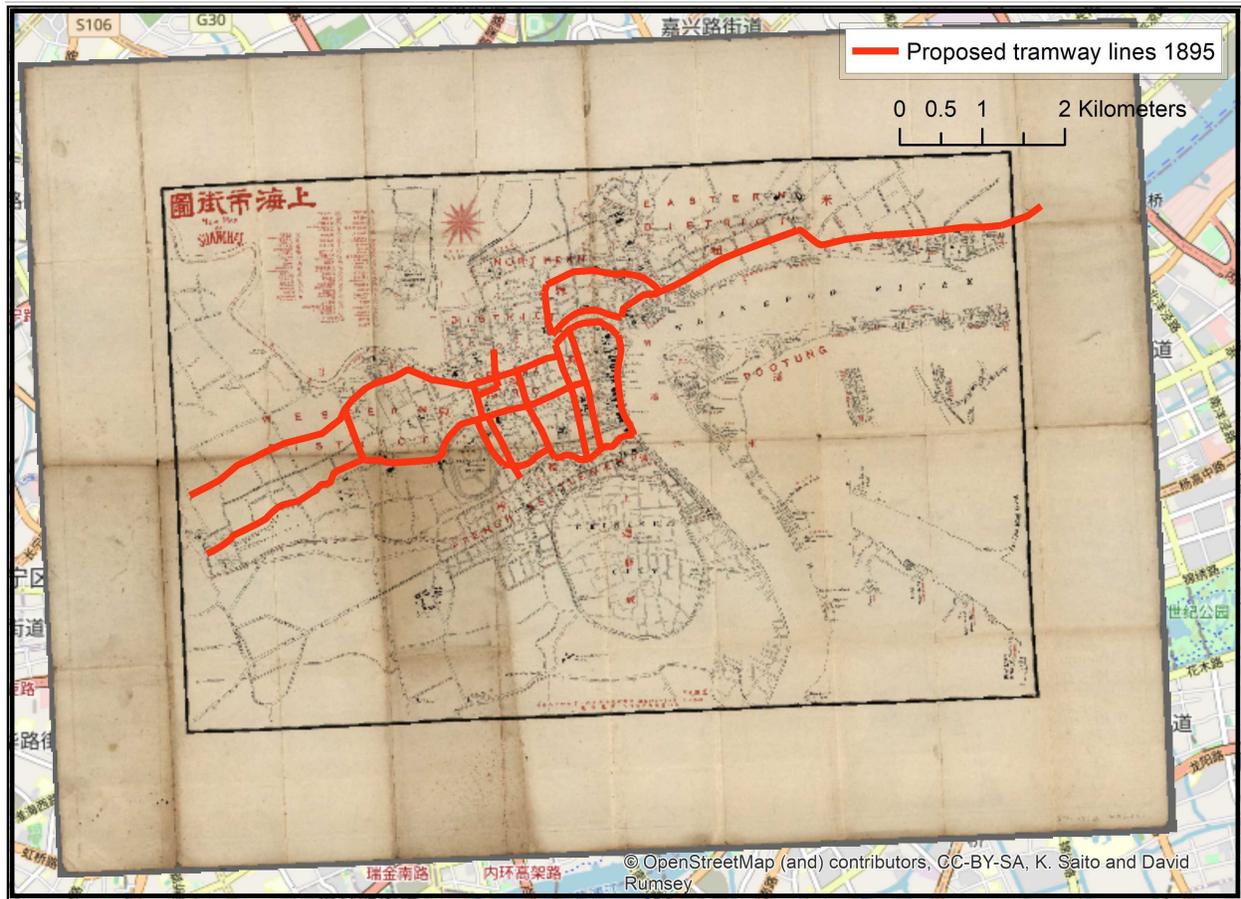
Figure A2.4: Proposed Tramway Lines in 1895

Notes: This map shows the proposed tramway lines by Engineer Mr. Leigh Hunt in 1895. The information is obtained from the annual report published by the Shanghai Municipal Council (1892–1933).
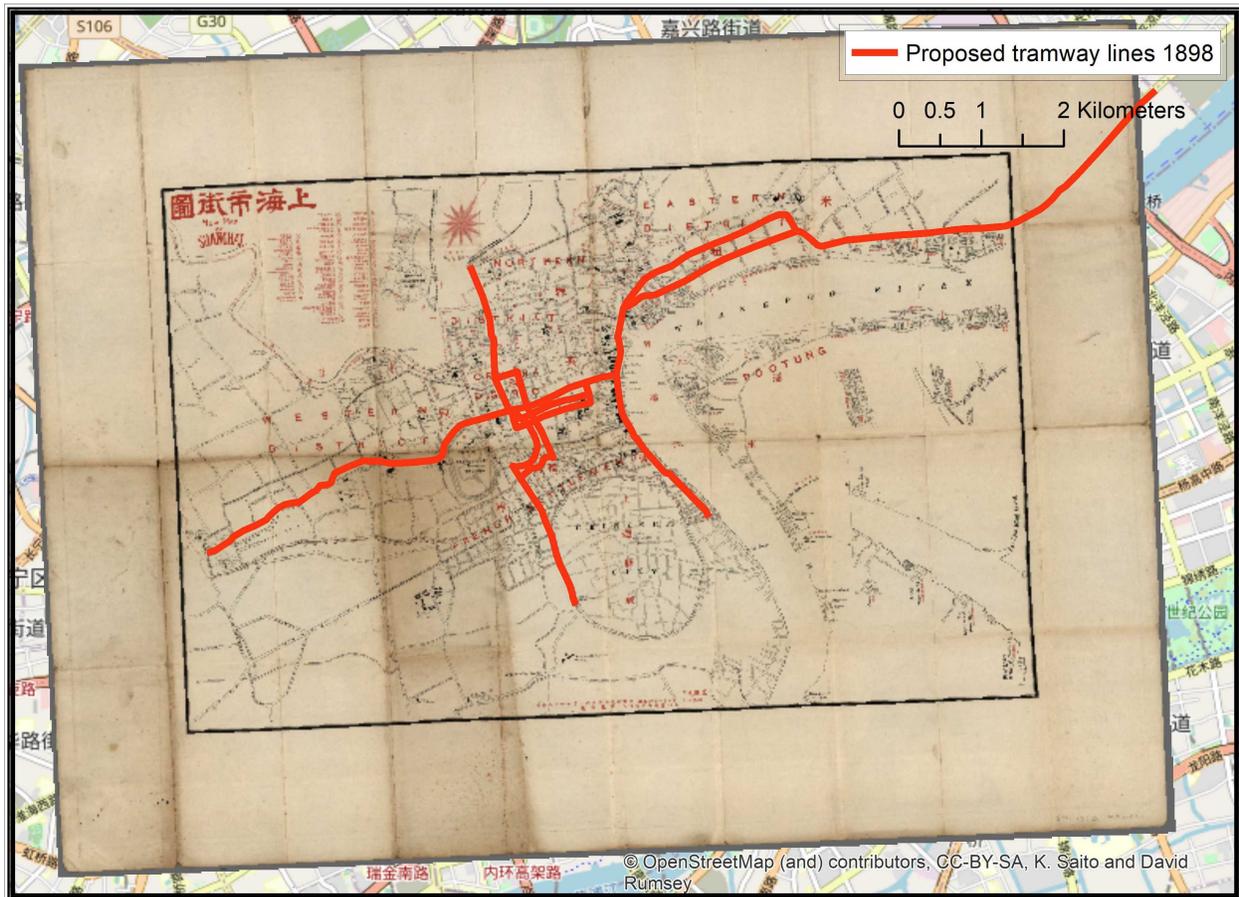
Figure A2.5: Proposed Tramway Lines in 1898

Notes: This map shows the proposed tramway lines in the advertisement published by the Shanghai Municipal Council in 1898. The information is obtained from the annual report published by the Shanghai Municipal Council (1892–1933).
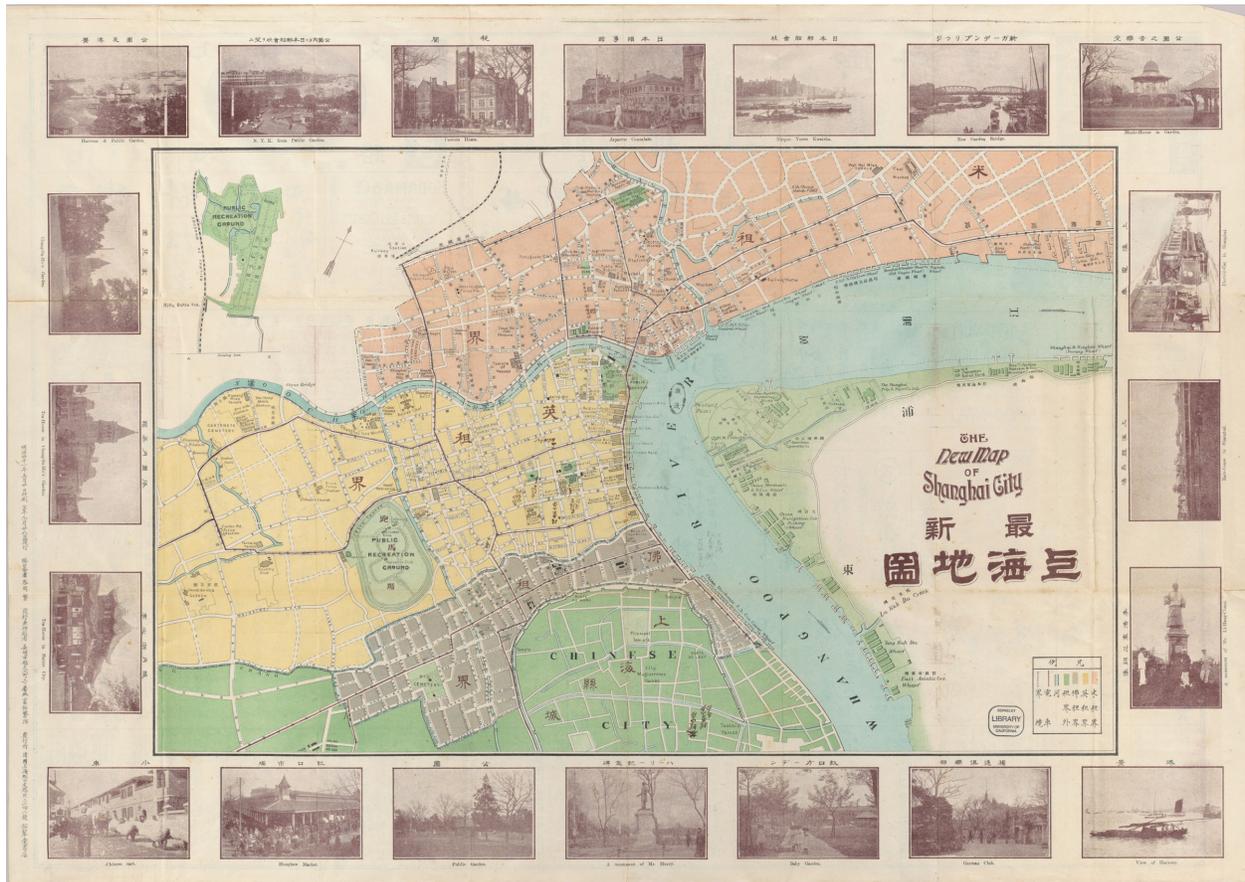
Figure A2.6: New Map of Shanghai City, 1908

Notes: This map shows the map of Shanghai with the newly constructed tramway lines in 1908.
Source: virtualshanghai.net, ID269.

Figure A2.7: Map of the Tramway Lines, 1936

Notes: This map shows the map of Shanghai with the tramway lines in 1936. Source:
virtualshanghai.net, ID172.

Figure A2.8: Map of the Rail-less Trolley, 1936

Notes: This map shows the map of Shanghai with the rail-less trolley lines in 1936. Source: virtualshanghai.net, ID327.

CENTRAL

LAND ASSESSMENT SCHEDULE, 1911

Number of Lot		REGISTERED OWNER.	Area for Taxation.	Value per Mow.	Total Value.
Consular.	Cad-astral.		*Mow.*	*Tls.*	*Tls.* *Tls.*
1012	Brit. 223	Drummond, W. V.			
910	,, 482		1.370	17,000	23,290
262	,, 340	,,	0.683	16,000	10,928
6322	,, 344B	Drummond, W. V. and White-Cooper, A. S. P.	4.700	17,000	34,218 / 79,900
		Drummond, W. V., White-Cooper, A. S. P., and Phillips, T. M.	0.563	15,000	8,445
552	,, } 573	Dudgeon, Sir C. J. and Anderson, F.	19.105	13,000	248,365
553	,, }				
1078	,, 695	Dudgeon, Sir C. J. and Porter, E. E.	8.703	11,000	95,733
58A late	,, 160	Dyer, E. S. and F. E.	3.360	50,000	168,000
22B	,, 99	Ehlers & Co., A.	2.555	45,000	114,975
1274	,, 597	Ellert, P. E., Keble, J. A. and Ellert, J. A.	2.970	14,000	41,580
1279	,, 613	,,	3.736	16,000	59,776
	618	,,	1.174	15,000	17,610 / 118,966
1337	,, 163	Ezra, I. (estate)	0.918	50,000	45,900
731	,, 185	Ezra, Mrs. K. (estate)	1.881	32,000	60,192
92	,, } 278	Ford, C.	9.420	30,000	282,600
166	,, }				
167	,, }				
270	,, } 531	,,	8.244	18,000	148,392
208	U.S. }				
1678	Brit. 532	,,	1.333	24,000	31,992 / 462,984
961	,, 371	Fowler, Mrs. M. A.	2.639	15,000	39,585
201	Ger. 52	German Government	2.133	53,000	113,049
252	Brit. 274	Graham, M. C., Ewart, S. J. B., Currie, W. E., Currie, W. B., Dean, B., Paul, J. B., and Currie, M. H. B.	2.793	35,000	97,755
1732	,, 550	Gratton, F. M.	0.687	17,000	11,679
487	,, 287	Gregson, R. E. S.	3.548	34,000	120,632
7300	,, 449D	,,	0.211	11,000	2,321
1679	,, 503	,,	0.925	15,000	13,875 / 136,828

Figure A2.9: Land Assessment of the International Settlement, 1911

Notes: This picture shows one page of the *Land Valuation Schedule* of 1911 in the International Settlement.

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Chapter 3

Shanghai Nostalgia:

The Cultural Heritage in Historic Buildings

3.1 Introduction

Modern cities are products of history. What a city has been through usually helped create its unique identity. The remains of the past could be seen in many aspects of the city life, among which historic buildings, part of the cultural capital, are of great importance (see, e.g., Throsby 2001). This is particularly true for Shanghai, a city possessing both a traditional Chinese culture brought by the immigrants from Zhejiang and Jiangsu Provinces and a Western imagination inherited from its colonial past. Today in the central part of the inner city, facing the skyscrapers built in the 1990s on the other side of the Huangpu River are the western-style mansions and old-fashioned apartments that have existed for more than a century. Though lacking modern facilities, community management, and even necessary renovation, this kind of properties is generally associated with a larger market value than its younger counterpart.

The market value of cultural heritage has been witnessed in many other cities. For example, Winson-Geideman, Jourdan, and Gao (2011) find that buildings older than 119 years in Savannah, Georgia are associated with higher economic value, and suggest that there exists a point where the value of historic properties as a function of the date of construction is enhanced as the properties are considered "antiques". Analyzing the Jeonju Hanok Village, a tourist destination where Hanok—the traditional Korean architectural type–is highly concentrated, Kim and Lee (2020) also find a

positive relationship between accommodation prices and building age. Such antique effect is often related to the value of rarity. History cannot be replicated during the construction of new buildings, so the supply of old properties is limited, contributing to escalating prices. As pointed out by Diaz et al. (2008), older residential properties may be valued higher due to their distinctiveness and limited ability to reproduce the same structure.

Besides the antique effect, historic buildings can also generate a historical atmosphere when a couple of them are agglomerated and therefore provide positive externalities to the neighboring properties. Lazrak et al. (2014), focusing on the real estate market in Zaanstad, the Netherlands, find that one additional listed building contributes an extra 0.28% to the market value for the surrounding houses.

Having recognized the value of cultural heritage embodied in historic buildings, lots of governments officially designate historic buildings or create historic districts both for preservation and for social and economic benefits. Cities and neighborhoods actively seek such designation to enhance a sense of neighborhood pride, attract heritage tourism, and encourage private sector investment(Conservancy, 1977; Listokin, Listokin and Lahr, 1998). Empirical studies have also confirmed the strong correlation between market value and historic designation. As an initial attempt to measure the historic designation on price, Ford (1989) use data on sold houses in Baltimore, Maryland, and finds that historic districts have higher prices than identical non-historic districts. Focusing on the historic designation in two neighborhoods in Chicago, Schaeffer and Millerick (1991) find a positive effect of historic designation by the national authority whereas a negative one by the local authority. They attribute the difference to the enhanced prestige associated with being part of a national district, and more stringent controls in the local area. Using a database of tax-appraisal records for residential properties in Abilene, Texas, Coulson, and Leichenko (2001) find that each additional designated house within the census tract increases the value of each house in the same census tract by 0.14%. Cyrenne, Fenton, and Warbanski (2006) use a panel data set in Winnipeg, Manitoba, Canada, and find higher assessed values for certain classes of historic buildings than comparative, non-historic properties. In the same vein, Noonan (2010) studies Chicago and shows that designated landmarks have a 10.6% premium over comparable properties, and residential properties

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located in landmark districts have a 3–5% premium.

As a historical epitome of the modern history of China, Shanghai has rich architectural heritage buildings designed by both Chinese and European architects during the 19th and 20th centuries. It is also the first city in China to have a separate category of historic preservation for modern architecture. Against this background, however, few studies have looked at the economic influence of historic buildings in Shanghai. This paper is the first attempt in this field. Applying the hedonic pricing model to the 2018 housing price data, I find that residential complexes that were built during the colonial era (1845-1943) generally have a comparable price to those that were built in the new century. Unlike the other complexes that were built later in the 20th century, complexes built before 1943 have not depreciated with age. I also find that being a historic building is associated with an 8.95% premium in the real estate market, but such premium is derived more from a "historic ensemble" effect than an "antique effect"—the proximity to other historic buildings for residential use is more likely to be valued than the official designation itself by the potential buyers.

The remainder of the paper is organized as follows: Section II provides background of Shanghai and its historic buildings, Section III introduces the data, Section IV presents the empirical results, and Section VI concludes.

3.2   Background

Shanghai, the economic and financial center of China, lies on China's east coast roughly equidistant from Beijing and Guangzhou, and is bisected by the Huangpu River, a man-made tributary of the Yangtze River (see Figure 3.1). It covers an area of 6,340 km^2 and has a total population of 24,870,900 in 2020, about 90% of which are urban. In 2020, Shanghai's GDP came in at CNY 3,870.058 billion (USD 619.209 billion), with a GDP per capita of CNY 155,606 (USD 24,911).

As illustrated in Figure 3.2, the city is divided into 16 districts, seven of which form its central part—Huangpu, Hongkou, Yangpu, Jing'an (including the former district of Zhabei), Putuo, Changning, and Xuhui, which is the area studied in this paper. These districts are located to the west of the Huangpu River and therefore are known as Puxi (i.e. "the west bank of the Huangpu River"). They have remained the residential, cultural, and commercial center of Shanghai for more

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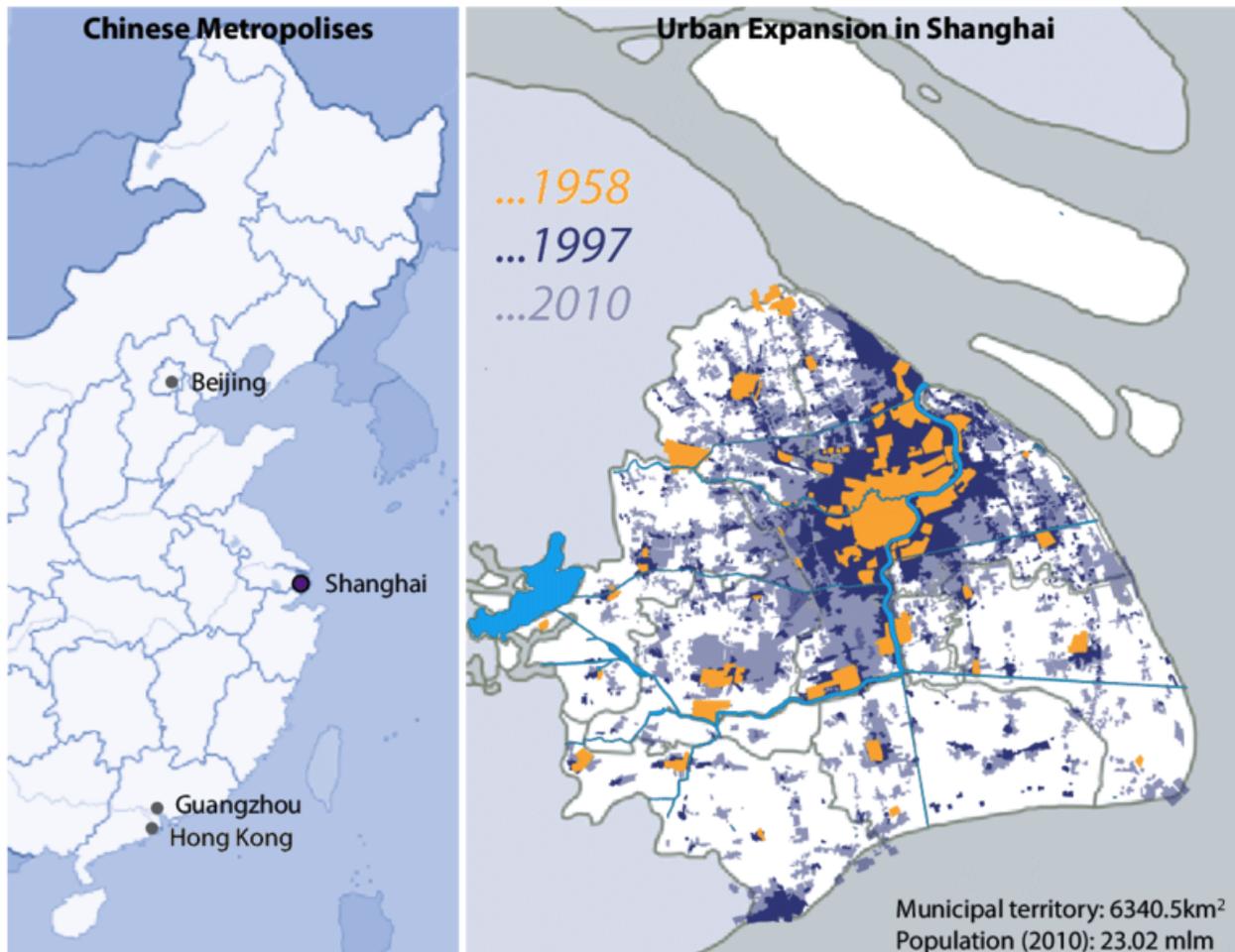
Figure 3.1: Location of Shanghai and Its Urban Expansion

Notes: This figure shows the location and expansion of Shanghai. Source: He (2015).

than 100 years, accommodating approximately 30% of the city's residents according to the 2021 Shanghai Census. Generally considered as the center of the city, Huangpu District is where the city hall, the Bund, and many shopping areas such as the Nanjing Road, Huaihai Road, and Xintiandi located. Across the Huangpu River, Pudong, whose name refers to "the east bank of the Huangpu River", is a newly developed area since its formation in 1992.

Mainly divided into the Chinese part, the International Settlement, and the French Concession during its colonial era, Shanghai a century ago was much smaller than today, and was entirely encompassed in Puxi (see Figure A3.1). Within this region, the Central and Northern Districts of
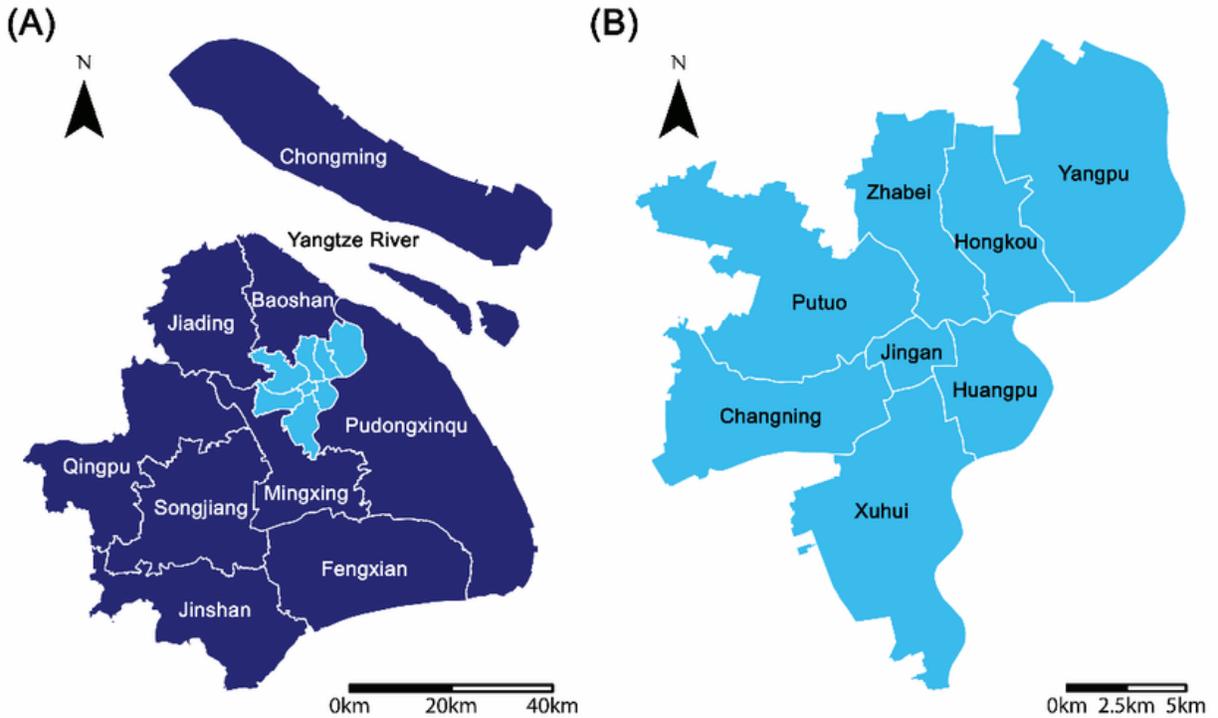
Figure 3.2: Division of Shanghai: (A) Administrative Districts, (B) Inset Map of the Central Part (i.e. Puxi of Shanghai)

Notes: This figure shows the 16 districts of Shanghai, with emphasis on the central part. Source: Xu et al. (2018).

the International Settlement and the original French Concession near the Bund were the bustling commercial area full of banks, hotels, trading companies, and customs offices, while the southern part of the Western District of the International Settlement and the 1914 Extension of the French Concession were known as residential areas, being left with elegant garden houses designed for foreign businessmen or government officials, or lilong houses (*shikumen*) that used to accommodate tons of Chinese households. The Eastern District and the northern part of the Western District of International Settlement, on the other hand, developed as industrial areas with factories and shantytowns (*penghuqu*).

Interestingly, the distinct ambience of each area has largely persisted despite the communist city planners' will to minimize the difference in income and housing conditions between districts.

Although the boundaries that used to separate rich communities from poor ones disappeared on the city map, within each newly configured modern district, the boundaries between the so-called "upper quarters" (*shangzhi jiao*) and "lower quarters" (*xiazhi jiao*) continue to exist in the residents' mental universe. Even today one could sense a logical relationship between the spatial terrains and the particular socioeconomic echelons from such "jargon" in the local dialect. For most of the ordinary residents living in the former International Settlement and the French Concession, especially the Western District and the 1914 Extension that have long been viewed as *shangzhi jiao*, their sense of superiority derived from the very location (*jiao*) of their homes and not necessarily their actual housing conditions (Pan, 2005), as within the "upper quarters", an apartment building inherited from the colonial years could be in disrepair and occupied by more than a dozen families.

To protect the buildings with cultural heritage, the Shanghai Urban Planning and Building Administration proposed a list of historic buildings in 1982. In 1991, the city government enacted the "the Excellent Modern Building Preservation Act". Later in 1993, 1994, 1995, 2005, and 2015, a total of more than 1,000 modern buildings were listed by the Shanghai Urban Planning and Building Administration and Municipal Housing and Land Administration, and then designated by the city government after soliciting the opinions of the property owners, the local government, and the Department of Cultural Relics. To be nominated as a historic building, the building must be built 30 years ago, and satisfy any of the following requirements:

(1) buildings having special features and study value in terms of architectural style, construction technology, and engineering technology;

(2) buildings reflecting the historical and cultural characteristics of Shanghai regional architecture;

(3) representative works of famous architects;

(4) representative workshops, shops, factories, and warehouses in the history of Chinese industrial development;

(5) other outstanding historic buildings of historical and cultural significance.

3.3 Data

This paper leverages a combination of historic buildings and modern residential complexes in Puxi of Shanghai, whose distributions are shown in Figure 3.3.
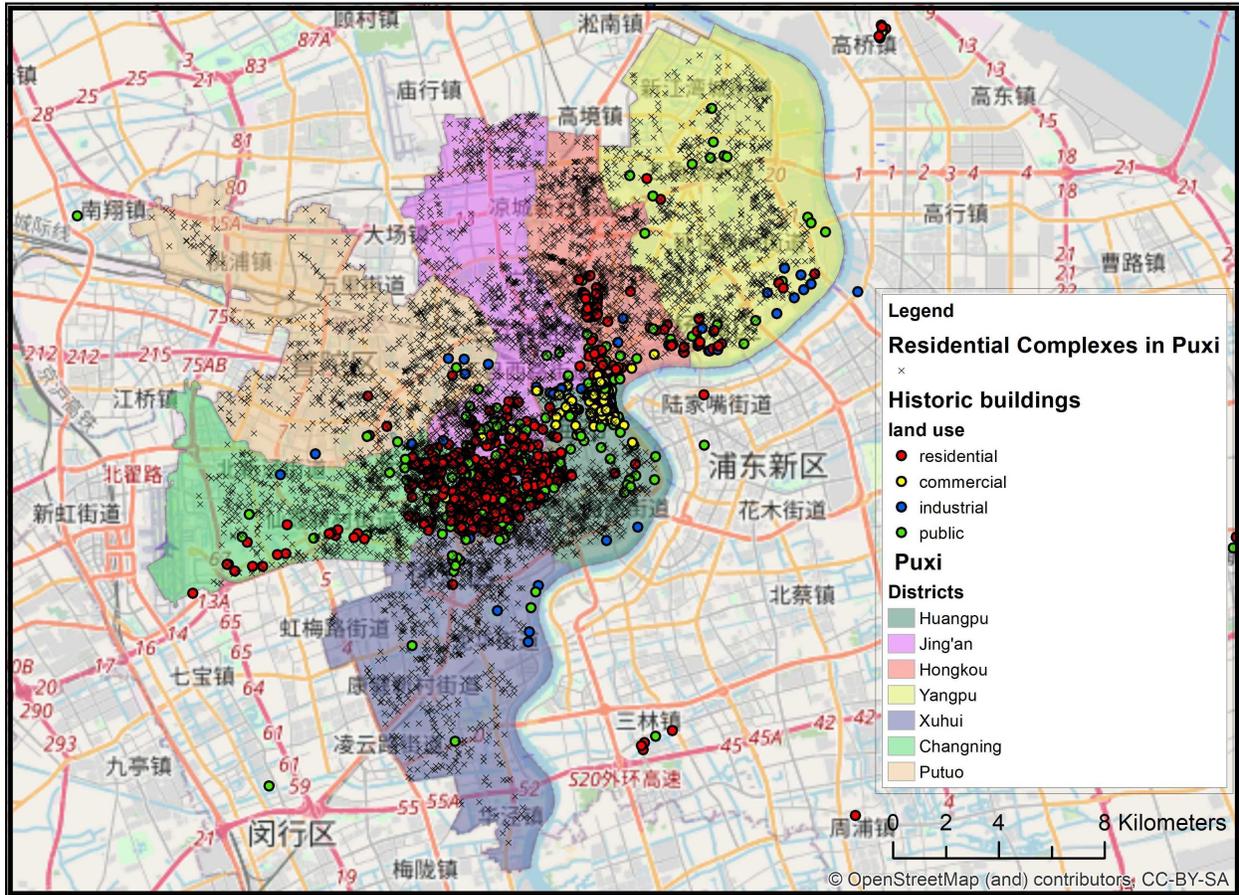
Figure 3.3: Historic Buildings and Selected Residential Complexes in Puxi

Notes: This figure shows the location of historic buildings in Shanghai and the selected residential complexes in Puxi.

As mentioned in the previous section, historic buildings for residential use concentrate in the former Western District of International Settlement and the 1914 Extension of French Concession (now parts of the Huangpu, Jing'an, Xuhui, and Changning Districts), while those for commercial use concentrate near the Bund (now the Huangpu District). The handful of historic buildings for industrial use, after Shanghai driving most of its old plants away, can be found in the former

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Eastern District and the northern part of the Western District of International Settlement (now parts of the Yangpu and Jing'an Districts).

The data of historic buildings is collected from the website of Shanghai Municipal Housing and Land Administration (http://fgj.sh.gov.cn/yxlsjzcs/index.html). For each historic building, information of current name and location is posted. For most of the structures, years built and historical land uses can be obtained. Table 3.1 presents the summary statistics of the 1,063 historic buildings, among which nearly 90% are located in one of the Huangpu, Xuhui, Jing'an, Changning, and Hongkou Districts. In the latter four districts, residence is the most common use, accounting for approximately 50% of the historic buildings. In the Huangpu District, however, more than a half historic buildings were for commercial use.

The data on housing prices of 2018 is scraped from Anjuke, a real estate rental and sale platform in China. For each residential complex, information of name, address, longitude and latitude, average transaction price per square meter, year built, and number of buildings and houses is recorded. After geo-locating them into ArcGIS, I identify the complexes that have been designated as historic buildings, and count the historic buildings within a 50 m (or 100 m) radius from each complex. Table 3.2 presents the summary statistics for the seven districts of Puxi. In terms of the age of the property, Huangpu is the oldest district, with Xuhui a close second, whereas Putuo is the youngest. Huangpu also has the smallest average complex scale (indicated by the average numbers of buildings and houses of a complex), and Putuo has the largest. Both the younger age of the property and the larger scale of the complex are characteristics of later development. In this sense, districts that had become the residential and commercial areas since the colonial era retain more vestiges of old Shanghai. Consistent with Table 3.1, Huangpu, Xuhui, and Jing'an have substantially more monument amenities than Yangpu and Putuo.

3.4 Empirical Results

In this section, I use a hedonic pricing model to estimate the cultural heritage on the price of both the residential complex itself and the neighbouring complexes. Equation 3.1 shows the conventional log-linear specification:

Table 3.1: Summary Statistics of Historic Buildings

	Year Built	Residential Use	Commercial Use	Industrial Use	Public Use	Non-Occupation	obs
Huangpu District	1921	80	153	3	51	3	290
	(16.43)	27.59%	52.76%	1.03%	17.59%	1.03%	27.28%
Xuhui District	1930	15	1	10	20	0	252
	(12.67)	65.08%	7.14%	1.19%	26.59%	0%	23.71%
Jing'an District	1929	78	23	11	50	1	163
	(12.49)	47.85%	14.11%	6.75%	30.67%	0.61%	15.33%
Changning District	1927	58	22	1	42	1	124
	(10.06)	46.77%	17.74%	0.81%	33.87%	0.81%	11.67%
Hongkou District	1925	59	12	4	23	0	98
	(15.23)	60.20%	12.24%	4.08%	23.47%	0%	9.22%
Pudong District	1883	26	2	1	20	0	49
	(111.33)	53.06%	4.08%	2.04%	40.82%	0%	4.61%
Yangpu District	1927	15	1	10	20	0	46
	(16.46)	32.61%	2.17%	21.74%	43.48%	0%	4.33%
Qingpu District	1912	9	0	0	4	0	13
	-	69.23%	0%	0%	30.77%	0%	1.22%
Putuo District	1930	3	0	4	5	0	12
	(9.60)	25.00%	0%	33.33%	41.67%	0%	1.13%
Jiading District	1829	0	1	0	3	0	4
	(184.31)	0%	25%	0%	75%	0%	0.38%
Jinshan District	-	1	0	0	2	0	3
	-	33.33%	0%	0%	66.67%	0%	0.28%
Minhang District	1901	0	0	0	2	0	2
	-	0%	0%	0%	100%	0%	0.19%
Chongming District	1930	0	0	0	2	0	2
	(3.54)	0%	0%	0%	100%	0%	0.19%
Baoshan District	1880	0	0	1	1	0	2
	(9.90)	0%	0%	50%	50%	0%	0.19%
Fengxian District	-	1	1	0	0	0	2
	-	50%	50%	0%	0%	0%	0.19%
Sojiang District	1935	0	0	0	1	0	1
	-	0%	0%	0%	100%	0%	0.09%
Total	1925	494	233	38	293	5	1063
	(20.65)	46.47%	21.92%	3.57%	27.56%	0.47%	100%

Notes: This table presents the summary statistics of the historic buildings officially designated in Shanghai.

Table 3.2: Summary Statistics of Residential Complexes in Puxi

District	Huangpu	Hongkou	Xuhui	Changning	Jing'an	Yangpu	Putuo
Price (Yuan/m^2)	88852.44	64388.87	84136.55	74641.41	73889.01	64215.83	60686.47
	(21914.64)	(13483.65)	(26407.55)	(20497.28)	(23524.81)	(11915.62)	(13831.80)
Structural Characteristics							
Year Built	1982	1989	1985	1989	1988	1992	1993
	(25.59)	(15.18)	(21.56)	(17.31)	(20.39)	(12.50)	(11.53)
# of Buildings	7.94	13.34	19.38	15.86	15.93	23.08	30.29
	(12.15)	(21.96)	(31.03)	(25.78)	(23.80)	(34.23)	(43.97)
# of Houses	230.50	325.66	403.53	309.53	367.19	501.09	687.84
	(332.85)	(463.15)	(564.66)	(417.16)	(528.23)	(644.13)	(865.35)
Spatial characteristics							
Distance to River (*m*)	1307.47	3481.55	3110.63	1571.61	2259.41	2502.75	1571.88
	(685.65)	(1659.34)	(1479.13)	(878.63)	(1918.62)	(1239.88)	(1398.35)
Distance to Metro (*m*)	412.74	643.28	643.16	599.13	603.24	624.34	664.18
	(170.55)	(374.46)	(621.03)	(260.28)	(388.49)	(295.06)	(389.63)
Within School District	19.59%	8.33%	9.62%	14.30%	9.73%	8.39%	10.32%
Monument Amenities							
Designated as an HB	3.78%	1.17%	3.14%	1.94%	3.60%	0.35%	0.29%
Have an HB within 50-m	9.13%	2.47%	8.86%	5.28%	7.59%	0.35%	0.29%
Have an HB within 100-m	22.36%	5.86%	19.71%	13.90%	17.32%	1.52%	0.86%
Obs	635	768	1,050	928	1,028	858	698

Notes: This table presents the summary statistics of the complexes that had transaction records on Anjuke in 2018.

$$
\begin{aligned}
\ln Price_{is} =\ & \alpha + \beta_0 HB_{is} + \beta_1 HBresidential_{is} + \beta_2 HBcommercial_{is} + \beta_3 HBindustrial_{is} + \alpha_4 HBpublic_{is} \\
& + \gamma_0 Period_{is} + \gamma_1 Age1_{is} + \gamma_2 Age2_{is} + \gamma_3 Age3_{is} + \gamma_4 Age4_{is} + \gamma_5 Age5_{is} + \gamma_6 Age6_{is} \\
& + \theta_1 Building_{is} + \theta_2 House_{is} + D_{is}\delta + \sigma_s + \epsilon_{is}
\end{aligned}
$$

(3.1)

where $Price_{is}$ denotes the average housing price of the residential complex i in district s. HB_{is} is a dummy variable that equals 1 when the residential complex i in district s is designated as a historic building by the government. $HBresidential_{is}$, $HBcommercial_{is}$, $HBindustrial_{is}$, and $HBresidential_{is}$ are a series of monument densities that denote the numbers of historic buildings for residential use, commercial use, industrial use, and public use, respectively, within a 50 m or 100 m radius. As "year built" influences the property value in two dimensions—newly built complexes are always related to modern facilities and better management, but buildings erected long ago are more likely to be considered antique, I break such information into two kinds of variables: one categorical variable $Period_{is}$ indicating the time period in which the complex is built, and

another six variables $Age1_{is}, Age2_{is}, ..., Age6_{is}$ indicating the *comparative* age of the complex in the corresponding category. I partition the time range into six periods: the colonial era (before 1943), the period before reform and opening up (1944-1980), and the four decades after that. The last period 2010-2018 is set as the base period. For each period, I calculate the comparative age of each complex separately. For example, a complex $m1$ built in 1942 is considered to have a comparative age of 1 while a complex $n1$ built in 1944 have a comparative age of 36; that is, complex $m1$ is considered young while complex $n1$ is considered old in their corresponding category ($Age1_{m1} = 1$ and $Age2_{m1}, ..., Age6_{m1} = 0$, while $Age2_{n1} = 36$, and $Age1_{n1} = 0$, $Age3_{n1}, ..., Age6_{n1} = 0$). $Building_{is}$ and $House_{is}$ are the numbers of buildings and houses in the complex, respectively. D_{is} is a set of spatial characteristics including distance to the Huangpu River, distance to the metro stations, distance to the former settlements and the old Shanghai Town, and whether the complex is within a school district or not. σ_s's are the district-specific fixed effects with $s = 1, ..., 7$ denoting the seven districts in Puxi.

As the dependent variable is the logarithm of average transaction price per square meter of a residential complex, I weight the observations by the number of houses. The results of the OLS regression are presented in Table 3.3. In Column (1), only one heritage variable is included: the dummy indicating whether the complex is designated as a historic building or not. After controlling for the structural and spatial characteristic, the identity of a historic building heritage variable is found to bring a positive and significant contribution to the housing price of approximately 8.95%, over comparative non-designated complexes. This means that potential buyers, considering only the year built, the scale of the complex, and the spatial characteristics listed in Table 3.3, are generally willing to pay an additional 8.95% to purchase an apartment in the residential complex that is designated as a historic building. It is worth noting that the designated buildings are not the only ones that enjoy such a cultural heritage premium—complexes that were built during the colonial era as a whole are highly valued in the market. The 100-year-old architectural design, building materials, and utility facilities have not become a burden to this group of properties. On the contrary, being built before 1943 is probably a feature as attractive as being built in the 21th century. This is further confirmed by the insignificant coefficient on $Age1_{is}$—unlike complexes built

Table 3.3: Long-Run Effect of Tramway on Land Value

Dep. Variable: ln $Price$	(1)	(2)	(3)
Monument Amenities			
Designated as a Historic Building	0.0895**	0.0658*	0.0396
	(0.0356)	(0.0390)	(0.0371)
# of Residential HB within 50-m		0.0373*	
		(0.0198)	
# of commercial HB within 50-m		0.0085	
		(0.0311)	
# of industrial HB within 50-m		-0.0005	
		(0.0163)	
# of public HB within 50-m		-0.0140	
		(0.0955)	
# of residential HB within 100-m			0.0366***
			(0.0085)
# of commercial HB within 100-m			-0.0227
			(0.0436)
# of industrial HB within 100-m			-0.0370
			(0.0496)
# of public HB within 100-m			-0.0125
			(0.0397)
Structural Characteristics			
Built before 1943	-0.2301	-0.2394	-0.2590
	(0.1545)	(0.1554)	(0.1562)
Built in the Period 1944−1980	-0.2947*	-0.2949*	-0.2940*
	(0.1592)	(0.1593)	(0.1594)
Built in the Period 1981−1990	-0.2941*	-0.2941*	-0.2940*
	(0.1612)	(0.1613)	(0.16155)
Built in the Period 1991−2000	-0.2743*	-0.2745*	-0.2746*
	(0.1595)	(0.1596)	(0.1598)
Built in the Period 2001−2010	-0.0668	-0.0666	-0.0663
	(0.1646)	(0.16475)	(0.1649)
Age (Built before 1943)	0.0018	0.0020	0.0023
	(0.0021)	(0.0021)	(0.0020)
Age (Built in the Period 1944−1980)	-0.0036***	-0.0036***	-0.0036***
	(0.0007)	(0.0007)	(0.0007)
Age (Built in the Period 1981−1990)	-0.0021	-0.0022	-0.0021
	(0.0017)	(0.0017)	(0.0016)
Age (Built in the Period 1991−2000)	-0.0056***	-0.0056***	-0.0055***
	(0.0017)	(0.0017)	(0.0017)
Age (Built in the Period 2001−2010)	-0.0139***	-0.0139***	-0.0138***
	(0.0035)	(0.0035)	(0.0035)
Age (Built in the Period 2010−2020)	-0.0184	-0.0184	-0.0183
	(0.0191)	(0.0191)	(0.0191)
# of Buildings	0.0005***	0.0005***	0.0005***
	(0.0002)	(0.0002)	(0.0002)
# of Houses	-0.0000***	-0.0000***	-0.0000***
	(0.0000)	(0.0000)	(0.0000)
Spatial characteristics			
Distance to Huangpu River (100 m)	0.0001	0.0000	0.0000
	(0.0005)	(0.0005)	(0.0006)
Distance to Metro Station (100 m)	-0.0047***	-0.0047***	-0.0048***
	(0.0007)	(0.0007)	(0.0007)
Distance to Former Settlement (100 m)	-0.0049***	-0.0049***	-0.0049***
	(0.0005)	(0.0005)	(0.0005)
School District-Tier 1	0.1334***	0.1333***	0.1318***
	(0.0125)	(0.0124)	(0.0124)
School District-Tier 2	0.0376***	0.0372***	0.0380***
	(0.0145)	(0.0146)	(0.0145)
R^2	0.5174	0.5176	0.5189
obs	5,947	5,947	5,947

Notes: This table reports part of the estimated coefficients of the hedonic pricing model. Robust standard errors are noted in parentheses. * indicates statistical significance at the 10% level, ** at the 5% level, and *** at the 1% level.

in the post-colonial era, complexes built before 1943 have not depreciated with age. An apartment built in 2001 may be sold at a lower price than an apartment built in 2010 by more than 10%, but there may be no difference in market value between an apartment built in 1900 and 1940.

As discussed in the first section, besides the antique effect of itself, a historic building could help create a historic atmosphere that may increase the economic value of the surrounding area. Moreover, owing to its colonial legacy, in Shanghai, the historic buildings are often designated in groups. So in Column (2), I add more heritage variables to separate out these two kinds of effects. While the estimated coefficients on the structural and spatial characteristics almost stay unchanged, the coefficient on the historic building dummy decreases from 8.95% to 6.58%, which means when taking the historic atmosphere brought by other historic buildings within 50 m into account, potential buyers are willing to pay less for the identity of the specific historic building. Within such a radius, each additional historic building for residential use contributes to the housing price by approximately 3.73%; historic building for commercial, industrial, or public use, on the other hand, is found to have an insignificant effect on the price of the surrounding complexes. In Column (3), I replace heritage densities within 50 m with those within 100 m. When allowed to consider historic atmosphere in a broader range, potential buyers further reduce their willingness to pay for the identity of the historic building, which emphasizes the "historic ensemble" effect. Residential complex benefits from the cultural heritage when it is located in a cluster of historic buildings with historic ambience, even if it is not a designated historic building itself. This is consistent with the situation of Shanghai—ordinary people may not be able to name one or two single historic building, but they are very likely to know where to find them on a cultural heritage tour.

3.5 Conclusion

Applying the hedonic pricing model to the 2018 housing price data, this paper is the first to estimate the economic effect of historic buildings in Shanghai. Residential complexes that are designated as historic buildings are found to have higher market values than comparative, non-historic properties. Each additional historic residential complex also contributes to the price of the

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surrounding properties by approximately 3.7%. Compared to the official designation, the "historic ensemble" effect plays a more important role, as people are willing to pay more for the historic ambience derived from a cluster of historic buildings. Besides the officially designated historic buildings, complexes built during the colonial era are generally highly valued, and unlike their counterparts built in the latter decades of the 20th century, older buildings are not necessarily associated with lower market value. By showing the distinctiveness of this kind of complexes, this paper confirms the relationship between the spatial terrains and the particular socioeconomic echelons that has existed for more than a century in Shanghai. As long as such cultural heritage is valued, the housing price of the so-called "upper quarters" in the inner city will still be well ahead of the rest of the city.

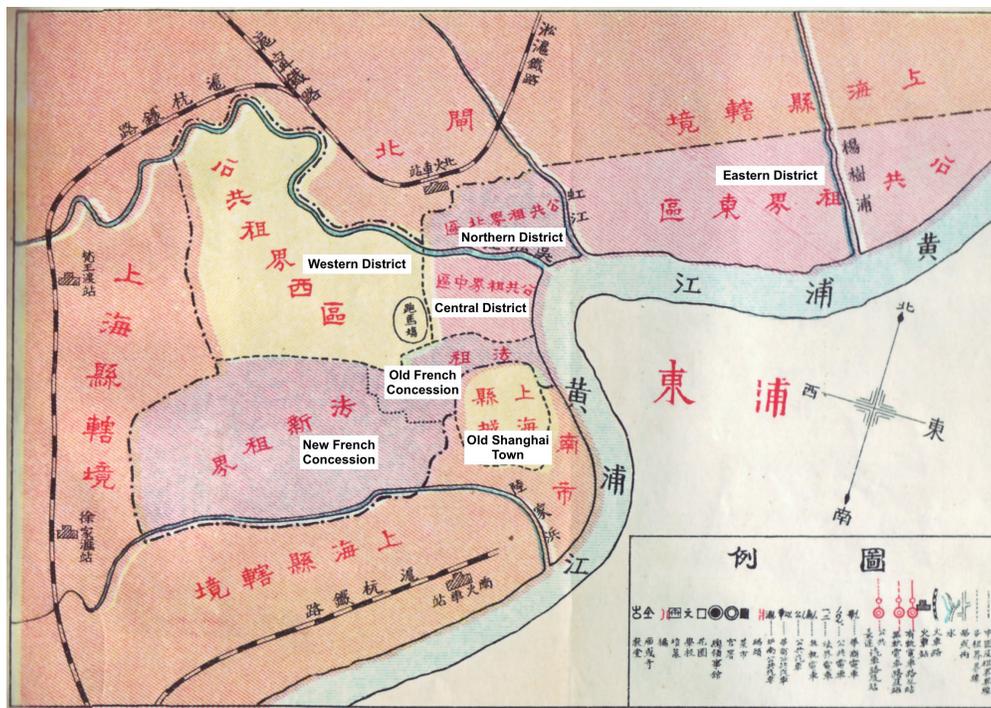## 3.6 Appendix Tables and Figures

Figure A3.1: Districts of the Shanghai Settlements

Notes: This figure shows the four districts of the International Settlement and the two districts of the French Concession. Source: virtualshanghai.net, ID208.

BIBLIOGRAPHY

Acemoglu, Daron, and Simon Johnson. 2005. "Unbundling Institutions." *Journal of political Economy*, 113(5): 949–995.

Acemoglu, Daron, Simon Johnson, and James A. Robinson. 2001. "The Colonial Origins of Comparative Development: An Empirical Investigation." *American Economic Review*, 91(5): 1369–1401.

Acemoglu, Daron, Simon Johnson, and James A Robinson. 2002. "Reversal of Fortune: Geography and Institutions in the Making of the Modern World Income Distribution." *The Quarterly Journal of Economics*, 117(4): 1231–1294.

Acemoglu, Daron, Simon Johnson, and James A Robinson. 2005. "Institutions as a Fundamental Cause of Long-run Growth." *Handbook of Economic Growth*, 1: 385–472.

Aldrich, Robert. 1996. *Greater France: A History of French Overseas Expansion.* Macmillan International Higher Education.

Ali, Merima, Odd-Helge Fjeldstad, Boqian Jiang, and Abdulaziz B Shifa. 2019. "Colonial Legacy, State-Building and the Salience of Ethnicity in Sub-Saharan Africa." *The Economic Journal*, 129(619): 1048–1081.

Alonso, William. 1964. "The Historic and the Structural Theories of Urban Form: Their Implications for Urban Renewal." *Land Economics*, 40(2): 227–231.

Bajic, Vladimir. 1983. "The Effects of a New Subway Line on Housing Prices in Metropolitan Toronto." *Urban Studies*, 20(2): 147–158.

Baruah, Neeraj G, J Vernon Henderson, and Cong Peng. 2021. "Colonial Legacies: Shaping African Cities." *Journal of Economic Geography*, 21(1): 29–65.

Berger, Daniel. 2009. "Taxes, Institutions and Local Governance: Evidence from a Natural Experiment in Colonial Nigeria." *Unpublished manuscript.*

Bergère, Marie-Claire. 2002. *Shanghai: China's Gateway to Modernity.* Stanford: Stanford University Press.

Bleakley, Hoyt, and Jeffrey Lin. 2012. "Portage and path dependence." *The Quarterly Journal of Economics*, 127(2): 587–644.

Botero, Juan C, Simeon Djankov, Rafael La Porta, Florencio Lopez-de Silanes, and Andrei Shleifer. 2004. "The Regulation of Labor." *The Quarterly Journal of Economics*, 119(4): 1339–1382.

Bowes, David R, and Keith R Ihlanfeldt. 2001. "Identifying the Impacts of Rail Transit Stations on Residential Property Values." *Journal of Urban Economics*, 50(1): 1–25.

Brooks, Leah, and Byron Lutz. 2019. "Vestiges of Transit: Urban Persistence at a Microscale." *Review of Economics and Statistics*, 101(3): 385–399.

Cai, Yutian. 2005. *Shanghai Title Deeds (Shanghai Daoqi): 1847-1911.*

Cervero, Robert. 1984. "Journal Report: Light Rail Transit and Urban Development." *Journal of the American Planning Association*, 50(2): 133–147.

Chen, Yanlin. 1933. *Shanghai Dichan Daquan (A Guide of Real Estate in Shanghai).*

Cogneau, Denis, and Alexander Moradi. 2014. "Borders that Divide: Education and Religion in Ghana and Togo since Colonial Times." *The Journal of Economic History*, 74(3): 694–729.

Cogneau, Denis, Sandrine Mesplé-Somps, and Gilles Spielvogel. 2015. "Development at the Border: Policies and National Integration in Côte d'Ivoire and Its neighbors." *The World Bank Economic Review*, 29(1): 41–71.

Conservancy, New York Landmarks. 1977. "The Impacts of Historic District Designation—Summary."

Coulson, N Edward, and Robin M Leichenko. 2001. "The Internal and External Impact of Historical Designation on Property Values." *The Journal of Real Estate Finance and Economics*, 23(1): 113–124.

Council, Shanghai Municipal. 1892–1933. *Annual Report of the Shanghai Municipal Council.*

Council, Shanghai Municipal. 1899, 1902, 1903, 1904, 1905, 1906, 1912, 1913, 1916, 1920, 1921. *The Minutes of the Shanghai Municipal Council.*

Council, Shanghai Municipal. 1906, 1909, 1911, 1913, 1914, 1915. *Shanghai Municipal Gazette.*

Cyrenne, Philippe, Robert Fenton, and Joseph Warbanski. 2006. "Historic Buildings and Rehabilitation Expenditures: A Panel Data Approach." *Journal of Real Estate Research*, 28(4): 349–380.

d'administration municipale de la Concession française, Conseil. 1893–1940. *Compte rendu de la gestion pour l'exercice.*

Damm, David, Steven R Lerman, Eva Lerner-Lam, and Jeffrey Young. 1980. "Response of Urban Real Estate Values in Anticipation of the Washington Metro." *Journal of Transport Economics and Policy*, 315–336.

Denison, E., and G.Y. Ren. 2006. *Building Shanghai: The Story of China's Gateway.* Wiley.

Dewees, Donald N. 1976. "The Effect of a Subway on Residential Property Values in Toronto." *Journal of Urban Economics*, 3(4): 357–369.

Diao, Mi, Yu Qin, and Tien Foo Sing. 2016. "Negative Externalities of Rail Noise and Housing Values: Evidence from the Cessation of Railway Operations in Singapore." *Real Estate Economics*, 44(4): 878–917.

Diaz, Julian, Andrew Hansz, Matthew Cypher, and Darren Hayunga. 2008. "Conservation Status and Residential Transaction Prices: Initial Evidence from Dallas, Texas." *Journal of Real Estate Research*, 30(2): 225–248.

Dill, Jennifer. 2003. "Transit Use and Proximity to Rail: Results from Large Employment Sites in the San Francisco, California, Bay Area." *Transportation Research Record*, 1835(1): 19–24.

Dittmar, Hank, and Gloria Ohland. 2012. *The New Transit Town: Best Practices in Transit-Oriented Development.* Island Press.

Djankov, Simeon, Edward Glaeser, Rafael La Porta, Florencio Lopez-de Silanes, and Andrei Shleifer. 2003*a.* "The New Comparative Economics." *Journal of Comparative Economics*, 31(4): 595–619.

Djankov, Simeon, Rafael La Porta, Florencio Lopez-de Silanes, and Andrei Shleifer. 2002. "The Regulation of Entry." *The Quarterly Journal of Economics*, 117(1): 1–37.

Djankov, Simeon, Rafael La Porta, Florencio Lopez-de Silanes, and Andrei Shleifer. 2003*b.* "Courts." *The Quarterly Journal of Economics*, 118(2): 453–517.

Donaldson, Dave, and Richard Hornbeck. 2016. "Railroads and American Economic Growth: A "Market Access" Approach." *The Quarterly Journal of Economics*, 131(2): 799–858.

Dubé, Jean, Marius Thériault, and François Des Rosiers. 2013. "Commuter Rail Accessibility and House Values: The Case of the Montreal South Shore, Canada, 1992–2009." *Transportation Research Part A: Policy and Practice*, 54: 49–66.

Duncan, Otis Dudley, and Beverly Duncan. 1955. "A Methodological Analysis of Segregation Indexes." *American Sociological Review*, 20(2): 210–217.

Dupraz, Yannick. 2019. "French and British Colonial Legacies in Education: Evidence from the Partition of Cameroon." *The Journal of Economic History*, 79(3): 628–668.

Du, Xuncheng. 2012. "Jindai Shanghai zaoqi chengshihua guocheng zhong de nongtian shougou yu liyi fenpei (Farmland Acquisition and Profits Allocation during the Early Urbanization of Modern Shanghai)." *Researches in Chinese Economic History*, , (3): 3–15.

Electric Railway Journal. 1920. *Electric Railway Journal.* McGraw Hill Publishing Company.

Feetham, Richard. 1931. *Reprot of the Hon. Mr. Justice Richard Feetham to the Shanghai Municipal Council.* Shanghai: North China Daily News and Herald, Ltd.

Ford, Deborah Ann. 1989. "The Effect of Historic District Designation on Single-Family Home Prices." *Real Estate Economics*, 17(3): 353–362.

Fredet, Jean, and Charles B. Maybon. 1929. *Histoire de la Concession Française de Changhai.* Plon.

Gatzlaff, Dean H, and Marc T Smith. 1993. "The Impact of the Miami Metrorail on the Value of Residences near Station Locations." *Land Economics*, 54–66.

Gibbons, Stephen, and Stephen Machin. 2005. "Valuing Rail Access Using Transport Innovations." *Journal of Urban Economics*, 57(1): 148–169.

He, Jinghuan. 2015. *Evaluation of Plan Implementation: Peri-urban Development and the Shanghai Master Plan 1999-2020.* TU Delft.

Hou, Qingbin. 2017. "Wanqing zhongwai huishen zhidu zhong huayang faguan de falv suyang yu shenpan fengge: Yi Shanghai fazujie huishen gongxie weili (Chinese and foreign judges' trial style and legal literacy in the joint-trial system of late Qing: Evidence from the Mixed-Court of the French concession in Shanghai)." *Xueshu Yuekan*, 49(1): 165–176.

Ibeas, Ángel, Ruben Cordera, Luigi dell'Olio, Pierluigi Coppola, and Alberto Dominguez. 2012. "Modelling Transport and Real-Estate Values Interactions in Urban Systems." *Journal of Transport Geography*, 24: 370–382.

Iyer, Lakshmi. 2010. "Direct versus Indirect Colonial Rule in India: Long-term Consequences." *The Review of Economics and Statistics*, 92(4): 693–713.

Jackson, Isabella. 2017. *Shaping Modern Shanghai: Colonialism in China's Global City.* Cambridge University Press.

Jackson, Jerry R. 1979. "Intraurban Variation in the Price of Housing." *Journal of Urban Economics*, 6(4): 464–479.

Jedwab, Remi, and Alexander Moradi. 2016. "The Permanent Effects of Transportation Revolutions in Poor Countries: Evidence from Africa." *Review of Economics and Statistics*, 98(2): 268–284.

Keller, Wolfgang, Ben Li, and Carol Shiue. 2013. "Shanghai's Trade, China's Growth: Continuity, Recovery, and Change since the Opium Wars." *IMF Economic Review*, 61: 336–378.

Kim, Go-Eun, and Jeong-Ran Lee. 2020. "The Impact of Historic Building Preservation in Urban Economics: Focusing on Accommodation Prices in Jeonju Hanok Village, South Korea." *Sustainability*, 12(12): 5005.

Landis, John D. 1995. "Imagining Land Use Futures: Applying the California Urban Futures Model." *Journal of the American Planning Association*, 61(4): 438–457.

La Porta, Rafael, Florencio Lopez-de Silanes, and Andrei Shleifer. 1999. "Corporate Ownership around the World." *The Journal of Finance*, 54(2): 471–517.

La Porta, Rafael, Florencio Lopez-de Silanes, and Andrei Shleifer. 2008. "The Economic Consequences of Legal Origins." *Journal of Economic Literature*, 46(2): 285–332.

La Porta, Rafael, Florencio Lopez-de Silanes, Andrei Shleifer, and Robert Vishny. 1999. "The Quality of Government." *The Journal of Law, Economics, and Organization*, 15(1): 222–279.

La Porta, Rafael, Florencio Lopez-de Silanes, Andrei Shleifer, and Robert Vishny. 2002. "Investor Protection and Corporate Valuation." *The Journal of Finance*, 57(3): 1147–1170.

La Porta, Rafael, Florencio Lopez-de Silanes, Andrei Shleifer, and Robert W Vishny. 1997. "Legal Determinants of External Finance." *The Journal of Finance*, 52(3): 1131–1150.

La Porta, Rafael, Florencio Lopez-de Silanes, Andrei Shleifer, and Robert W Vishny. 1998. "Law and Finance." *Journal of Political Economy*, 106(6): 1113–1155.

La Porta, Rafael, Florencio Lopez-de Silanes, Cristian Pop-Eleches, and Andrei Shleifer. 2004. "Judicial Checks and Balances." *Journal of Political Economy*, 112(2): 445–470.

Layford, L. H. 1932. *Decennial Reports on the Trade Navigation Industries, Etc., of the Ports Open to Foreign Commerce in China and Corea, and on the Conditions and Development of the Treaty Port Provinces.*

Lazrak, Faroek, Peter Nijkamp, Piet Rietveld, and Jan Rouwendal. 2014. "The Market Value of Cultural Heritage in Urban Areas: An Application of Spatial Hedonic Pricing." *Journal of Geographical Systems*, 16(1): 89–114.

Lee, Alexander, and Kenneth A. Schultz. 2012. "Comparing British and French Colonial Legacies: A Discontinuity Analysis of Cameroon." *Quarterly Journal of Political Science*, 7: 1—46.

Leng, Shengwu. 1946. *Zuixin Shanghai Zhinan (Guide to Shanghai).* Shanghai Cultural Research Association.

Levine, Ross, Chen Lin, Chicheng Ma, and Yuchen Xu. 2021. "The Legal Origins of Financial Development: Evidence from the Shanghai Concessions." National Bureau of Economic Research.

Li, Han, Yehua Dennis Wei, Yangyi Wu, and Guang Tian. 2019. "Analyzing Housing Prices in Shanghai with Open Data: Amenity, Accessibility and Urban Structure." *Cities*, 91: 165–179.

Listokin, David, Barbara Listokin, and Michael Lahr. 1998. "The Contributions of Historic Preservation to Housing and Economic Development."

MacPherson, Kerrie. L. 1987. *A Wilderness of Marshes: The Origins of Public Health in Shanghai, 1843–1893.* Oxford University Press, Hong Kong.

Ma, Debin. 2006. "Shanghai-Based Industrialization in the Early 20th Century: A Quantitative and Institutional Analysis."

Ma, Debin. 2008. "Economic Growth in the Lower Yangzi Region of China in 1911–1937: A Quantitative and Historical Analysis." *The Journal of Economic History*, 68(2): 355–392.

Ma, Jun, and Jie Jiang. 2016. *Shanghai fazujie shi yanjiu (A Study on the History of the French Concession in Shanghai).* Shanghai Academy of Social Sciences Press.

McCauley, John F, and Daniel N Posner. 2015. "African Borders as Sources of Natural Experiments Promise and Pitfalls." *Political Science Research and Methods*, 3(2): 409–418.

McDonald, John F. 1989. "Econometric studies of urban population density: A survey." *Journal of Urban Economics*, 26(3): 361–385.

Mills, Edwin S. 1967. "An Aggregative Model of Resource Allocation in a Metropolitan Area." *The American Economic Review*, 57(2): 197–210.

Mulligan, Casey B, and Andrei Shleifer. 2005*a*. "Conscription as regulation." *American Law and Economics Review*, 7(1): 85–111.

Mulligan, Casey B, and Andrei Shleifer. 2005*b*. "The Extent of the Market and the Supply of Regulation." *The Quarterly Journal of Economics*, 120(4): 1445–1473.

Muth, Richard F. 1969. "Cities and Housing: The Spatial Pattern of Urban Residential Land Use."

NEORail, II. 2001. "The Effect of Rail Transit on Property Values: A Summary of Studies." *NEORail, Cleveland.*

Noonan, Douglas S, and Douglas J Krupka. 2010. "Determinants of Historic and Cultural Landmark Designation: Why We Preserve What We Preserve." *Journal of Cultural Economics*, 34(1): 1–26.

North, Douglass C. 1990. "Institutions, Institutional Change and Economic Performance."

North, Douglass C, and Robert Paul Thomas. 1973. *The Rise of the Western World: A New Economic History.* Cambridge University Press.

Nunn, Nathan. 2008. "The Long-Term Effects of Africa's Slave Trades." *The Quarterly Journal of Economics*, 123(1): 139–176.

of Commerce, United States. Department, Labor. Bureau of Statistics, and United States. Department of the Treasury. Bureau of Statistics. 1894. *Monthly Summary of Commerce and Finance of the United States.*

Office, Washington: Government Printing. 1899. *Consular Reports: Commerce, Manufactures, etc.*

Pan, Tianshu. 2005. "Historical Memory, Community-Building and Place-Making in Neighborhood Shanghai." *Restructuring the Chinese City: Changing Society, Economy and Space*, 109–123.

Schaeffer, Peter V, and Cecily Ahern Millerick. 1991. "The Impact of Historic District Designation on Property Values: An Empirical Study." *Economic Development Quarterly*, 5(4): 301–312.

Shen, Bojing, and Huaipu Chen. 1934. *Shanghai Shi Zhinan (Guide to Shanghai).* Zhonghua Book Company.

Shen, Yao, and Kayvan Karimi. 2017. "The Economic Value of Streets: Mix-Scale Spatio-Functional Interaction and Housing Price Patterns." *Applied Geography*, 79: 187–202.

Shi, Jian-gang, and Bo Xie. 2013. "The Intervention of Urban Housing Land Supply Policy on the Housing Price—Based on Empirical Analysis of the Shanghai Housing Market." *East China Economic Management.*

Shi, Meiding, Changlin Ma, and Shaoting Feng. 2001. *Shanghai zujie zhi (History of the Shanghai Settlement).* Shanghai Academy of Social Science Press.

Shiroyama, Tomoko. 2011. "The Shanghai Real Estate Market and Capital Investment, 1860-1936." *The Treaty Port Economy in Modern China: Empirical Studies of Institutional Change and Economic Performance.*

Siodla, James. 2017. "Clean Slate: Land-Use Changes in San Francisco after the 1906 Disaster." *Explorations in Economic History*, 65: 1–16.

Special Agents Series. 1919. *Special Agents Series.* United States. Bureau of Foreign and Domestic Commerce.

Tang, Zhenchang. 1989. *Shanghai Shi (History of Shanghai).* Shanghai People's Publishing House.

Throsby, David. 2001. *Economics and Culture.* Cambridge university press.

Treisman, Daniel. 2000. "The Causes of Corruption: A Cross-national Study." *Journal of Public Economics*, 76(3): 399—457.

Tu, Jiahua, and Jie Zhang. 2005. "What Pushes up the House Price: Evidence From Shanghai." *World Economy*, 91: 165–179.

Voith, Richard. 1991. "Transportation, Sorting and House Values." *Real Estate Economics*, 19(2): 117–137.

Wang, Changnian. 1934. *Da Shanghai Zhinan (Guide to Shanghai).* Southeast Cultural Service.

Winson-Geideman, Kimberly, Dawn Jourdan, and Shan Gao. 2011. "The Impact of Age on the Value of Historic Homes in a Nationally Recognized Historic District." *Journal of Real Estate Research*, 33(1): 25–48.

Wright, A., and H.A. Cartwright. 1908. *Twentieth Century Impressions of Hongkong, Shanghai, and Other Treaty Ports of China: Their History, People, Commerce, Industries, and Resources.* Lloyds Greater Britain publishing company.

Xiao, Longkai, and Xiaoping Zhou. 2018. "Research on the Influence of Regulatory Policies of Shanghai Real Estate on the House Price—Based on the Empirical Study of VAR Model." Atlantis Press.

Xu, Yang, Shih-Lung Shaw, Feng Lu, Jie Chen, and Qingquan Li. 2018. "Uncovering the Relationships Between Phone Communication Activities and Spatiotemporal Distribution of Mobile Phone Users." In *Human Dynamics Research in Smart and Connected Communities*. 41–65. Springer.

Yan, Se. 2010. "Real Wages and Wage Inequality in China, 1858-1936." *The Journal of Economic History*, 70(2): 454–458.

Yokohama-shi. 1881. *The Japan Gazette.*

Zheng, Youkui. 1984. *Zhongguo de duiwai maoyi he gongye fazhan: 1840-1948 (Foreign Trade and Industrial Development in China: 1840-1948).* Shanghai Academy of Social Sciences Press.

Zou, Yiren. 1980. *Jiu Shanghai renkou bianqian de yanjiu (A Study on the Demographic Transition in the Old Shanghai).* Shanghai People's Publishing House.