Seeds of Market-Based Capitalism: Christian Missionaries and China's Modernization *

First version: November 2024

This version: May 2026

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Abstract

This paper examines the historical and institutional roots of China's market-based capitalism through the lens of financial development. We study how Christian missionaries facilitated the adoption of modern banks and the establishment of enterprises between 1857 and 1936, and how this historical exposure interacted with the market-oriented reforms of the 1980s to shape growth through 2022. Using a staggered difference-in-differences design for the pre-1936 period, we find that missionary presence increased modern banks by 31% and enterprises by 27%. Our evidence points to two mechanisms: practical education and the diffusion of useful knowledge through publications and translations. Missionaries, especially Protestants, introduced training in subjects such as mathematics, bookkeeping, economics, and English, helping local actors operate modern financial institutions. They also translated Western texts into vernacular Chinese, helping diffuse useful knowledge relevant to modern economic and financial practices. Using an instrumental variable strategy for long-run exposure, we document that these effects weakened between 1949 and 1978 but re-emerged after the market reforms. Overall, the results suggest that missionaries transmitted not only human capital, but also institution-specific knowledge that helped plant the seeds of market-based capitalism in China.

*We thank Ruixue Jia, Ruiming Liu, Samuel Bazzi, Sara Lowes, Paul Niehaus, Gaurav Khanna, Craig McIntosh, Daryl Ireland, Laura Muñoz Blanco, Martin Fernandez Sanchez, as well as seminar and conference participants at UC San Diego, Boston University, University of Bologna, Xiamen University, and ASREC for helpful feedback.

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1 Introduction

What explains the origins and takeoff of market-based capitalism? This question has long been central to economics, but it remains especially important for understanding China. Since the market-oriented reforms of 1978, China has become increasingly integrated into markets, private enterprise, and modern finance, with GDP growth averaging over 9 percent annually and nearly 800 million people lifted out of poverty (World Bank, 2024). Yet many of the institutional and human capital foundations that made this transition possible were formed much earlier. This paper studies one historical source of these foundations: Christian missionaries in China.

The role of religious institutions in capitalist development is debated. Some work views religion as central to Europe's economic rise (Weber, 2001; Becker and Woessmann, 2009; Becker, Pfaff, and Rubin, 2016), while other work shows how specific religious laws can constrain financial and institutional change (Kuran, 2012, 2018; Rubin, 2011). Although China has been somewhat peripheral to this debate, it experienced notable exposure to Western religious institutions and capitalist ideology before 1949, and later went through a sharp period of institutional reversal under Communist rule before reopening to markets in the 1980s.

This paper offers a new perspective on China's modernization by examining how Christian missionaries influenced the adoption of modern banking and enterprises between 1857 and 1936, and how this historical exposure interacted with the 1980s reforms to shape recent growth. We focus on one channel: financial innovation. Missionaries did not simply expose China to Western religion. They also brought schools, books, translations, and practical knowledge that could help local actors understand and operate new economic institutions. We argue that this mattered for the spread of modern banks, which represented a new way of organizing the Chinese economy around corporations, deposits, formal governance, and capital markets.

Following the Opium Wars, China was forced to open to the West. Trade expanded, foreign banks entered treaty ports, and Chinese reformers began to build modern financial institutions. This was a major break from the traditional financial system. Traditional banks, including *Piaohao* and *Qianzhuang*, were largely based on kinship, personal networks, and unlimited liability. These institutions were trusted locally and worked well for remittances and local lending, but their scale

was limited. Modern banks, by contrast, were organized as joint-stock corporations with limited liability, larger deposit mobilization, formal governance, and standardized accounting. Aggregate historical data show this transition clearly: traditional banks initially dominated but eventually declined, while modern banks grew rapidly over time.[1]

To study these dynamics, we combine newly available data from the China Historical Christian Database (CHCD) with historical data on modern banks, enterprises, railways, treaty ports, government investments, and bankers' biographies. The CHCD allows us to construct detailed measures of exposure to recorded Christian churches, schools, hospitals, orphanages, publishing houses, and other institutions from 1550 to 1950. To our knowledge, this is the first economics paper to use this source to construct a long panel of Christian institutions in China. The panel structure is important because common missionary atlases tend to oversample prominent missions established early (Jedwab, Meier zu Selhausen, and Moradi, 2022). In our data, early missionary entry is positively selected into more central and developed places, but this selection becomes much weaker after the initial treaty-port period and does not appear in the variation used in our panel design.

Our first empirical strategy uses a staggered difference-in-differences design that exploits the yearly expansion of missionaries across prefectures from 1857 to 1936. A prefecture becomes treated in the year missionaries first arrive and remains treated afterward. The design compares each treated prefecture to places that have not yet received missionaries and to places never treated, while controlling for prefecture and year fixed effects. We find no evidence of pre-trends in the main outcomes or in economic and geographic predictors of modernization, including enterprises, modern banks, traditional banks, railways, treaty ports, and government investments.

Missionary presence led to a large and persistent increase in modern banking. After missionary arrival, treated prefectures experienced a 31% increase in modern banks relative to comparison areas. The effect is visible in event studies, where treated and control locations follow similar trends before missionary arrival and then diverge afterward. The results are robust to alternative measures of banking activity, including deposits and loans, to different functional forms, and to excluding early periods and treaty ports. Missionary presence also increased private enterprises by

[1] Appendix Figure A7 plots the aggregate modern-bank series.

around 27%, consistent with modern banks supporting broader market activity.

These results raise the question of why missionary presence affected the adoption of modern banks. We provide evidence for two main mechanisms: the formation of practical human capital and the diffusion of useful knowledge.

First, Christian education helped create the human capital needed for modern finance. China already had an advanced education system, but it was largely oriented toward the civil service examination and classical learning (Bai, 2019). Missionary schools, especially Protestant ones, introduced a different form of human capital, teaching subjects such as mathematics, science, bookkeeping, economics, and English. These were the skills needed to work in, manage, and expand modern financial institutions. We digitize bankers' curricula for the historical period of our difference-in-differences design and find that around 30% of bankers were affiliated with Christianity through schooling or religious ties. In places with missionary presence, these "Christian bankers" established more banks. The effect of missionary presence is also stronger where missionaries founded at least one school and is driven by Protestant missions, with no comparable effect for Catholic missions. This is consistent with Protestant missionaries' stronger emphasis on mass education and practical training (Bai, 2019; Bai and Kung, 2015).

Second, missionaries diffused useful knowledge through publications and translations. Missionaries produced and translated Western texts into Chinese, including educational, scientific, and economic materials, often in vernacular Chinese or bilingual formats. These texts made modern economic and institutional practices more accessible outside the classroom. We find that the effect of missionary presence on modern banks is stronger in locations where missions engaged in publication activity. This supports the idea that missionaries mattered not only by locating in a prefecture, but also by transmitting practical knowledge that helped local actors adopt new financial technologies.

We also show that missionaries contributed to China's transition from traditional to modern finance. We digitize data on two major financial institutions predating modern banks and find that missionaries first boosted these older institutions, yet modern banks soon rose in the same locations and eventually replaced them. Only those traditional banks focused on local lending and enjoying established networks and trust survived longer, suggesting possible complementarities with modern

banks.[2] The effect of missionaries on modern banks is stronger where traditional institutions were already present, indicating that modern banks emerged where financial demand was higher.

We then examine whether historical missionary exposure shaped outcomes after 1949. This part of the paper moves from a panel design to a cross-sectional framework, using the total number of missions in each prefecture as the measure of historical exposure. Because cumulative missionary presence is endogenous, we follow the logic of Sequeira, Nunn, and Qian (2020) and instrument missionary exposure with the interaction of railway expansion timing and variations in missionary migration flows.

We compare prefectures with similar lengths of railway connection and number of railway lines but different connection years, which either coincided with a surge or a lull in missionary migration. Prefectures connected to the railway just before a national missionary surge became more exposed to missionaries than otherwise similar prefectures connected just after the surge. This approach assumes that the external "push" factors driving missionary booms or lulls are uncorrelated with the exact timing of local railway construction. By matching prefectures in this way, we account for railway endogeneity. While railways can influence modern banks and enterprises through migration and productivity, our identification hinges on the assumption that, conditional on railway connection and railway lines, the missionary migration cycles themselves are not systematically aligned with local rail development at the yearly level.

We first validate the IV design by applying it to the final six years of the historical panel, from 1930 to 1936. The IV estimates reproduce the historical positive effect on modern banks and are similar in magnitude to the difference-in-differences estimates. We then extend the analysis to 1949–2022. The effect of missionary exposure weakens during the Communist period, when market institutions were suppressed. It then re-emerges after the market reforms of the 1980s. Event-study estimates show that the effects become especially pronounced after major land and banking reforms, and we find a sustained positive impact on per capita GDP from 1992 onward, with a larger increase after China joined the WTO in 2001. Together, these results suggest that places with historical missionary exposure had a comparative advantage when China reopened to markets.

[2] In fact, this type of traditional bank, called *QianZhuang*, often collaborated with modern banks, which initially lacked local connections and trust.

Our first contribution is to the literature on the historical roots of development and the debate over institutions and human capital (North, 1990; Acemoglu, Johnson, and Robinson, 2001, 2002; Glaeser, La Porta, Lopez-de Silanes, and Shleifer, 2004; Nunn, 2008; Dell and Olken, 2020; Lowes and Montero, 2021). We show that missionary exposure was not only a source of schooling. It also helped transmit institution-specific knowledge: the practices, networks, and organizational forms that allowed modern banks to take root. Modern banks were an institutional technology, changing how capital was mobilized, allocated, and governed; missionary education and publications supplied some of the skills needed to use it. By tracing these effects from the late Qing and Republican periods through the Communist period and the reform era, we show how early institutional exposure can persist even after decades of suppression. Our reform-era results also connect to work on China's post-1978 reforms (Lin, 1992; Song, Storesletten, and Zilibotti, 2011; Xu, 2021; Erten and Leight, 2021), showing that these policies were especially effective in places with earlier missionary exposure.

Second, the paper contributes to work on missionaries and development. Prior studies show that missions shaped education (Nunn, Akyeampong, Bates, and Robinson, 2014; Wantchekon, Klašnja, and Novta, 2015; Valencia Caicedo, 2019), democracy (Woodberry, 2012), and cultural change (Henrich, 2020; Bergeron, 2019). Yet less is known about how missionary activity affected finance. The related literature on religion and financial development has mostly studied how religious law, political authority, and community organization shaped credit and financial institutions in Islamic, Christian, and Jewish contexts (Kuran, 2012, 2018; Rubin, 2011; Pascali, 2016). We add evidence that missionaries could also facilitate financial innovation by diffusing practical skills and institutional knowledge. This provides a new pathway through which religious institutions can affect development: not only by changing beliefs or schooling, but also by helping local actors adopt new organizational forms.

Third, we add to the literature on missionaries in China. Existing work shows that missions contributed to enterprise growth and urbanization (Bai and Kung, 2015), women's education (Ma, Yan, and Zhao, 2022b), and higher GDP today (Chen, Wang, and Yan, 2014). Related work also shows that anti-Christian conflict inhibited modernization and foreign investment (Huang, Ma, and Valencia Caicedo, 2024), and that early Jesuit missions affected international trade by

transmitting information about China to Europe (Chen, Li, and Ma, 2025). We provide a finance-based channel that helps connect these findings. By linking pre-1949 missionary exposure to the reform-era response of banks and GDP, we show how these historical seeds interacted with the policies of the 1980s to shape China's later market orientation and growth. We also document the transition from traditional to modern finance, showing that modern banks eventually substituted for *Piaohao*, while *Qianzhuang* remained more complementary because of their local networks. China is an especially demanding setting because missionaries operated without formal colonial rule, faced conflict and repression, and remained small players in a large education market. We argue that they could still have large effects because modern banking had high economic leverage: a small amount of institution-specific knowledge could affect capital allocation, enterprise formation, and later responses to market reforms. This also relates to work on the historical rise of modern banks in China, which has emphasized legal institutions, culture, new technologies, railways, and upper-tail human capital. [3] Leveraging newly compiled panel data from the China Historical Christian Database, we identify the timing and intensity of missionary exposure and trace its effects before 1949, during the period of suppression, and after markets reemerged.

2 Historical Background

2.1 China's Financial Institutions

The institutional transition at the center of this paper is the movement from traditional Chinese finance to modern banking. Before the First Opium War, China's financial market was dominated by two traditional institutions: *Piaohao* (ticket houses) and *Qianzhuang* (money shops). These institutions provided remittances, loans, and currency exchange services. *Piaohao* managed long-distance remittances for the Qing government and large merchants through extensive branch networks (Cheng, 2003). *Qianzhuang* were smaller, locally operated money shops that issued cash and bills and connected local merchants to the broader financial system.

Modern banks entered China after the First Opium War. Foreign banks were first established

[3] See, among others, Levine, Lin, Ma, and Xu (2023) on legal institutions, Sun, Wang, and Xu (2024) on patriotism, Chen, Ma, and Sinclair (2022) on Confucianism, Lin, Ma, Sun, and Xu (2021) on telegraphs, Zhao, He, and Yu (2023) on railways, and Lin, Ma, Sun, and Xu (2024) and Chen, Liu, Shi, and Zhu (2025) on upper-tail human capital.

in treaty ports, where they were active in import–export finance, political loans, and other commercial ventures (Moazzin, 2022).[4] Chinese entrepreneurs and government officials soon recognized the value of these institutions. As foreign trade expanded and modern enterprises became more common, Chinese-run modern banks began to appear. The first modern Chinese bank, the Imperial Bank of China, was founded in 1897. Unlike traditional institutions, it operated with limited liability and formal rules governing deposits, loans, and bank notes (Cheng, 2003).[5]

The key difference between traditional and modern banks was not that traditional finance lacked value. Traditional banks were built around local information, personal networks, and relational enforcement. This made them trusted institutions in local markets. But the same features limited their scale. Modern banks were organized as joint-stock corporations, mobilized deposits at larger scale, used more formal governance, and adopted standardized accounting practices. These features made them better suited for an economy increasingly connected to trade, industry, and larger capital markets. Table 1 summarizes these differences.

Table 1: Traditional and Modern Banks in China

Feature	**Traditional Banks**	**Modern Banks**
Institutional form		
Institution type	*Piaohao* and *Qianzhuang*	Government-run, private, and joint-stock banks
Corporate form	Kin-based partnerships and local money shops	Joint-stock corporations
Risk taking and legal framework	Unlimited liability	Limited liability
Funding and lending	Partners' capital, remittance float, and relationship-based lending	Public deposits at scale and formal deposit–lending intermediation
Technology	Ledgers, abacus, and slower clearing	Standardized double-entry bookkeeping and telegraph-enabled clearing
Agency	Low agency problems, low scalability	Agency costs managed through formal governance
Economic implications		
Main strength	Local trust and relational enforcement	Scalable intermediation and formal governance
Main limitation	Limited scalability and local scope	Agency risk and systemic fragility
Best suited for	A closed, relationship-based economy	An open, market-industrial economy

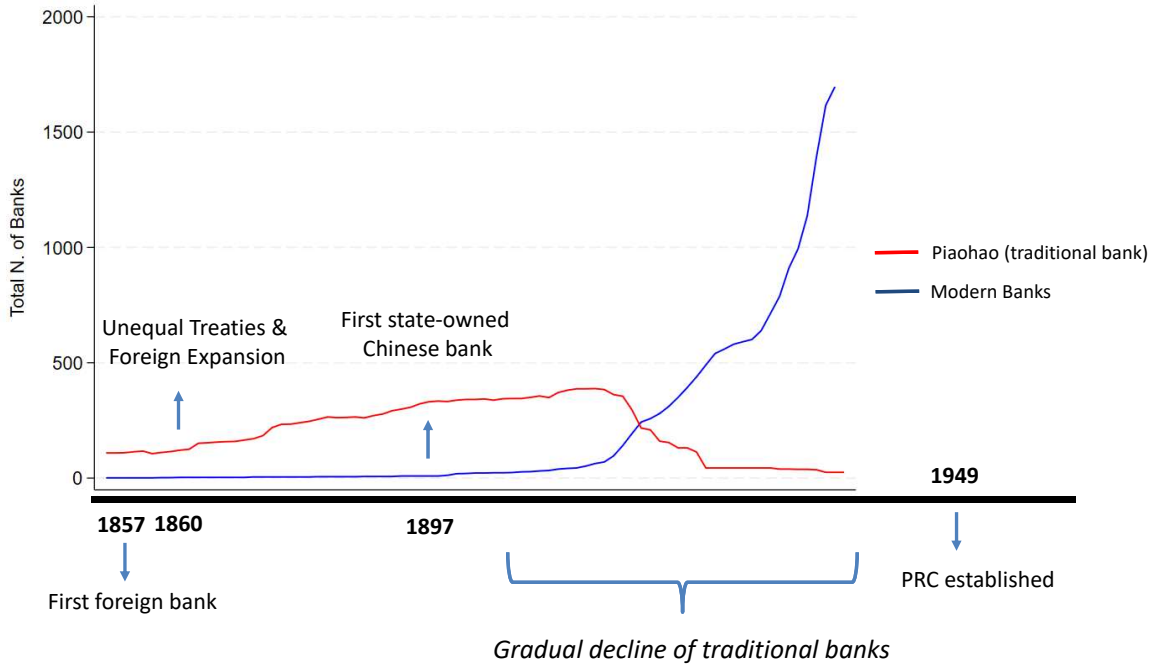
Notes: The table summarizes the main contrast between traditional Chinese financial institutions and modern banks. Traditional banks include *Piaohao* and *Qianzhuang*; Appendix Table A6 separates the two traditional institutions.

[4] Modern banking, originating in Europe during the Late Middle Ages, introduced a deposit–lending system that was considered foreign technology in China at the time (Cryan and Shatil, 2019).

[5] Modern Chinese banks include government-run, private, and joint banks.

Between 1911 and 1936, modern banks expanded rapidly in response to rising financial demand. The collapse of the Qing government weakened *Piaohao*, whose business depended heavily on official remittances and ties to the state. Modern banks replaced some functions of *Piaohao* by offering lower-cost remittance services and by lending to *Qianzhuang*. At the same time, *Qianzhuang* survived longer because they retained local information and networks of trust that modern banks initially lacked. Figure 1 shows the aggregate transition: modern banks rose quickly, while *Piaohao* declined. Since 1937, many banks relocated to the southwestern interior to escape the Japanese invasion, which is why our main historical panel stops in 1936.

Figure 1: Traditional and Modern Banks During China's Opening



Notes: The figure plots the aggregate number of modern banks and *Piaohao* over time. The x-axis is calendar year and the y-axis is the total number of banks. Modern bank data come from the Bank of China Economic Research Office and the *National Banking Yearbook*. *Piaohao* data come from Huang (2002) and Liu (2018).

2.2 Missionary Expansion in China

Christian missions expanded in China during the same period as this financial transition. Before 1842, missionary activity had little treaty protection and depended on Qing and local approval (Liu, Fairbank, and Twitchett, 1980). The treaty signed after the First Opium War allowed missionaries

to preach in treaty ports. The Second Opium War marked a further turning point: after 1860, missionaries gained the right to enter inland regions and to build churches, residences, and schools (Fairbank and Liu, 1980; Chen, Wang, and Yan, 2014; Ma, Yan, and Zhao, 2022a).[6]

Missionary expansion was not smooth. Christianity remained culturally and politically contentious, and anti-Christian conflict culminated in the Boxer Rebellion of 1900, in which over 240 foreign missionaries and 20,000 Chinese Christians were killed (Ren, 1903). Recent work shows that anti-Christian uprisings also affected modernization and foreign investment in China (Huang, Ma, and Valencia Caicedo, 2024). After the uprising was suppressed, new treaty protections and reparations strengthened the security of missionary activity. Between 1900 and 1920, the number of Christian believers quadrupled from 95,943 to 366,527, and missionary presence reached 94% of China's counties (Liang, 1988; Stauffer, 1922).

Missionary traditions also differed in ways that matter for our interpretation. Catholic missions often required converts to renounce traditional practices such as ancestor worship, while Protestant missions placed more emphasis on schools, vernacular publications, and practical training, and were more closely associated with ideas of hard work and material success (Fairbank and Liu, 1980; Bays, 2011; Liang, 1988). These differences motivate the Protestant–Catholic splits in the mechanism analysis.

This expansion generated the spatial and temporal variation used in the empirical analysis. Missionaries were initially concentrated in treaty ports and a small number of coastal locations, and gradually moved inland.[7] Figure 2 illustrates this staggered expansion in 1857, 1900, 1915, and 1936. After the founding of the People's Republic of China in 1949, most foreign missionaries left, and Christian schools, hospitals, and other institutions were brought under state control.

2.3 Missionary Education and the Diffusion of Useful Knowledge

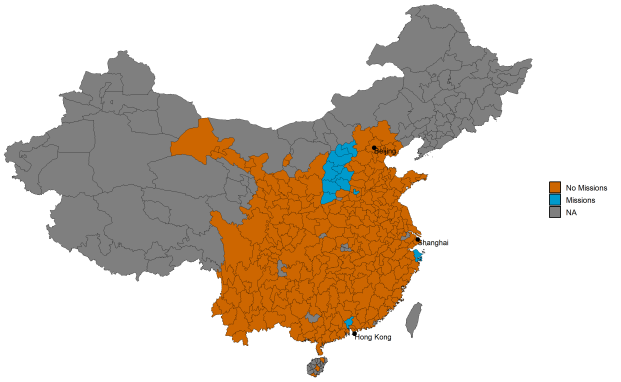
Missionaries could affect modern banking because they supplied skills and knowledge that were useful for operating new financial institutions. China already had an advanced education system,

[6] Following the war, China signed the *Convention of Peking*, which expanded missionary rights. By the late nineteenth century, around 1,500 missionaries and more than 80,000 Protestant converts were recorded in China.

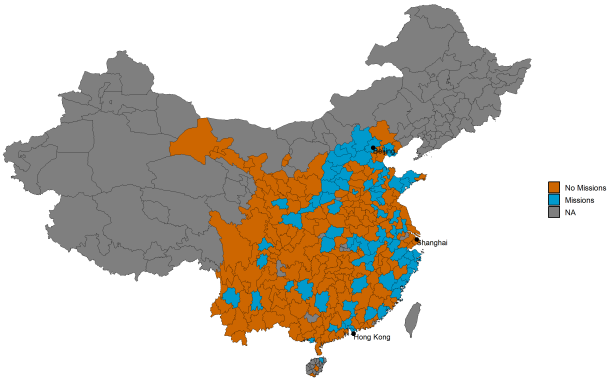
[7] According to Gu (2010), missionaries arrived at major coastal ports by ship and then ventured inland using railroads and other local transport. We discuss these transport data in Section 3.

Figure 2: Expansion of Missionaries

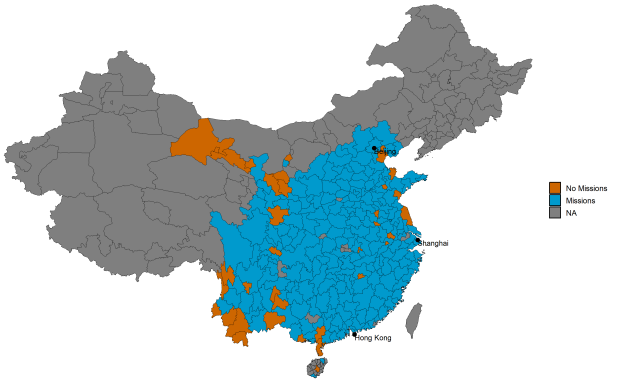
(a) 1857



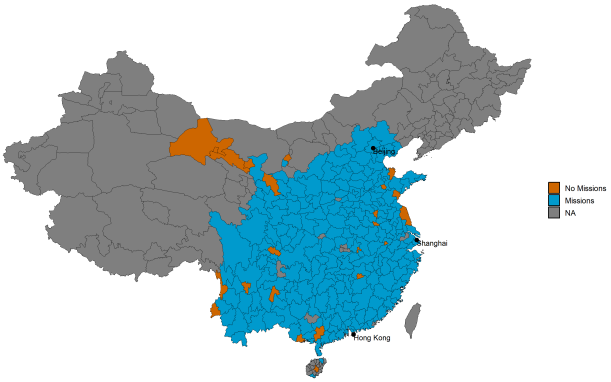
(b) 1900



(c) 1915



(d) 1936



Notes: These maps show the expansion of missionaries over time for selected periods. Prefectures with missionary presence are shown in blue, those without missionaries in orange, and prefectures not included in the main analysis are in gray. Panel a shows prefectures with missionaries by 1857, panel b by 1900, panel c by 1915, and panel d by 1936. See Figure A3 for more detailed maps of missionary diffusion. Data on missions are from the CHCD, and prefecture boundaries are from CHGIS 1911.

but it was largely oriented toward the civil service examination (Bai, 2019). This system emphasized classical texts, literary training, and preparation for official careers. It produced a highly educated elite, but it was less directly connected to the practical skills needed in modern banks, such as accounting, foreign languages, commercial law, and applied mathematics.

Missionary education introduced a different type of human capital. Protestant missionaries in particular established schools ranging from village primaries to colleges and universities. These schools taught modern subjects such as mathematics, science, bookkeeping, economics, and English, and Christian institutions accounted for an important share of modern higher education in early twentieth-century China (Bai, 2019; Bays, 2011; Bai and Kung, 2015). These were precisely the skills needed to work in, manage, and expand modern banks. The point is not that missionary schools replaced China's education system. They were small relative to the full education market. Rather, they supplied a specialized form of practical training that could have high value in a period when new financial institutions were being adopted.[8]

Missionaries also diffused useful knowledge through publications and translations. Missionary presses produced religious texts, school materials, newspapers, scientific works, and bilingual or vernacular publications. These materials made Western knowledge more accessible to Chinese readers and helped transmit ideas about science, education, commerce, and modern institutions (Liang, 1988; Stauffer, 1922; Dennis, Beach, Fahs, and Bartholomew, 1911).[9] This publication channel complements the education channel. Schools trained students directly, while translations and printed materials helped knowledge circulate beyond the classroom. Together, these channels explain why missionary exposure could matter for the local adoption of modern banks: missionaries did not only bring foreign institutions to China; they helped form the skills and knowledge that made those institutions usable in the Chinese context.

[8] As qualitative evidence, we also reviewed 44 interview summaries from Christian missionary workers in the Claremont Colleges Special Collections. A preliminary AI-assisted coding shows that mission schools and modern curricula are common themes, and selected excerpts mention English instruction, girls' education, and graduates entering Chinese banks. See Appendix E.

[9] This information role is related to recent work on Jesuit missions and international trade, which emphasizes missionary letters and publications as information flows from China to Europe. Our mechanism instead focuses on the internal diffusion of skills and knowledge useful for financial modernization (Chen, Li, and Ma, 2025).

3 Data and Descriptive Statistics

This section describes the datasets used in our analysis, focusing on missionary diffusion and modern banks, and presents additional data sources. All data are aligned with 1911 prefectural boundaries from CHGIS (2016), a standard reference in this field (Bai and Jia, 2016; Lin, Ma, Sun, and Xu, 2021; Dong and Zhang, 2024). Summary statistics are presented in Tables A4 and A5.

3.1 Missionary Institutions

We use the *China Historical Christian Database* (CHCD) for detailed geographic data on Christian institutions in China from 1550 to 1950. This dataset, a collaborative effort by theology researchers at the Center for Global Christianity and Mission at Boston University, merges data from various sources for a comprehensive study of Christianity in China. For more details, see Mayfield, Frei, Ireland, and Menegon (2024).[10]

The current baseline CHCD extract contains 20,213 institution-location records. After matching to 1911 prefectures and counting each institution once, it covers 5,885 unique institutions. We also add a directory-based CHCD school extension digitized with CHCD collaborators from historical school and mission directories. This extension adds 971 new prefecture-matched records, mostly schools, that are not already matched to CHCD v1.[11]

The CHCD records the locations of missionary institutions and, when available, the start and end years of each institution-location relationship. We use those locations and dates to build a prefecture-year panel. Our main treatment is the first year in which any missionary institution is recorded in a prefecture.[12] Appendix Table A1 details the distribution of institution types, and Appendix Figure A2 shows the cumulative expansion of missionary institutions over time. In

[10] Here is the complete list of CHCD sources. Appendix Figure A1 describes the CHCD data structure. Appendix Table A3 reports a short external check against CMS/Stauffer Protestant missionary counts in 1920.

[11] The directory sources documented in the CHCD handoff material include Educational Directory of China snapshots for 1914, 1916, 1917, 1918, and 1920, as well as 1936 handbooks. Confirmed matches to existing CHCD v1 institutions are not counted again. The added records mainly affect education descriptives and school heterogeneity; the any-mission arrival treatment is essentially unchanged because most affected prefectures already had earlier CHCD missionary presence.

[12] We use institutions because they capture a stable local organizational presence. In the language used by CHCD collaborators, a mission station is a place where a mission organization sent missionaries for evangelization. It is less formal than a hospital or university, but still represents a local base where missionaries lived or worked, not only individual movement.

the main analysis, we treat all missionary institutions equally, while using school data to explore heterogeneity.

Figure 2 shows the expansion of missionary presence at the prefecture level. When a missionary institution is established, the prefecture is marked as "treated." Prefectures shown in gray are excluded due to limited data for remote areas.[13] Before 1900, missions were concentrated along the coast and the Yangtze River. After 1900, they spread rapidly inland, and by 1936 only a few prefectures lacked missionary presence. We call these "never treated" prefectures. Our results remain robust even when these are excluded.

The CHCD also includes person, corporate-entity, and event nodes that can be linked to institutions and prefectures. We use these data mainly to describe missionary flows and to recover subdenomination detail. For the broad Protestant–Catholic split, we instead use the institution tradition field, because the CHCD team treats institution affiliation as more stable than individual affiliation.[14]

3.2 Modern Banks in China

For our historical analysis (1857–1936), we obtain bank data primarily from the *National Banking Yearbook* by Bank of China Economic Research Office (1937). The Republic of China government conducted a nationwide bank survey from 1934 to 1937, recording banks and bank offices listed by the survey, along with some older entries that had already ceased operations.[15] The dataset includes bank names, establishment dates, prefectures, addresses, equity ownership (Chinese government-owned, private, government-private joint, and foreign banks), and details on head offices and branches.

We supplement our analysis with foreign bank data from Huang (1995). Since the census mainly

[13] See Figure A3 for more detailed maps of missionary diffusion.

[14] The current CHCD v1 node file contains about 33,900 person nodes, 1,155 corporate-entity nodes, and 130 event nodes. Among missionaries with non-missing tradition in the processed person-location file, about 95% are Protestant. See Appendix Table B1 for the institution-based broad split, Appendix Table B2 for people-based subdenominations, Figures B2 and B3, and Appendix Figure B1.

[15] Direct inspection of the cleaned bank files shows that the data are not a pure survivor sample. The notes field flags about 5% of bank rows as ceased operations, in liquidation, or otherwise closed, and a smaller number include explicit closure or reorganization years. At the same time, the files do not contain a systematic closure-date column, so banks and branches that failed before the survey are still likely underrecorded. We therefore interpret the historical bank outcomes as total recorded modern-bank establishments, not as a complete opening–closure panel.

covers Chinese-owned banks, Huang's collection of enterprise directories (1861–1948) fills in gaps for foreign banks by providing details on bank names, operational dates, countries of origin, main branch locations, assets, and founders.[16] We used the Google API to obtain geographic coordinates for each modern bank's location, manually verified the data, and matched these coordinates to 1911 prefectures defined in CHGIS (2016).

The data show a rapid but uneven spatial expansion of modern banking. As shown in Figure 1, modern banks grew quickly as *Piaohao* declined. In the full historical panel, 9 of 247 prefectures had a modern bank by 1897. This increased to 57 by 1915, 82 by 1926, and 168 by 1936. Appendix Figure A5 maps this expansion using 1911 prefecture boundaries. Banks were initially concentrated in treaty-port and lower-Yangtze prefectures, then spread more widely inland during the Republican period.

For the long-term analysis, we collected data from the China Financial Supervision and Administration Bureau website, which provides detailed information on financial institutions that have received government-issued licenses from 1949 to 2022.[17] For each institution, we record the establishment date, prefecture of location, and closure date (if applicable).[18]

3.3 Other Data

Banker Biography Data (1857—1936). We hand-collected a unique set of banker biography data, which records bankers in key positions (directors, sponsors, managers, etc.) at Chinese-funded banks. This data was sourced from the *Jindai Zhongguo Yinhangye Jigou Renming Dacidian (Dictionary of Institutions and People of Modern Banking in Modern China)*, edited by Jiang (2014).

Bank Balance Sheets (1912—1936). We also digitized balance-sheet information for modern banks. We use two complementary sources. The 1932–1936 data come from the *National Banking Yearbook* (Bank of China Economic Research Office, 1937) and are bank-level records, which we

[16] Huang (1995) collected dozens of enterprise lists published in major Chinese cities between 1861 and 1948, such as the North China Desk Hong List, The Shanghai Directory, and others.

[17] See https://www.cbirc.gov.cn.

[18] According to the Ministry of Justice of the People's Republic of China, financial institutions include policy banks, commercial banks, financial asset management companies, credit unions, postal savings institutions, trust and investment companies, enterprise group finance companies, financial leasing companies, and foreign financial institutions; see https://www.moj.gov.cn/pub/sfbgw/flfggz/flfggzbmgz/200308/t20030813_143502.html.

use mainly for deposits, loans, assets, income, net income, cash, securities, paid-in capital, surplus reserves, and related ratios. The 1910s data come from Republican Ministry of Agriculture and Commerce statistical tables (Ministry of Agriculture and Commerce, 1912–1924). These records list head offices and branches separately, so we geocode each location to 1911 prefectures and aggregate branch-level information on deposits, capital, paid-in capital, banknote issuance, and surplus reserves. Since the 1910s series is less complete over time, we use it mainly as supporting evidence.

***Piaohao* (1823–1940).** We collected data on *Piaohao* from 1823 to 1940 based on Huang (2002) and Liu (2018).[19] The data include *Piaohao* name, founder-origin affiliation, location, head office/branch status, opening year-month, suspension year-month, and closure year-month.[20]

***Qianzhuang* (1871—1936).** We also collected and geocoded *Qianzhuang* data from the *National Banking Yearbook* conducted by Bank of China Economic Research Office (1937). The dataset covers the name of the *Qianzhuang*, date of establishment, prefecture of location, address, and core staff names and positions. These local money houses are used both as predetermined controls and to study how missionary exposure interacted with traditional finance.

Geographic, Economic, and Clan Controls. As additional geographic and economic controls, we use data from Bai and Jia (2016), which includes information on prefecture population, proximity to the sea, presence of a major river, rice cultivation suitability, status as a provincial capital, and status as a treaty port. In some balance and mechanism exercises, we also use genealogy-book counts from Dong and Zhang (2024) as a measure of Confucian clan intensity, following the banking literature on clans and financial development (Chen, Ma, and Sinclair, 2022).

Modern Enterprises (1840—1936). Data on the distribution of Chinese enterprises' head offices from 1840 to 1937 is recorded by Du (1991, 2019). Since these are registered enterprises, smaller enterprises are likely underrepresented or missing from this dataset.[21] We complement

[19] Huang (2002) collected *Piaohao* data from four sources: (1) newly excavated and collected materials from the Chinese Piaohao Museum in Pingyao County, Shanxi (the birthplace of the *Piaohao*); (2) materials lost to Japan that were recovered in cooperation with the Japanese government; (3) files of the Fengtian Chamber of Commerce in the Liaoning Provincial Archives; and (4) collections from descendants of the founders of the *Piaohao* and private collectors. Liu (2018) collected data based on his collation of original Shanxi businessmen's documents from various sources.

[20] Unlike modern banks and *Qianzhuang*, *Piaohao* branches are recorded with their own opening and closing dates, so the survivor-bias concern is much smaller.

[21] All included enterprises in the shipping, industrial, and mining industries have a capitalization of more than 10,000 silver dollars, and those in the financial industry have a capitalization of more than 50,000 silver dollars.

these data with a separate directory of foreign enterprises from Huang (1995). In the combined enterprise data, about 70% of enterprises are private, 5% government, and 24% foreign.

Trade (1934—1936). We gathered prefecture-level trade data from Ministry of Communications (1937). In 1934, the government entrusted local postal offices with a census of trade product types, production volumes, prices, and sales areas at the county and township levels, which was completed in 1936. We obtained domestic and international export data, including trade value and the types of commodities traded both in total and for each commodity separately.

Railway (1840—1949). We gathered data from Ma, Lu, Wang, and Wang (1983) on the stations and opening times of China's railroads during the period 1840–1949 and projected this information to the prefecture level.

GDP (1992—2022). Chen, Gao, Cheng, Hou, Song, Liu, and Liu (2022) estimated China's GDP from 1992 to 2019 using $1km \times 1km$ nighttime light data, which we aggregated to obtain prefecture-level GDP data.

4 Empirical Strategy

This section outlines the empirical exercise, which is divided into two parts. First, we apply a historical staggered difference-in-differences (DiD) analysis, examining the impact of missionary exposure on the development of modern banks and enterprises from 1857 to 1936. Next, we explore the long-run effects by studying the impact of historical missionary exposure on contemporary bank establishments, using an instrumental variable (IV) strategy.

4.1 Historical Analysis: Staggered DiD

4.1.1 Estimating Equations

Our baseline historical panel includes 247 prefectures between 1857 and 1936, of which 232 receive missionaries during the sample period.[22] We exploit the gradual expansion of missionaries described in Section III and define treatment based on the timing of missionary arrival. We follow Sant'Anna

[22]This is not the total number of Chinese prefectures, which ranged between 250 and 300 at the time. We included prefectures in the sample for which we have data on modern banks, enterprises, missionaries, and covariates. This yields coverage similar to that of other historical studies of China, due to data availability.

and Zhao (2020) to construct heterogeneous-robust estimates in an event-study regression. For simplicity, consider first the following static standard TWFE model, valid under heterogeneous treatment effects:

$$Y_{it} = \alpha_i + \theta_t + D_{it}\beta_{post} + \varepsilon_{it} \tag{1}$$

Where i and t stand for prefecture and year, respectively. D_{it} is a dummy variable that takes the value 1 for all years after the first missionary institution entered that prefecture, and 0 otherwise. D_{it} is always 0 for prefectures where missionary institutions never entered (i.e., "never treated"). Y_{it} represents the total number of modern banks or enterprises. The parameter of interest, β_{post}, measures the change in the outcome variables of the treated prefectures compared to the yet-to-be-treated and never-treated prefectures, conditional on the set of prefecture and year fixed effects. By design, we exclude prefectures that were already treated before 1857 (i.e., "always treated"), and we cluster standard errors at the prefecture level.

In practice, our estimation is more closely represented by a TWFE event-study model like the following:

$$Y_{it} = \alpha_i + \sum_{r \neq 0} 1[R_{i,t} = r]\beta_r + \varepsilon_{it} \tag{2}$$

Where we define $G_i = \min\{t : D_{i,t} = 1\}$ to be the earliest period at which unit i receives treatment, $R_{i,t} = t - G_i + 1$ is the time relative to treatment (e.g., $R_{i,t} = 1$ in the first treated period for unit i), and the summation runs over all possible values of $R_{i,t}$ except for 0. However, even this specification can encounter "forbidden comparison" issues under heterogeneity across cohorts (Sun and Abraham, 2021). Given that in our setting we are estimating ATTs over an 80-year period and for 42 cohorts, we believe that the doubly-robust Sant'Anna and Zhao (2020) estimator is suitable for our baseline model, as it will allow us to correctly estimate β_r even if the treatment effect for a cohort treated in 1861 is very different from that of a cohort treated in 1934.[23]

In short, our estimator is calculating many group-time average treatment effects on the treated,

[23] Note that since our estimation does not include covariates, we are assuming unconditional parallel trends and not taking advantage of the outcome model and propensity score matching. This makes this estimator very general and similar to other estimators proposed in the literature.

$ATT(g,t) = \mathbb{E}[Y_{i,t} - Y_{i,g-1} \mid G_i = g] - \mathbb{E}[Y_{i,t} - Y_{i,g-1} \mid G_i = g']$, for any $g' > t$, which gives the average treatment effect at time t for the cohort first treated in time g. These ATT's are then aggregated to obtain event-study estimates as an average of the treatment effect l periods after adoption across different adoption cohorts (Roth, Sant'Anna, Bilinski, and Poe, 2023):

$$ATT_l^{\omega} = \sum_g \omega_g ATT(g, g+l) \tag{3}$$

Intuitively, our estimator can be viewed as an aggregation of the multi-period analog of equation 2, with comparison groups being the not-yet treated in subsequent periods and the never-treated. The distribution G_i is shown in Appendix Figure C1.

4.1.2 Balance Test

A key assumption in our model is parallel trends between control and treated units in the staggered setting. More precisely:

$$\mathbb{E}[Y_{i,t}(0) - Y_{i,t'}(0)|G_i = g] - \mathbb{E}[Y_{i,t}(0) - Y_{i,t'}(0)|G_i = g'] \tag{4}$$

For all $t, t' \geq g_{min}$, where g_{min} is the first period in which a unit is treated, this imposes that, in the counterfactual scenario where treatment had not occurred, the average outcomes for all adoption groups would have evolved in parallel in the post-period. In our case, this means that for each cohort of treated prefectures, we would expect the total number of modern banks (or enterprises) to have evolved similarly to not-yet-treated cohorts if they had not received treatment. While we do not observe the counterfactual outcome, we can examine how prefectures that receive missionaries in a given time frame compare to the next-treated cohort of prefectures. If we observe differences in economic and social indicators across these prefectures, it could suggest that they were already following distinct trends.

A key concern from the literature on missionaries is that missions might have been established in places that were positively selected (Jedwab, Meier zu Selhausen, and Moradi, 2022). However, it is important to note that most studies on missionaries lack access to panel data, so we know relatively

little about the path of expansion and the relative selection year-to-year, especially when considering economic dynamics rather than static levels. Given the tumultuous history of missionaries in China—ranging from being confined to treaty ports, to concessions allowing expansion into the interior, and events like the Boxer Rebellion—we need to ensure we can address some of these concerns and rule out potential biases.

A first simple exercise is to examine what predicts the establishment year of missions in the cross-section (the variable that defines treatment cohorts G_i). We regress this variable on a series of predetermined economic and social indicators at the prefecture level, including province fixed effects. The time-varying variables in this specification are measured before the relevant missionary entry window. They include modern banks, enterprises, government investment during the Self-Strengthening Movement, railways, and treaty ports, together with geographic and economic controls from Bai and Jia (2016).[24]

The results from these regressions are shown in Table 2. Appendix Figures C2 and C3 report the corresponding one-by-one coefficient plots. Columns 1 and 2 reveal significant selection when considering the entire time period and all prefectures, except for those always treated. Prefectures with more railways, treaty ports, population, or provincial capital status are more likely to have received missionaries earlier. This finding aligns with historical accounts and the missionary literature, which indicate that missionaries were initially confined to a few major cities and treaty ports, with their freedom of movement only being established after the Second Opium War in 1860. Following this, missionaries aimed to reach as many prefectures as possible to convert all ethnic groups, eventually extending their reach to more remote and less populated areas (Bays, 2011). Column 2 focuses on prefectures treated after 1900, when selection is much weaker. Due to this observation, for robustness, we will later restrict the sample to post-1900 periods only.

Next, following Colonnelli and Prem (2022), we compare cohorts of prefectures that receive treatment within a given range of years to those that will receive it in the future and those never treated. We regress the indicator of whether a missionary institution entered a prefecture for different treatment cohorts on the same X's, now measured at the beginning of the time period of

[24] Modern banks, enterprises, and government investments are observed in 1880, treaty ports in 1860, and railways in 1890. For the post-1900 specification, time-varying controls are measured in 1900. Population and provincial-capital status are measured using the earliest available pre-period values.

Table 2: Predictors of Years of Treatment & Mission Status - Prefecture Level

	(1)	(2)	(3)	(4)	(5)
	Establish. Year		Cohort Comparisons		
Variables	All	Post 1900	1860-1900	1900-1904	1904-1920
Total Modern Banks	9.156	-1.899	-0.196	-0.069	0.106
	(8.755)	(5.715)	(0.244)	(0.364)	(0.251)
Total Enterprises	0.851	0.096	-0.051	0.024	-0.020
	(2.399)	(0.522)	(0.038)	(0.034)	(0.023)
Ln (investment gov. factory)	0.016	0.332	0.026	-0.086*	0.063
	(0.413)	(0.696)	(0.018)	(0.045)	(0.056)
Total railways	-5.237*	-2.163	0.837***	-0.056	0.025
	(3.004)	(3.654)	(0.230)	(0.174)	(0.099)
Total Treaty Ports	-25.857***	-0.629	0.695***	0.152	0.319
	(9.315)	(2.666)	(0.158)	(0.171)	(0.275)
Whether there's main river	-1.008	0.195	0.058	0.073	-0.072
	(1.814)	(1.371)	(0.059)	(0.088)	(0.107)
Provincial capital	-9.202***	-4.765**	0.190**	0.195	0.257
	(2.391)	(2.241)	(0.078)	(0.146)	(0.217)
Crop suitability: Rice	-0.660	0.861	-0.014	-0.051	0.068
	(1.225)	(1.002)	(0.040)	(0.064)	(0.081)
Ln population	-2.464**	-1.428	0.039	0.116**	0.034
	(1.128)	(0.883)	(0.037)	(0.057)	(0.068)
Coastal	-0.240	0.260	-0.054	0.072	0.062
	(3.100)	(3.421)	(0.101)	(0.213)	(0.475)
Province FE	Yes	Yes	Yes	Yes	Yes
Obs.	214	156	215	157	77
Adj. R sq.	0.330	0.105	0.342	0.0752	0.208
Mean Dep. Var.	1901	1907	0.250	0.448	0.635
S.D. Dep. Var.	13.75	8.173	0.433	0.498	0.482
P-value F-stat.	1.56e-05	0.452	3.59e-08	0.180	0.494

Notes: The historical panel includes 247 prefectures, of which 232 receive missionaries during the sample period. Regressions are at the prefecture level. Column 1 regresses G_i, the variable defining treatment (i.e., the establishment year of missions), on a series of covariates. The dependent variable for column 2 is the same but only for prefectures where missions were established post-1900. For columns 3-5, the dependent variable is whether a mission was established in the given range of years, and the sample includes only prefectures receiving missionaries in that time frame and in the subsequent period. Controls are from Bai and Jia (2016) and are measured in the pre-period. Banks, enterprises, and government investments are observed in 1880, treaty ports in 1860, and railways in 1890 (all measured in 1900 for column 2). Obs. refers to the number of observations; Adj. R^2 is the adjusted R^2. Fixed effects may vary; refer to the table. Standard errors are in parentheses. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively. Appendix Figures C2 and C3 report the corresponding one-by-one coefficient plots.

the treated cohorts. Columns 3–5 of Table 2 split the sample into four time periods and confirm the patterns observed in columns 1 and 2. While the estimation provides a weighted average of group treatment effects across different time periods, which is difficult to exactly replicate in a balance table, we can also generate narrower cohorts to compare a given treated cohort with the next cohort. Table 3 uses a finer partition and splits the sample into eight narrower cohort comparisons: 1860–1880, 1880–1890, 1890–1900, 1900–1903, 1903–1904, 1904–1905, 1905–1910, and 1910–1920. Appendix Figure C4 reports the corresponding one-by-one coefficient plot.

Table 3: Predictors of Mission Establishment by Range of Years and Treatment and Control Status - Prefecture Level

VARIABLES	(1) 1860-1880	(2) 1880-1890	(3) 1890-1900	(4) 1900-1903	(5) 1903-1904	(6) 1904-1905	(7) 1905-1910	(8) 1910-1920
Total Modern Banks	-0.830	-0.873	0.732	-0.086	0.107			1.359
	(0.664)	(1.874)	(1.313)	(0.407)	(0.667)			(0.824)
Total Enterprises	0.840	-1.115	-0.085	-0.006	0.218	-0.057	-0.018	0.053
	(0.540)	(0.780)	(0.116)	(0.047)	(0.265)	(0.102)	(0.042)	(0.285)
Ln (investment gov. factory)	0.005	-0.000	0.046	0.106	-0.096	0.076		
	(0.040)	(0.045)	(0.030)	(0.105)	(0.086)	(0.087)		
Total railways		0.414	-0.016	0.120	-0.588	-0.117	0.096	-0.034
		(0.396)	(0.353)	(0.204)	(0.628)	(0.158)	(0.201)	(0.288)
Total Treaty Ports	0.491	0.252	0.164	0.492		0.093	0.665	-0.330
	(0.297)	(0.381)	(0.374)	(0.354)		(0.560)	(0.488)	(1.117)
Whether there's main river	0.035	0.254	0.106	-0.034	-0.117	0.069	0.203	-0.026
	(0.221)	(0.329)	(0.110)	(0.118)	(0.246)	(0.183)	(0.189)	(0.205)
Provincial capital	0.257	0.094	-0.018	-0.185	0.156	-0.118	0.609	-0.989*
	(0.215)	(0.304)	(0.171)	(0.167)	(0.306)	(0.433)	(0.376)	(0.507)
Crop suitability: Rice	0.201	-0.178	-0.009	-0.018	0.182	-0.196	0.140	-0.026
	(0.124)	(0.239)	(0.094)	(0.091)	(0.209)	(0.182)	(0.161)	(0.117)
Ln population	0.106	-0.372**	0.135*	0.031	0.026	-0.031	-0.004	0.028
	(0.142)	(0.151)	(0.069)	(0.082)	(0.177)	(0.131)	(0.113)	(0.141)
Coastal	-0.282	0.574	-0.217	-0.002	0.898	0.532	0.122	
	(0.200)	(0.346)	(0.221)	(0.250)	(1.518)	(0.677)	(0.606)	
Province FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Obs.	42	36	68	79	38	44	36	30
Adj. R sq.	0.272	0.133	0.214	0.185	-0.279	-0.0376	0.218	0.510
Mean Dep. Var.	0.317	0.481	0.157	0.591	0.390	0.339	0.473	0.286
S.D. Dep. Var.	0.466	0.500	0.364	0.492	0.488	0.474	0.500	0.452
P-value F-stat.	0.0543	0.263	0.0414	0.896	0.926	0.913	0.670	0.350

Notes: The historical panel includes 247 prefectures, of which 232 receive missionaries during the sample period. Regressions are conducted at the prefecture level. In each column, the dependent variable is whether a mission was established in the given range of years, with the sample including only prefectures that received missionaries during that time frame and the subsequent period. Controls are from Bai and Jia (2016) and are measured in the pre-period for each column. For example, banks are measured in 1860 in column 1, meaning we compare how the number of banks in 1860 differs between prefectures with missionary presence in 1860-1880 and those with presence in 1880-1890. Obs. refers to the number of observations; Adj. R^2 is the adjusted R^2. Fixed effects may vary; refer to the table. Standard errors are in parentheses. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively. Appendix Figure C4 reports the corresponding one-by-one coefficient plot.

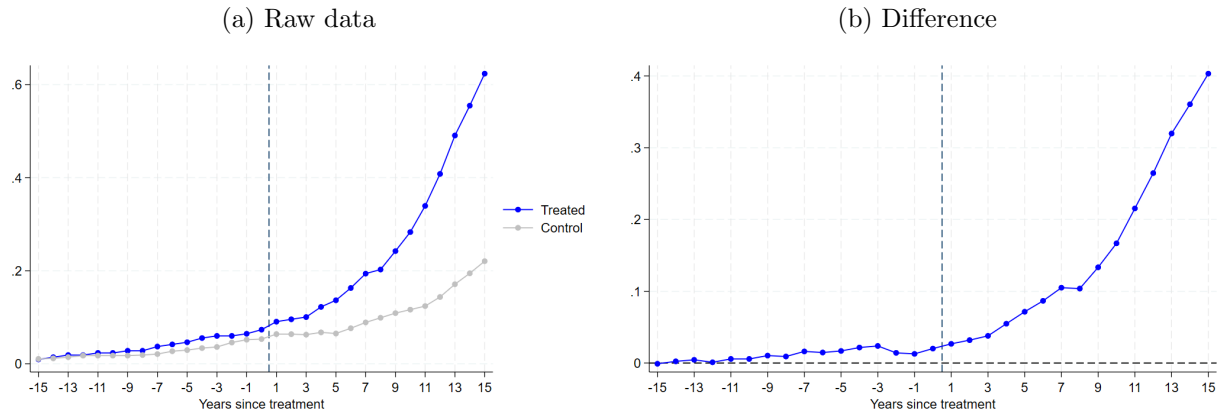
Table 3 shows that treatment and control groups are generally balanced, with only a few variables statistically different from zero. We could be facing power issues due to the limited sample size, but the results suggest that the selection we previously observed was largely driven by comparisons over long periods, when prefectures treated early were very different from those treated decades later. When comparing cohorts closer in time, treated and not-yet-treated prefectures appear more similar. One interpretation is that mission expansion depended on the interaction between local suitability and external missionary supply. Local factors, such as a new railway connection or demand for schools, could make several prefectures plausible mission targets around the same time. Which of these places received missionaries first could then depend on external

factors, such as missionary inflows, denominational budgets, conferences, revivals, wars, or funding cycles, that were not driven by the local economic trends of a specific prefecture. This interpretation is related to the source of variation used in the long-run IV analysis below, although the DiD estimates themselves do not rely on that instrument.

4.1.3 Results

We begin with modern banks, our main historical outcome. Panel A of Figure 3 displays the raw data over a window of [-15, 15] years surrounding the arrival of missionaries, using the 247-prefecture historical panel between 1857 and 1936. The control group consists of the next cohort of treated prefectures and the never-treated group for each year. While not perfect, this comparison closely mimics the variation underlying our estimator. Treated and control prefectures follow similar trends before missionary arrival and then begin to diverge after treatment. Panel B plots this difference directly.

Figure 3: Raw Data: Total Modern Bank Dynamics

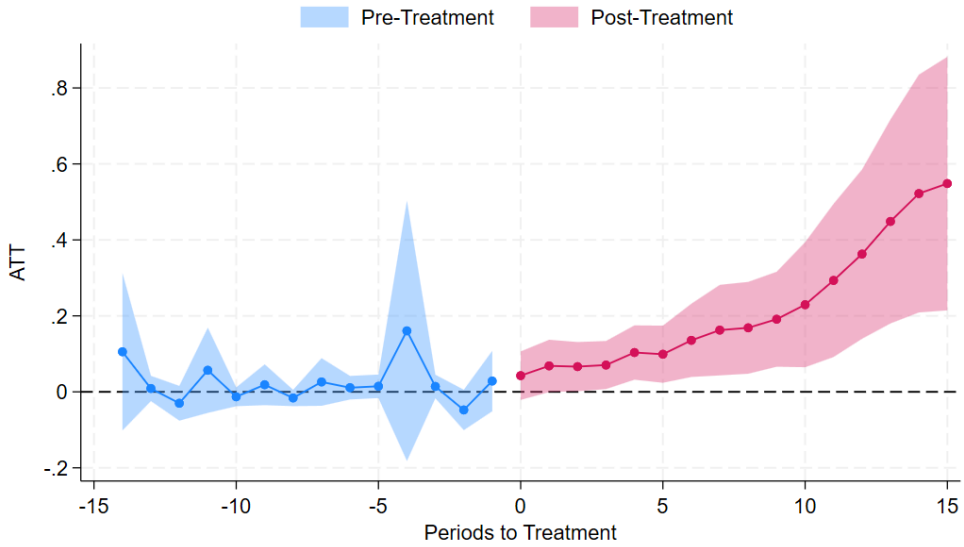


Notes: Panel A displays the raw data for total modern banks over a window $[-15, 15]$ years surrounding missionary arrival, using the 247-prefecture historical panel between 1857 and 1936. The control group consists of the next cohort of treated prefectures and the never-treated group for each year. Panel B plots the treated-control difference in the raw data.

To identify these dynamics more precisely, Figure 4 plots the event-study estimates from equation 2. The pre-treatment coefficients are close to zero, while the effect becomes positive and grows gradually after missionary arrival. The post-period average ATT is 0.22, which corresponds to a 31% increase over the mean number of modern banks in the sample.

One concern is that modern banks are rare in the early part of the sample, so flat pre-trends may

Figure 4: Missionary Presence and Total Modern Banks: 15 Periods



Notes: The figure reports event-study estimates from equation 2, using 15 periods before and after missionary arrival. The dependent variable is the total number of modern banks. The average post-treatment ATT is 0.22. The dependent-variable mean is 0.7 overall, 1.7 in 1920, and 5.8 in 1936 (Figure A7 reports the mean by year). Appendix Table D1 reports the corresponding pre- and post-treatment averages and alternative bank outcomes.

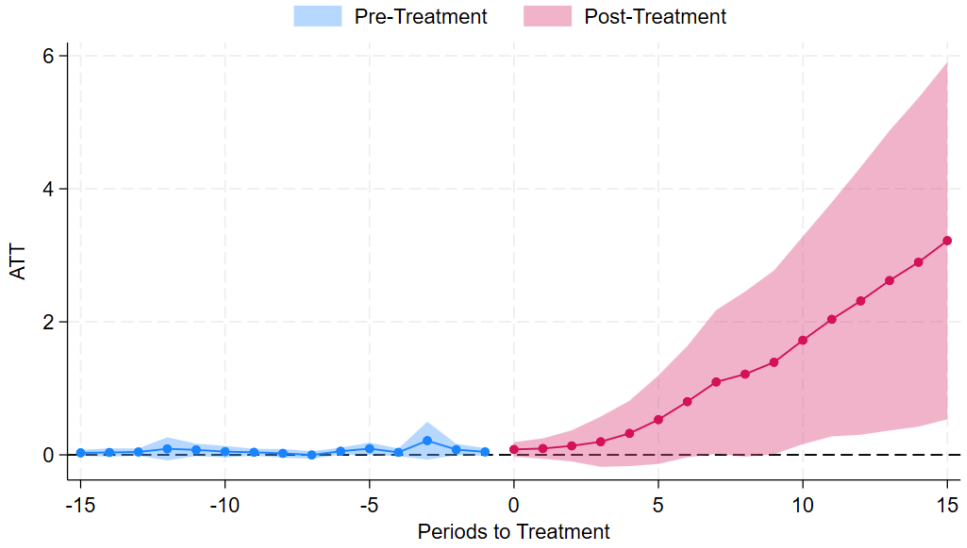
partly reflect limited pre-period variation. Appendix D.1 addresses this concern in two ways. First, a design-based minimum detectable effect exercise uses the estimated pre-period coefficients and covariance matrix to ask how large hidden pre-trends would need to be detected. The exercise shows that the design is informative against several smooth pre-trend shapes, although very late pre-trend activation is harder to detect. Second, the result is robust to alternative outcome transformations, including $\log(y+1)$, growth rates, an extensive-margin indicator, new-bank flows, and province-conditioned outcomes.

The effect is also not limited to the aggregate number of banks. Appendix D.2 shows similar patterns for private, government, and foreign banks. Supporting balance-sheet evidence also points in the same direction: missionary exposure is associated with larger deposits, loans, assets, and related measures of bank size. These results suggest that missionary presence affected the scale of modern banking activity, not only the recording of bank establishments.

We next ask whether missionary exposure also affected downstream market activity. The number of enterprises, particularly private ones, is a natural outcome because modern banks could relax financial constraints and support enterprise formation. Figure 5 presents the results for total

enterprises over the same 15-period window. As with modern banks, there are no visible pre-trends before missionary arrival. After treatment, missionary presence has a delayed positive effect on enterprises. This delayed timing is one reason we interpret enterprises as a downstream outcome rather than the first mechanism through which missionaries mattered. The event-study aggregation reported in Appendix Table D1 gives a post-treatment ATT of 1.29, about 27% of the mean.

Figure 5: Missionary Presence and Total Enterprises: 15 Periods



Notes: The figure reports event-study estimates from equation 2, using 15 periods before and after missionary arrival. The dependent variable is the total number of enterprises. The average post-treatment ATT is 1.29. The dependent-variable mean is 4.8 overall, 7 in 1920, and 17 in 1936 (Figure A8 reports the mean by year). Appendix Table D1 reports the corresponding pre- and post-treatment averages.

Appendix D.3 reports additional downstream outcomes. Missionary exposure is associated with stronger growth in trade-oriented activity and exports in 1936, consistent with modern banks supporting broader market exchange. The trade effects also appear with a lag, which reinforces the interpretation of trade as a downstream market response. Appendix D.4 then studies the transition from traditional to modern finance. The clearest substitution pattern is for *Piaohao*: missionary arrival is followed by the rise of modern banks and the eventual decline of these older remittance institutions. Results for *Qianzhuang* are reported separately in the appendix, since their local networks appear to have been more complementary with modern banks.

Finally, Appendix D.5 reports the remaining identification checks. The results are robust to restricting the sample to the post-1900 and post-1905 periods, excluding treaty ports, using longer event windows, balancing the number of pre- and post-treatment periods, adding railway controls,

and examining group-specific ATTs. We also find no pre-trends in other predetermined outcomes, including enterprises, government investment, railways, treaty ports, traditional banks, and trade.

4.1.4 Mechanisms

Why would exposure to missionary institutions contribute to the development of modern banks? We focus on two related mechanisms, supported by available data: practical education and the diffusion of useful knowledge through publications and translations. Both channels speak to the same idea. Modern banks were a new institutional technology in China, and missionary institutions helped form the skills and knowledge that made this technology usable locally. The exercises below should be interpreted as suggestive mechanism evidence, since missionary schools, publications, and other mission activities often arrived together.

Education One of the primary channels through which Christianity can foster market-oriented development is through the dissemination of ideas and education (Becker and Woessmann, 2009; Bryan, Choi, and Karlan, 2020). Jedwab, Meier zu Selhausen, and Moradi (2022) survey fifty studies on missionaries published over the past decade and find that nearly all of them associate colonial Christian missions with improved human capital outcomes. Education has also been identified as a key mechanism in other studies that find positive effects of missions on Chinese development (Bai and Kung, 2015; Ma, Yan, and Zhao, 2022b). In our setting, the relevant channel is a specific form of practical education. Missionary schools, especially Protestant ones, taught subjects such as mathematics, science, bookkeeping, economics, and English. These were skills needed to work in, manage, and expand modern financial institutions. We explore the importance of education in three ways.

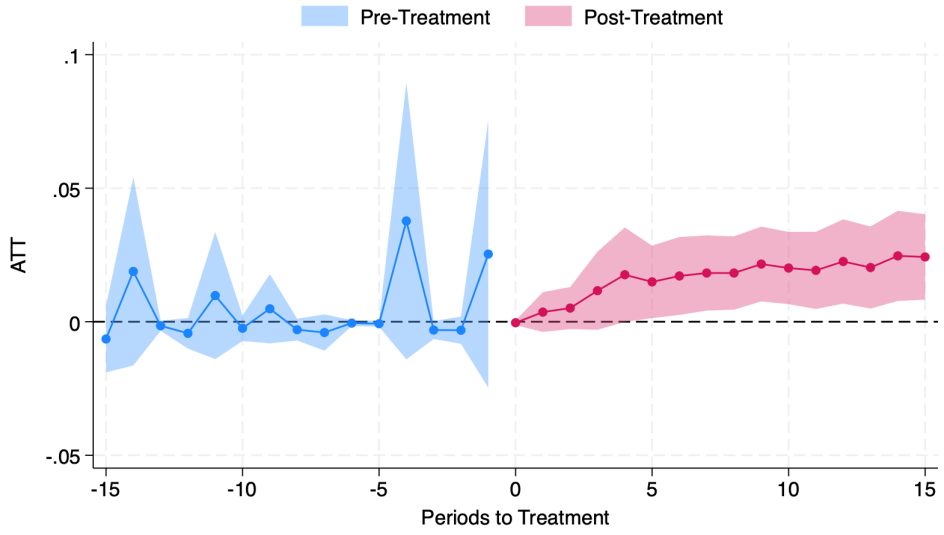
First, we focus on skilled education by using our banker dataset to assess how missionary institutions influenced the rise of Christian-affiliated bankers. If missionary education had a significant effect on the financial sector, we would expect a higher share of bankers who were either affiliated with Christianity or educated in Christian schools in areas with missionary presence.[25]

[25] For example, Lin Zifeng (1892–1971) was a prominent banker and Baptist church leader in the Republic of China. His father was a Baptist pastor, and Lin became a Christian at the age of 14, attending the Baptist Jieyang Truth High School. In 1922, Lin founded the K. W. Bank in Guangzhou, which was reorganized as the K. W. Savings Bank in June of the same year. Between 1924 and 1931, he opened a branch in Shanghai with a share capital of one million

To test this, we digitized a book that compiled the resumes of notable bankers and created a variable to represent their relationship with Christianity (Jiang, 2014). We coded bankers as "Christian-affiliated" if they were born into a Christian family, converted to Christianity, attended a church school, or worked in a Christian institution. We then matched the names of the banks where these bankers were employed with our bank data for the period 1857–1936.[26] The presence of Christian bankers is significant, even though the data include only Chinese individuals and exclude foreigners: across the years, there are 693 Christian bankers out of 2,576 total bankers, yielding a ratio of Christian bankers to total bankers of 26.90%. For intuition on the magnitude of this ratio, we compare it with the proportion of Christian converts. According to data provided by Mattingly and Chen (2022), the average number of Christians in China's prefectures in 1920 was 2,730, with an average population of 1,371,070, implying that Christians made up 0.20% of the population. Appendix Figure E1 shows the ratio of Christian bankers to the total number of bankers over time.

Figure 6 then estimates the effect of missionary presence on the share of Christianity-related bankers. The share increases after missionary arrival, consistent with the idea that missions helped train or connect individuals who later worked in modern banking.

Figure 6: Missionary Presence and the Share of Christianity-Related Bankers



Notes: This figure shows the result using equation 1, with the share of Christianity-related bankers as the outcome. Post ATT: 0.016; dependent variable mean: 0.025; 0.052 in 1920 and 0.113 in 1936.

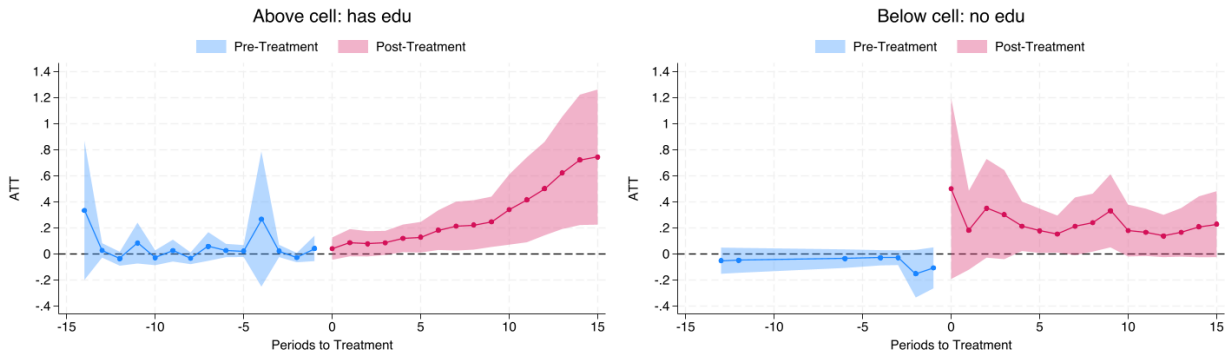
Hong Kong dollars.

[26] Currently, the year is therefore imputed from the bank data.

Second, we consider education more broadly by distinguishing missionary exposure that included schools from exposure that did not. With the expanded school data, the effect on modern banks is positive both in prefectures with missionary schools and in prefectures without them. This suggests that education is important, but it is not the only channel. The timing is also informative: the school difference becomes larger later in the event window, which is consistent with the time needed for education to affect the local supply of bankers and managers. For downstream enterprises, the school channel carries most of the bite, suggesting that practical education mattered especially for the broader diffusion of market activity. Appendix Table E3 summarizes these magnitudes, and Appendix Figure E5 reports coefficient-by-coefficient difference tests for the main school and school-publication splits.

Figure 7: Missionary Presence and Modern Banks: Places With and Without Missionary Schools

(a) Modern banks on missions with schools (b) Modern banks on missions without schools

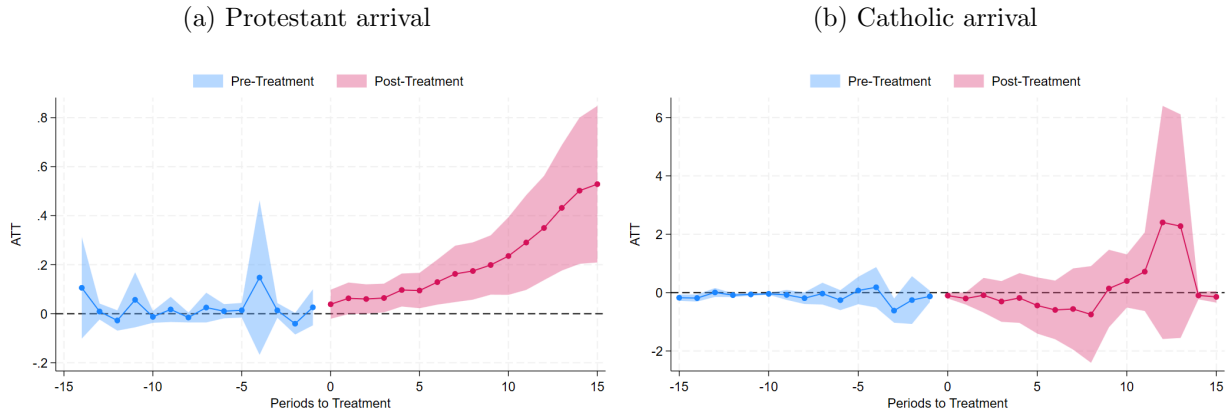


Notes: This figure uses the expanded school definition that includes the additional digitized missionary schools. Panel A includes treated prefectures with at least one missionary school; Panel B includes treated prefectures without a missionary school. Never-treated prefectures are used as controls in both panels.

Third, using the CHCD institution tradition field, we categorize mission presence as Protestant or Catholic. If the effect operates through practical education, we expect it to be driven mainly by Protestants, who placed stronger emphasis on schooling and conversion through education (Bai, 2019; Bai and Kung, 2015). Figure 8 supports this interpretation. Protestant missionary arrival is associated with a positive effect on modern banks, while Catholic missionary arrival is not.

Publications and translations The second mechanism is the diffusion of useful knowledge through publications and translations. Missionaries produced and translated Western texts into Chinese, including religious texts, school materials, newspapers, scientific works, and economic or

Figure 8: Missionary Presence and Modern Banks: Protestant and Catholic Missions



Notes: The treatment in Panel A is defined as the year of arrival of a Protestant missionary institution. The treatment in Panel B is defined as the year of arrival of a Catholic missionary institution. The outcome is the total number of modern banks.

educational materials. Many of these publications were written in vernacular or romanized Chinese, making them accessible beyond the classical elite. This channel complements the education channel: schools trained students directly, while translations and printed materials helped knowledge circulate outside the classroom.

We exploit publication data from 677 missionary publications. Table 4 summarizes the main features of these publications. About 38% were in vernacular or romanized Chinese, 32% included a Western language, 17% included English, and 16% were educational or student-oriented. Figure 9 plots the growth of missionary publications over time.

Table 4: Features of Missionary Publications

Publication feature	**Freq.**	**Percent**
Religious / missionary focus	461	70.2%
Vernacular / romanized Chinese	260	38.4%
High circulation (>900)	260	38.4%
Western language present	214	31.6%
English present	112	16.5%
Educational / student-oriented	108	16.4%
High frequency (24+ issues per year)	101	14.9%
Bilingual (Chinese + Western)	55	8.1%
Scientific / technical	29	4.4%

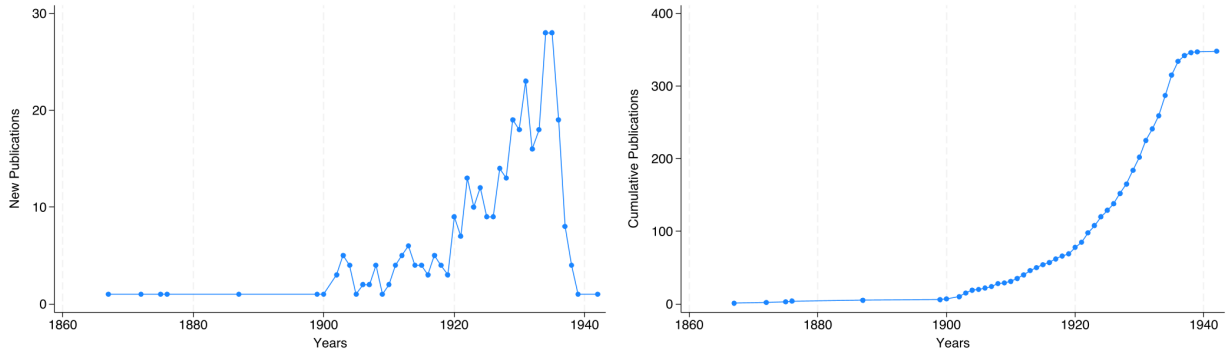
Notes: The table reports descriptive features of the missionary publication data used in the mechanism exercises. The categories are not mutually exclusive.

We then test whether locations with missionary publication activity experienced stronger effects on modern banks. Figure 10 splits treated prefectures by whether they ever had a missionary

Figure 9: Missionary Publications Over Time

(a) New publications

(b) Cumulative publications



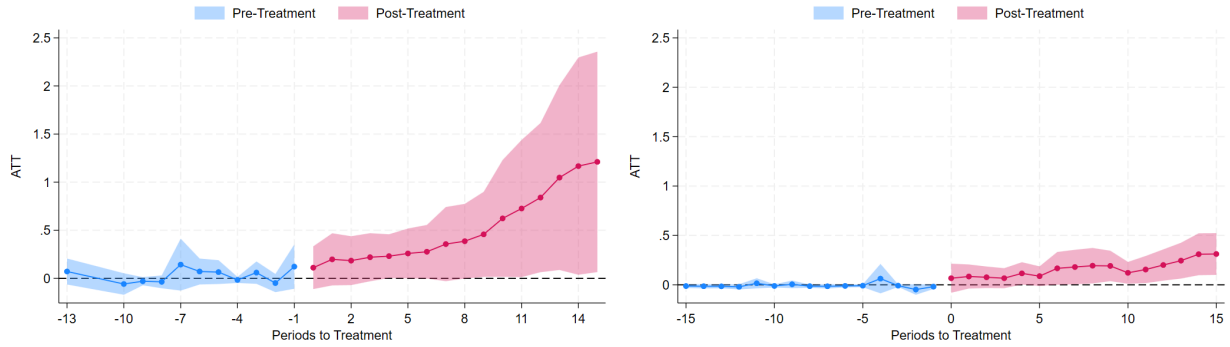
Notes: Panel A plots the number of new missionary publications by start year. Panel B plots the cumulative number of missionary publications over time.

publication in circulation. The effect is much stronger in places with publication activity and flatter in places without publications. This is consistent with publications and translations helping diffuse the knowledge needed to adopt and operate modern financial institutions.

Figure 10: Missionary Publication Activity and Modern Banks

(a) Missions with publication activity

(b) Missions without publication activity



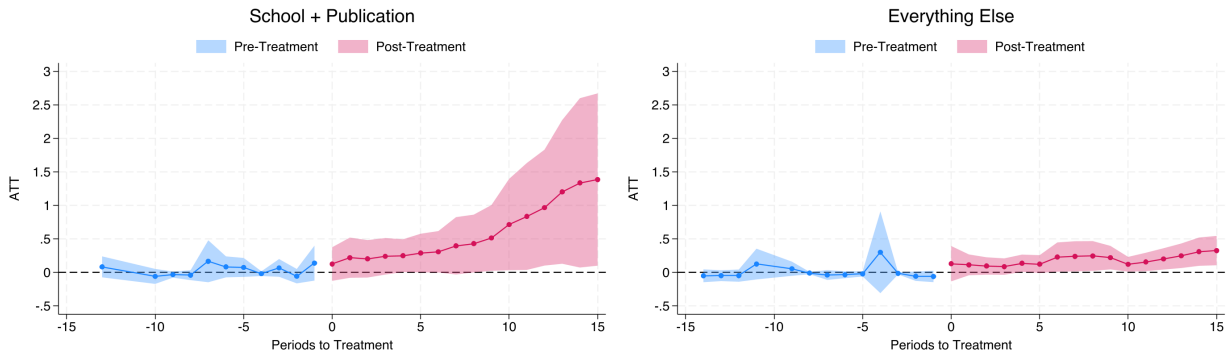
Notes: The outcome is the total number of modern banks. Panel A includes prefectures with at least one missionary publication in circulation. Panel B includes prefectures without missionary publication activity. Never-treated prefectures are included in both panels.

The education and publication channels also appear complementary. In the split by schools and publications, the largest effect is in prefectures that had both a missionary school and missionary publication activity. Prefectures with neither still show a positive effect, but the effect is smaller. This reinforces the interpretation that education and publications amplified missionary exposure, while also indicating that they do not fully exhaust the channels through which missionaries affected modern banks. Appendix Figure E4 reports the four separate cells, and Appendix Table E3 gives

the corresponding average pre- and post-treatment differences.

Figure 11: School and Publication Complementarity

(a) School and publication (b) Other treated prefectures



Notes: This figure compares prefectures with both a missionary school and missionary publication activity to the remaining treated prefectures. Never-treated prefectures are used as controls in both panels. Appendix Figure E4 reports the four separate school-by-publication cells.

Additional channels and alternative explanations The mechanism evidence should not be read as only a human-capital story. The broader institutions literature distinguishes explanations based on skills from explanations based on rules, organizations, and institutional practices (Acemoglu, Johnson, and Robinson, 2001, 2002; Glaeser, La Porta, Lopez-de Silanes, and Shleifer, 2004). In this setting, missionary schools and publications are one way institution-specific knowledge moved, but other channels could also matter.

We examine two additional channels. The first is a competing explanation based on clans. Recent work argues that Confucian clan institutions and financial markets can act as substitutes (Chen, Ma, and Sinclair, 2022), and missionary activity may weaken kin-based institutions (Henrich, 2020; Schulz, Bahrami-Rad, Beauchamp, and Henrich, 2019). This raises the possibility that our results reflect missionaries weakening clans, rather than directly facilitating modern banks. Appendix Figure E6 shows that the effect on modern banks is similar across high- and low-clan prefectures. Appendix Tables E5 and E6 then report a horse-race exercise between missionary exposure and clan intensity, using the IV strategy introduced in Section 4.2. The missionary effect remains positive, while the clan effect becomes small and statistically insignificant.

The second is a possible network channel through compradores. Compradores were Chinese intermediaries who worked with foreign firms and banks and could transmit foreign financial practices

into Chinese institutions. Our banker biography data provide descriptive evidence consistent with this channel. Appendix Table E4 shows that compradore-background bankers are a small group, but disproportionately connected to Christianity and to Chinese finance: 28% are Christianity-related, compared with 15% among other bankers, 63% later founded at least one Chinese bank, *Qianzhuang*, *Yinhao*, or *Piaohao*, and 72% worked at both foreign and Chinese banks.[27] We interpret this as suggestive evidence that missionary exposure may also have operated through networks of intermediaries connecting foreign and Chinese finance, although we do not treat this as a separate causal mechanism.

Overall, the mechanism evidence suggests that missionaries mattered through more than one channel. Education created practical human capital, especially for banking and downstream enterprise formation. Publications and translations diffused useful knowledge about modern economic and financial practices. The clan exercises suggest that the results are not simply driven by missionaries weakening kin-based institutions, while the comprador evidence points to a possible intermediary network connecting foreign and Chinese finance. Taken together, the evidence is consistent with missionaries transmitting institution-specific knowledge: not just schooling, but also practices, networks, and organizational models that helped modern banks take root.

4.2 Long-Term Analysis: IV Estimates

Can the early influence of missionaries, who introduced capitalist practices between 1857 and 1936, create lasting advantages that contribute to China's modernization from 1949 to 2022? To test this hypothesis, we examine the relationship between historical missionary exposure and bank development over this later period. Specifically, we estimate the following regression model:

$$Y_{i,p} = \xi_p + \psi \text{TotMiss Inst}_{i,p} + \nu_{i,p}$$

Where i denotes a prefecture inside a province p. Our outcome of interest is the total number of modern banks in a given recent year, and our treatment of interest is a measure of exposure to missionaries over the whole time period, TotMiss Insti, p, which is the total number of missions

[27] In levels, Sheet 1 of *Bankers CV.xlsx* contains 1,041 bankers, of whom 43 are flagged as compradore-related.

ever built or established between 1850 and 1936.[28] This cross-sectional regression presents obvious endogeneity issues that we cannot overcome directly by exploiting panel techniques, as we did using the difference-in-difference analysis. Specifically, over the whole time period, the total number of missions established in a given prefecture is endogenous and likely to be correlated with both the error term and the outcome. Our solution is to construct an instrumental variable aimed at predicting the total number of missionary institutions. Following Sequeira, Nunn, and Qian (2020), we exploit the interaction between national missionary migration flows and railway connections to instrument for missionary exposure. In this section, we show the estimating equations, explain the logic behind the instrument both graphically and descriptively, provide some examples, and then show the results.

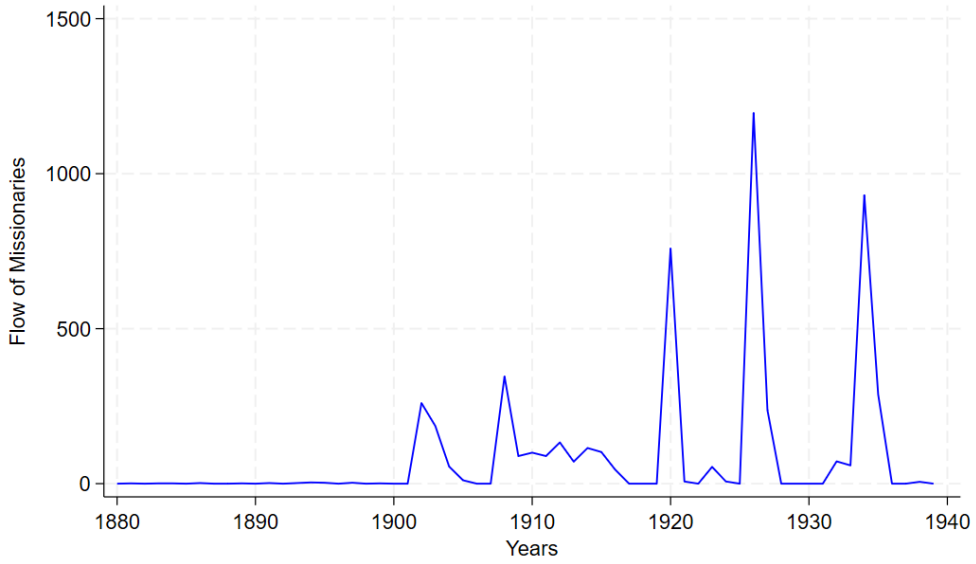
4.2.1 Estimating Equations

This IV strategy is based on two key observations regarding missionary immigration patterns during this period. Upon arriving in China, missionaries' preferred modes of transportation, whenever available, were rivers and the railway system to travel inland to their intended destinations. Consequently, a prefecture's connection to the railway network affected the number of missionaries settling in that prefecture.[29] The second observation relates to the significant year-to-year fluctuations in the total number of missionary immigrants to China within our study period, as shown in Figure 12. As a result, prefectures connected to the railway network during periods of high missionary immigration typically experienced an increase in missionary arrivals and, consequently, in the total number of missions established over the entire time period.

[28] This approach ensures consistency with the period used in the DiD analysis and allows us to examine outcomes in the 1930s. The results remain unchanged when using the broader timeframe of 1850-1950 instead.

[29] The impact of railroads on the number of missionaries is unlikely to confound the DiD estimates. In the DiD analysis, we assume that the number of railroads does not significantly affect the timing of missionary entry in the cohorts of prefectures that receive treatment within a given range of years, relative to those that will receive treatment in the future and those that are never treated. The balance tests in Tables 2 and Table 3 suggest that this assumption holds.

Figure 12: Annual Flow of Missionaries in China - 1880-1940



Notes: Flow of Missionaries at time t is defined as the total number of missionaries (people) present in China in t+1 minus the total number of missionaries present in China at t.

To better understand the source of variation in the instrument and to construct it, our analysis begins by estimating the following zero-stage equation:

$$\begin{aligned} \text{MissInst Stock}_{i,t} = \alpha_t + \alpha_i + \delta \text{RRstock}_{i,t-1} \\ + \beta \text{ Missionary Flow}_{t-1} \times \text{RRstock}_{i,t-1} + \varepsilon_{i,t} \end{aligned} \tag{5}$$

Where i indexes prefectures and t years (1850-1936). $\text{MissInst Stock}_{i,t}$ is the total missionary institutions in prefecture i and year t. $\text{Missionary Flow}_{t-1}$ is the flow of missionaries arriving in China between $t-1$ and t and $\text{RRstock}_{i,t-1}$ is total number of railways in year $t-1$. α_i is prefecture fixed effects and α_t is year fixed effects.

Central to our identification strategy is the interaction between the aggregate flow of missionaries into China and whether a prefecture was connected to the railway network:

$$\beta \text{ Missionary Flow}_{t-1} \times RRstock_{i,t-1}.$$

This interaction captures the differential effect that railway connection had on immigrant settlement

during periods of high aggregate missionary immigration compared to periods of low aggregate immigration. Consequently, we expect the estimate of β in the equation to be positive.

The two variables that comprise the interaction term are also included in equation (5), capturing the effect of being connected to a positive number of railway lines when no missionaries are entering China, and the general effect of missionary flow (absorbed by year fixed effects).

Then, to aggregate the zero stage at the prefecture level, we conduct the following exercise. After estimating equation (5), we calculate the missionary stock in each prefecture and year as predicted by the interaction between the aggregate inflow of missions and connection to the railway network:

$$\widehat{\text{MissInst Stock}}_{i,t} = \widehat{\beta}\ \text{Missionary Flow}_{t-1} \times \text{RRstock}_{i,t-1}$$

where $\widehat{\beta}$ is the estimate of β from equation (5). We then sum this prefecture year-specific predicted missionary stock over the whole time period (1850-1936):

$$\widehat{\text{TotMiss Inst}}_i = \sum_{t=1}^{T} \widehat{\text{MissInst Stock}}_{i,t}$$

Where T is the total number of periods. Finally, our 2SLS equations are equation (6), the first stage, and equation (7), the second stage:

$$\begin{aligned} \text{TotMiss Inst}_{i,p} = \zeta_p + \mu \widehat{\text{TotMiss Inst}}_{i,p} \\ + \omega \text{RR Duration}_{i,p} + \text{RR Density}_{i,p} + \varepsilon_{i,p} \end{aligned} \tag{6}$$

$$\begin{aligned} Y_{i,p} = \xi_p + \psi \text{TotMiss Inst}_{i,p} \\ + \pi\, \text{RR Duration}_{\ i,p} + \text{RR Density}_{i,p} + \nu_{i,p} \end{aligned} \tag{7}$$

Where i indexes prefectures and p indexes provinces, ζ_p and ξ_p are province fixed effects, and $Y_{i,p}$ is our outcome of interest, measured in a given recent year. We use the total number of banks for each year in separate regressions from 1949 to 2022, and GDP estimated through night lights from 1992 to 2019. RR Durationi, p denotes the number of years a prefecture has been connected

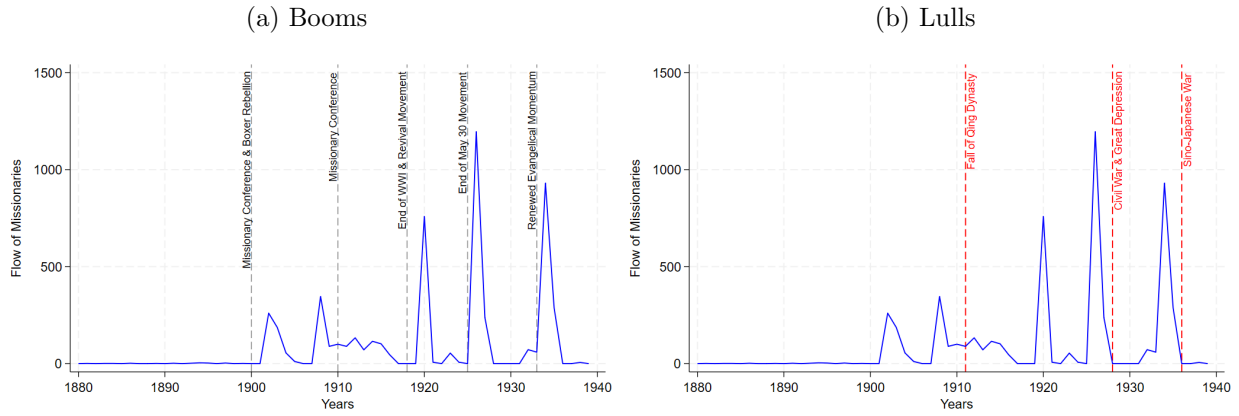
to the railway network as of 2000, while RR Densityi, p is defined as: $\frac{\sum_{t=1}^{T} \text{RRstock}_{i,t}}{Area\ in\ km^2}$, representing the total number of railway lines per km^2. This metric serves as the prefecture-level equivalent of the same term included in the zero-stage equation.

We include these controls, already introduced in the zero-stage, because the railway network influenced missionary numbers beyond its interaction with missionary flows. For instance, prefectures connected to the railway early could have a higher number of missions established by the end of the study period. Similarly, a greater number of railway lines could be associated with an increased presence of missions over time.

For this reason, our IV strategy cannot rely on railway stock and length of connection as sources of variation, but instead needs to directly control for these factors. In fact, conditional on the length of connection to the railways and the total number of railway lines per km^2, we are identified by the fact that prefectures connected prior to high migration periods received more missions than those connected prior to a lull. What matters is therefore the coincidental timing of railway construction in interaction with missionary flows. To be more precise, our source of exogenous variation comes from the zero-stage interaction: number of railways $_{t-1}$ $\times$ national missionary flows $_{from\ t-1\ to\ t}$.

The exclusion restriction is satisfied if this interaction affects our outcome of interest, such as the total number of banks in 2000, solely through its impact on the total number of missions. An example of a violation of this assumption would occur if a prefecture decides to build a railway line in period t-1 specifically to attract more missionaries in period t. Note that internal movements of people and resources due to the railway do not pose an issue because we are comparing places with the same exposure to the railway over the entire time period, with the only variable being the exact timing of railway connections. For this reason, this IV can only be used when it is possible to aggregate a long historical time period to study more recent outcomes. Potential issues could arise from economic or social conditions within China that affect both the exact timing of railway construction in a given prefecture and the flow of missionaries in a given year. For example, a war might delay railway expansion and missionary flows. However, what matters is that the war or event specifically shifts railway construction from $t-1$ to t, or from t to $t-1$, rather than causing general delays. In the next sections, using a combination of balance and descriptive statistics, we will argue that this is unlikely to occur.

Figure 13: Annual Flow of Missionaries in China - Booms and Lulls



Notes: this figures shows some of the potential push and pull factors influencing missionary migration flows between 1880 and 1940

4.2.2 Sources of Variation for Identification

The first source of variation used for identification is the yearly missionary migration flows. While multiple factors influence these flows, we can identify some key push and pull factors that may contribute to the spikes and lulls observed in Figure 12. Figure 13 illustrates events that may correlate with missionary migration. We note that some of these spikes coincide with factors related to the Christian church's priorities, such as the conclusion of missionary conferences aimed at boosting missionary presence overseas or major revival movements.

In fact, during this period, missionary migration was primarily driven by religious revivalist movements and economic conditions in the missionaries' home countries, rather than by the economic situation in China. In the nineteenth century, Western countries, particularly in Europe and the United States, experienced several religious revivalist movements, such as the Second Great Awakening, which fueled a strong desire for overseas missionary work (Shelley, 2004). Around 1830, there was a prevailing belief in British society that, as a Christian nation, it had a responsibility to spread Christianity to overseas territories (Shelley, 2004). Similarly, between 1880 and 1920, American society viewed overseas missions as a means to demonstrate American power, leading to an unprecedented wave of student volunteers for missionary work abroad (Wang, 1997). The end of World War I saw a significant missionary revival movement, especially in countries with sufficient resources to send missionaries abroad. A similar pattern followed the end of the Great Repression.

Additionally, missionary migration was constrained by the economic power of their home countries. A stable and continuous source of funding was essential for missionaries to sustain their work abroad. For instance, prior to World War I, British missions were the predominant force in China. However, during the war and the subsequent decline of British influence, the strength of British missions diminished. By 1930, the American Missionary Society's assets in China had grown to $41.9 million, four times those of the British, reflecting the shift in missionary power due to war efforts (Dan, 1996).

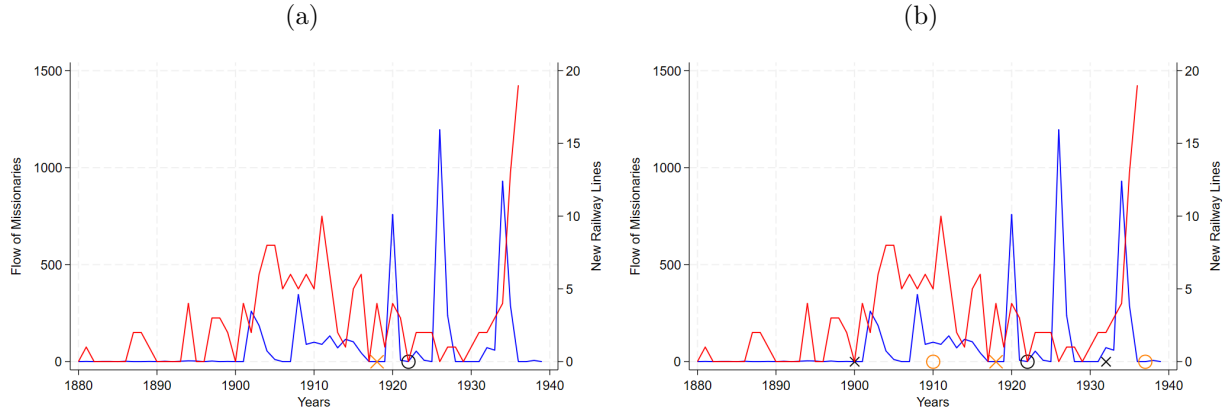
Other foreign immigrants in China followed a different trajectory than the missionaries. During this period, foreigners in China also included merchants, foreign government officials, and explorers. Due to security concerns, treaty restrictions, and economic incentives, merchants and government officials primarily operated within treaty port areas, while the only foreigners who adventured into the inland were a small number of explorers.

Nevertheless, it is important to note that other factors may have influenced these flows. For example, another pattern that emerges is the presence of spikes following the end of conflicts against Christians, such as the Boxer Rebellion or the May 30th Movement. Additionally, panel b shows that some of the lowest missionary migration periods coincide with the onset of political and social instability in China. These factors may pose a problem for identification insofar as they are correlated with the exact timing (year by year) of railway line completion.

The second source of variation is the number of new railway lines built annually in China. Figure 14 overlays this data with missionary flows to graphically illustrate the interaction used in the IV. Panel A illustrates the type of comparisons our IV makes, where an X represents a prefecture that gets connected to a new railway line the year before a missionary migration boom, while a circle represents a prefecture connected the year after. Implicitly, our IV relies on these comparisons, within provinces. As an example, consider the 1934 boom, which involved 931 new missionaries. In our data, Prefecture A, connected just before the boom, received 26 new missionaries (3% of the total) and established 18 new missions (a 13% increase from a base of 139 missions). In contrast, Prefecture B, connected just after the boom, received 2 new missionaries (0.21% of the total) and established 6 new missions (a 5% increase from a base of 118 missions).

Since only 30% of Chinese prefectures were connected to the railway by 1950, many comparisons

Figure 14: New Railways Lines & Missionary Flow by Year - 1880-1940



Notes: The red line represents the number of new railway lines being constructed (connecting A to B). A railway line is the addition of a stop in an existing railway line or the construction of a brand new line. The blue line represents missionary flows at the national level. Black represents a given prefecture, while orange another prefecture (in the same province). X are boom years, circles are lull years

also resemble those depicted in Panel B. In Panel B, the same prefecture, represented by the color black, is first connected prior to a boom, then receives a new railway line prior to a lull, and another one before a subsequent boom. The same logic applies to the "orange" prefecture. Essentially, these comparisons are made for each year and each prefecture that gets a new railway line, and then they are aggregated at the prefecture level.

4.2.3 Threats to Identification

A first threat to our identification strategy is the correlation between missionary flows and both early railway connections and railway density. To account for this, in the construction of the instrument, we control for years of connection (as of 2000) and the number of railway lines per square kilometer. For example, Prefecture A has been connected to the railway network for 92 years with 7 railway lines, whereas Prefecture B has been connected for 102 years with 9 railway lines. The difference between these two prefectures, 10 years of connection and 2 railway lines, will be accounted for in the first stage regression allowing the comparison to rely solely on the exact timing of railway expansion and missionary flows.

Secondly, the two interaction terms (connection date and railway density) could be correlated with each other. For example, in Prefecture A, the coincidental timing of railway expansion was driven by a deliberate desire to attract more missionaries. Moreover, political unrest in China

might affect both the timing of railway construction and missionary flows. To address this issue, we can implement several strategies. First, we examine the balance between "boom Prefectures" and "lull Prefectures". We define boom Prefectures as those connected to a railway line one or two years prior to when missionary flows are above the median, and lull Prefectures as those connected one or two years after. Table 5 presents the results of a pairwise t-test difference test using OLS, with clustering at the prefecture level (since the same prefecture may appear multiple times). All variables are measured at the beginning of the period, in 1880. We note that there are no significant differences between boom and lull places.

Table 5: Balance Between Boom and Lull Prefectures

	(1) Lull Prefecture		(2) Boom Prefecture		(1)-(2) Pairwise t-test	
Variable	N/Clusters	Mean/(SE)	N/Clusters	Mean/(SE)	N/Clusters	Mean difference
Total Modern Banks	45	0.133	105	0.114	150	0.019
	25	(0.098)	38	(0.083)	48	
Total Enterprises	45	0.578	105	0.381	150	0.197
	25	(0.316)	38	(0.267)	48	
Ln (investment gov. factory)	45	1.815	105	2.726	150	-0.911
	25	(0.925)	38	(1.043)	48	
Total railways	47	8.149	120	17.100	167	-8.951
	27	(5.990)	43	(10.063)	53	
Total Treaty Ports	45	0.133	105	0.133	150	0.000
	25	(0.069)	38	(0.061)	48	
Whether there's main river	47	0.617	120	0.658	167	-0.041
	27	(0.110)	43	(0.080)	53	
Provincial capital	46	0.370	120	0.450	166	-0.080*
	26	(0.111)	43	(0.089)	52	
Crop suitability: Rice	47	2.082	120	2.075	167	0.007
	27	(0.251)	43	(0.185)	53	
Ln population	44	5.307	105	5.412	149	-0.104
	24	(0.144)	38	(0.148)	47	
Coastal	47	0.447	120	0.283	167	0.163
	27	(0.115)	43	(0.084)	53	

Notes: Boom prefectures are prefectures connected to a railway line one or two years before national missionary flows are above the median. Lull prefectures are prefectures connected one or two years after such high-flow years. Variables are measured at the beginning of the period, in 1880, except time-invariant geographic variables. The table reports means for each group and the pairwise difference from an OLS regression with standard errors clustered at the prefecture level, since a prefecture can appear more than once. N/Clusters reports the number of prefecture-year observations and distinct prefecture clusters. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

Another important consideration is our reliance on the exact year of completion for each railway line. Even if there are factors that could bias our estimates, these factors would need to simultaneously affect both railway construction and missionary flows with precise timing. Given the likely

unforeseen delays in railway construction - our data indicate an average completion time of three years with a standard deviation of six years - such precise alignment is improbable. For example, we would have to assume that the Chinese Civil War of 1927, which likely correlates with a lull in migration between 1928 and 1931, specifically delayed the completion of a railway in Prefecture A from 1926 to 1927 (or vice versa).

Finally, the timing of railway connections may be correlated with a prefecture's geographic location. To address this, we include prefecture fixed effects in our zero-stage regression and subsequently control for latitude and longitude as a robustness check in the first stage.

4.2.4 Results

We begin by presenting our results from the zero-stage estimating equation (5) and the first stage equation (6) in table 6.[30]

We see that our interaction of interest, Missionary Flow$_{t-1} \times RRstock_{i,t-1}$, is positive and significant in our zero-stage estimating equation. This indicates that increased missionary flow in China the year before a railway line is constructed predicts the establishment of more missionary institutions. Column (2) shows the result of the first stage, which is also positive and significant. Our predicted measure of missionary institutions at the prefecture level, derived solely from the effect of railway and missionary flows, remains positively associated with the actual number of missions in a given prefecture over the entire time period. The Kleibergen Paap F-statistic of the instrument is 11.68.

Next, we proceed to our second-stage regressions using the last six years of our historical modern-bank dataset, previously utilized in the DiD estimation, along with data on total banks from 1949 to 2022. Given the substantial variation in the total number of banks over this period (see Appendix, Figure F1), we standardize the outcome within each year to facilitate comparisons of magnitudes.[31] We use a portion of the historical data to assess whether our IV approach yields results similar to those in the previous section. Results from individual cross-sectional regressions

[30] All results are presented using winsorized variables at the 99.5th percentile to address extreme outliers. The findings remain consistent when using the 99th percentile, not winsorizing, or excluding extreme outliers altogether. For detailed tables and figures, refer to the robustness section.

[31] Results using the total number of banks, not standardized, are in Figures F2 and F3.

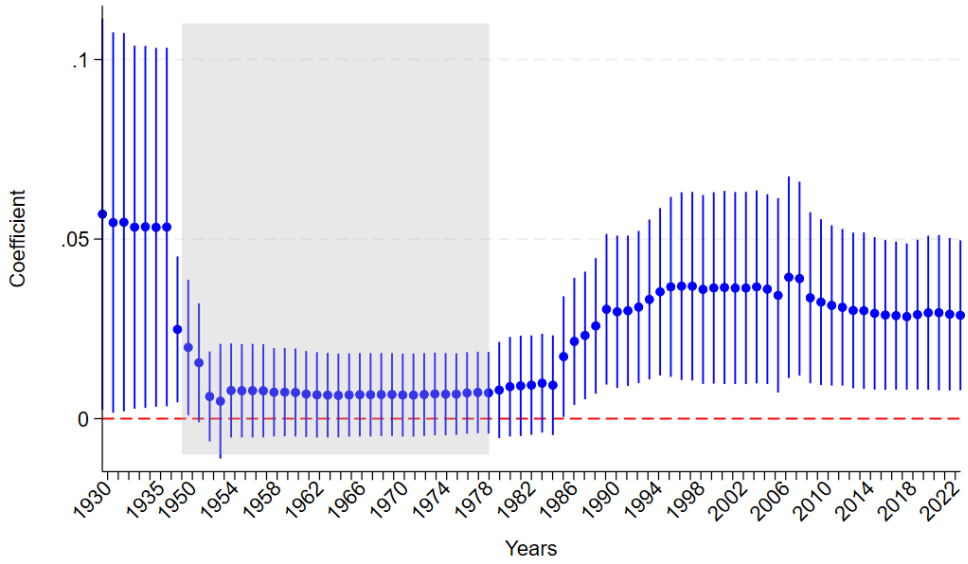
Table 6: Zero-stage and First stage Results. Constructing the Instrument

Variables	Zero-stage (1) MissInst Stock	First stage (2) Tot Miss Inst
RRstock (t-1)	5.1333***	
	(1.2828)	
Miss Flow (t-1) x RRstock (t-1)	0.0008***	
	(0.0002)	
Predicted Tot Miss Inst		2.2614***
		(0.6893)
RR Duration		0.1935**
		(0.1024)
RR Density		-1093.687
		(848.4495)
Prefecture FE	Yes	No
Time FE	Yes	No
Province FE	No	Yes
Obs.	21,242	247
Adj. R sq.	0.635	0.220
Mean Dep. Var.	6.85	31.64
S.D. Dep. Var.	16.22	31.29
F-stat	12.74	14.01

Notes: MissInst Stock$_{i,t}$ is the total missionary institutions in prefecture i and year t. Missionary Flow$_{t-1}$ is the flow of missionaries arriving in China between $t-1$ and t, and RRstock$_{i,t-1}$ is total number of railways in year $t-1$. Predicted Tot Miss Inst is the total predicted missionary institutions as a result of the zero-stage, equation 5, summed over time for each prefecture. RR Duration$_{i,p}$ represents the years connected to the railway network (as of 2000), and Densityi,p is defined as: $(\sum_{t=1}^{T} \text{RRstock}_{i,t}) \div (Area\ in\ km^2)$. Fixed effects vary, refer to the table. Robust standard errors in parentheses. The Kleibergen Paap F-statistic of the instrument is 11.68. ***, ** and * indicate significance at the 1%, 5% and 10% level, respectively.

for each year are presented in Figure 15, and Appendix Table F1 reports the headline years in table form. The historical effect from 1930 to 1936 is consistent, positive, and significant at the 10% level, with a magnitude around 0.5 SD, which corresponds to a 9-17% increase in the total number of banks. This aligns with the order of magnitude observed in our DiD design (the DiD effects ranged between 10 and 30%).

Figure 15: 2SLS - Standardized Modern and Total Banks, 1930-1936 and 1949-2022



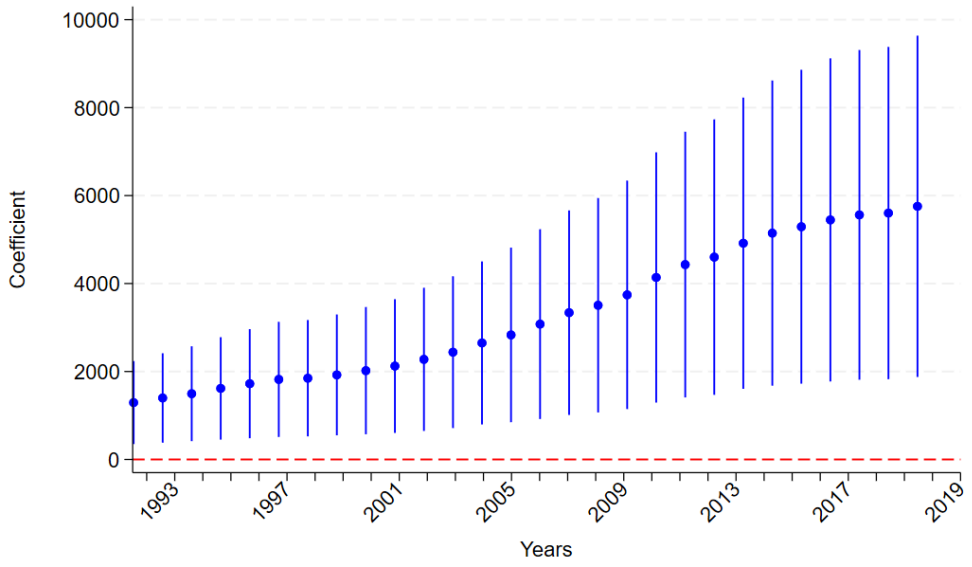
Notes: The figure reports coefficients from equation 7 estimated separately by year, using the historical modern-bank data used in the DiD design and recent total-bank data from 1949 to 2022. Historical modern-bank means are 1.7 in 1930 and 5.8 in 1936, so the IV estimates correspond to increases of roughly 9–17%. Recent total-bank means are 836 in 1990 and 3,745 in 2022, so the estimates correspond to increases of roughly 2%. Appendix Table F1 reports the 1936 and 2020 estimates in regression-table form. The figure shows 90% confidence intervals. The gray area marks the first 30 years of the People's Republic of China. Source: China Financial Supervision and Administration Bureau.

We observe a positive and significant effect of missionary exposure on total banks starting in the 1980s, coinciding with the country's economic reforms.[32] Between 1949 and the 1980s (the shaded gray area), some banks were closed down, and the remaining banks were nationalized due to strong anti-capitalistic sentiment. Therefore, it is not surprising that no effect is seen until the 1980s. This evidence suggests that regions with a historical presence of missionaries, and consequently an increase in modern banks, possessed a form of "latent capitalism" that was ready to take off once modern banks were permitted and profitable again. The early development of a modern financial system likely set the stage for the adoption of the same technology and capitalistic ideology once the Chinese government allowed it.

[32]The highest significance is at the 95% level. The magnitude corresponds to an average increase in the total number of banks of 2%.

Finally, these results are reflected in GDP, as shown in Figure 16, which uses gridded revised real GDP and electricity consumption data (1992-2019) based on night light observations. The magnitudes of the coefficient correspond to an increase in GDP ranging from 3.3%, in 1992, to 2.3% in 2019.

Figure 16: 2SLS - GDP (Millions) 1992-2022



Notes: The figure reports coefficients from equation 7 estimated separately by year. Dependent-variable mean: 146,516; 53,800 in 1992 (3.3% increase in GDP), 259,124 in 2019 (2.3%). Appendix Table F1 reports the 2019 estimate in regression-table form. Source: Chen et al. gridded revised real GDP and electricity consumption, 1992–2019, based on night lights.

4.2.5 Robustness Checks

We perform several robustness checks on our main result. First, since constructing the instrument requires two stages and the exact functional form of the railway numbers in the first stage - which is cross-sectional rather than panel - is unknown, we modify how we control for railways in the first stage. We believe that our main specification, which includes railway duration and railway density, already precisely captures the railway duration introduced in the zero-stage. However, the results remain robust when adding non-linear railway controls (such as railway bins - Figures F8 and F9), mileage of railway lines per km^2 (Figure F10), cubic polynomials of latitude and longitude (Figure F11), the number of railways in 1936 (instead of the sum over time - Figure F12), and replacing density with bins (Figure F13).

Second, we alter the variation introduced in the zero-stage or exclude certain observations from the sample. For example, we exclude all treaty ports (Figure F14), drop the top three railway outliers (instead of winsorizing - Figure F15), winsorize at the 99th percentile (Figure F17), and use all the years in the zero-stage instead of the ones used in the DiD (1850-1950 instead of 1850-1936 - Figure F16).

Third, we use a recentering exercise following Borusyak and Hull (2023) to check that the IV is not simply capturing average exposure to missionary inflows through the railway network. The IV gives more predicted missions to prefectures whose railways were present in years with larger national missionary inflows. A related concern is that prefectures with longer or denser railway histories would have received more exposure to any average flow process, independent of the realized timing of missionary inflows. We therefore simulate counterfactual histories of national missionary flows, holding each prefecture's railway path fixed, and subtract the exposure each prefecture would receive under these simulated flow histories. This removes the average-flow-times-railway component and keeps the part coming from the realized alignment between missionary-flow spikes and railway connections. Appendix D.5 shows that the long-run estimates are very similar: for standardized banks in 2020, the coefficient falls from 0.068 to 0.058 under the full-flow permutation and remains significant; the GDP estimate in 2019 is essentially unchanged. The first stage is also not weakened: the K–P F-statistic rises from 12.9 in the original specification to about 15.1 in the recentered specifications.

5 Interaction with Openness Policies of the 1980-2000s

Our objective in this section is to examine whether missionary exposure interacts with the significant policy changes that occurred in China during the 1980s. To achieve this, we use our instrumental variable estimation within an event study framework. This approach allows us to compare the effects of missionary exposure on our outcome of interest both before and after the implementation of nationwide policy changes. Essentially, this is a more direct test of what we observe graphically in Figure 15, where we argue that the effect begins to take off around the 1980s. We are now going to look directly at how the missionary treatment effect appears a few years before and after a given policy.

The key policies we consider in this analysis include:

Land Reform (1978-1984): A series of measures aimed at redistributing land and restructuring agricultural practices, moving away from collective agriculture and towards privatization. This policy was staggered over time and space. However, for the moment, we would treat it as a nationwide shock and test it both at the onset (1978) and at the end (1984).

Provisional Regulations on Banking Administration (1986): Reform intended to modernize and stabilize the banking sector by limiting government involvement and guaranteeing minimal government control.

World Trade Organization (WTO) Accession (2001): China's entry into the WTO, marking a significant step towards integrating its economy with global markets.

WTO Banking Sector Commitments (2006): Specific commitments related to the banking sector as part of China's WTO accession. This policy signifies the moment when banks finally began taking full advantage of the WTO accession, as well as allowing foreign banks to operate in the country.

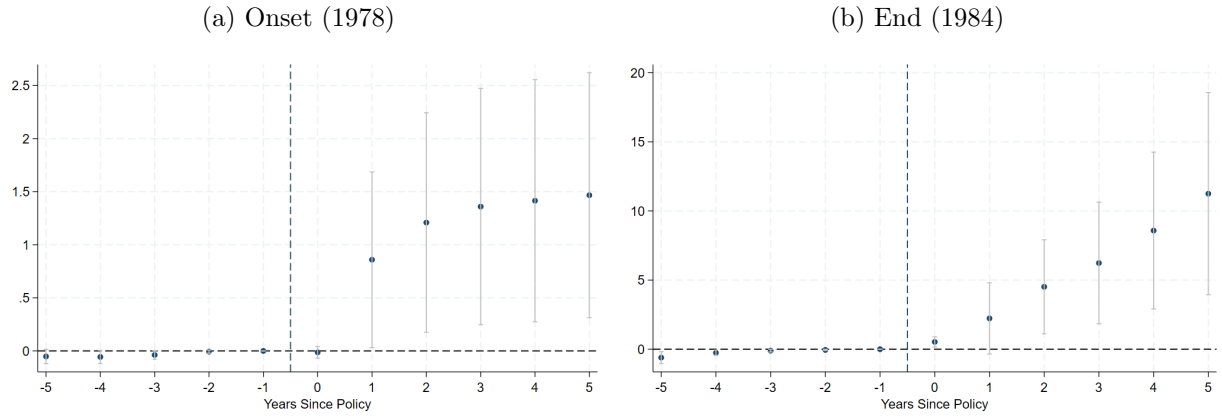
Our empirical model is specified as follows:

$$Y_{it} = \alpha + \sum_{k=-5}^{5} \beta_k \, \widehat{\text{TotMiss Inst}}_i \times D_{t=k} + \delta_t + \mu_i + \varepsilon_{it} \tag{8}$$

In this equation, Y_{it} represents the total number of banks for prefecture i at time t. The term $\widehat{\text{TotMiss Inst}}_i \times D_{t=k}$ captures the interaction between our instrumented total missionary institutions and the time prior to or post a policy change, using a five-year window. The coefficients β_k measure the differential impact of missionary exposure around the time of policy implementation. Additionally, δ_t accounts for time fixed effects, μ_i controls for prefecture fixed effects, and ε_{it} denotes the error term. Standard errors are clustered at the prefecture level, given that the panel structure of this estimation involves stacking cross-sectional regressors on a panel outcome, resulting in repeated observations for the same prefecture multiple times.

The event study using the onset and end of the land reform as time zero is shown in Figure 17. The effect of missionary exposure on total banks seems to take off precisely when this first policy was implemented (1978). After the initial jump, there appears to be another increase by the time

Figure 17: Interacting Missionary Treatment with Land Reform - Total Banks



Notes: event study regression from Equation 8 5 years prior and post a nationwide policy change using total banks as the outcome. 95% confidence intervals shown. Standard errors clustered at the Prefecture level.

all places have implemented this reform (1984).

When examining banking regulations specifically, as shown in Appendix Figure F6, we observe that they interact meaningfully with missionary exposure. The coefficients on the pre-trends are negative, which is not surprising given that by 1986 and 2006, these policies were already building upon the effects of previous policies. Finally, Appendix Figure F7 analyzes the WTO accession and the differential effect of places with more missionary exposure on GDP. Again, the pre-trends are significant and negative since these areas had already experienced differential effects on banking due to earlier policies. However, after the WTO, at least descriptively, we observe a jump in the treatment effect.

6 Conclusion

This paper studies the historical and institutional roots of China's market-based capitalism through the lens of financial development. Using newly compiled data on Christian missionary institutions, modern banks, enterprises, traditional financial institutions, and long-run banking outcomes, we show that missionary exposure helped China adopt modern banks before 1936 and shaped the response of local economies to the market-oriented reforms of the 1980s.

Our historical analysis exploits the staggered expansion of missionaries across Chinese prefectures between 1857 and 1936. We find that missionary presence increased modern banks by 31%

and enterprises by 27%. These effects are not driven by pre-existing trends in banks, enterprises, railways, treaty ports, government investment, or traditional banks. The results are also robust to alternative transformations of the bank outcome, different bank types, balance-sheet measures, and a range of sample restrictions.

The evidence points to two main mechanisms. First, missionaries, especially Protestants, supplied practical education in subjects such as mathematics, bookkeeping, economics, science, and English. These skills were useful for operating modern financial institutions. Consistent with this channel, we find a high share of Christian-affiliated bankers, stronger effects in places with missionary schools, and larger effects for Protestant missions. Second, missionaries helped diffuse useful knowledge through publications and translations. The effects on modern banks are stronger in locations where missions engaged in publication activity, suggesting that printed materials and translations helped make modern economic and institutional practices more accessible.

We also document how missionary exposure interacted with China's transition from traditional to modern finance. Modern banks expanded especially in places with pre-existing traditional financial activity, suggesting that they emerged where financial demand was already present. Over time, they substituted for *Piaohao*, whose remittance functions became less central after the fall of the Qing state. By contrast, *Qianzhuang* survived longer and appear more complementary to modern banks, likely because they retained local information and networks of trust that modern banks initially lacked.

The long-run analysis shows that these historical effects did not disappear permanently. Using an instrumental variable based on the interaction between railway expansion and national missionary inflows, we find that missionary exposure predicts modern banking development before 1949, weakens during the Maoist period, and re-emerges after the market reforms of the 1980s. We also find effects on per capita GDP after 1992, with a stronger increase after China joined the WTO. These patterns are consistent with the idea that missionary exposure created a latent market orientation that became relevant again once the policy environment allowed markets and private financial activity to expand.

Overall, the results suggest that missionaries transmitted more than human capital. They also helped diffuse institution-specific knowledge: the skills, practices, networks, and organizational

forms that made modern banks usable in the Chinese context. In this sense, missionaries helped plant the seeds of market-based capitalism, not by replacing Chinese institutions, but by interacting with local conditions and helping new financial institutions take root. This helps explain why some places were better positioned to respond to China's reform-era opening and why the roots of China's modern market economy partly predate the reforms themselves.

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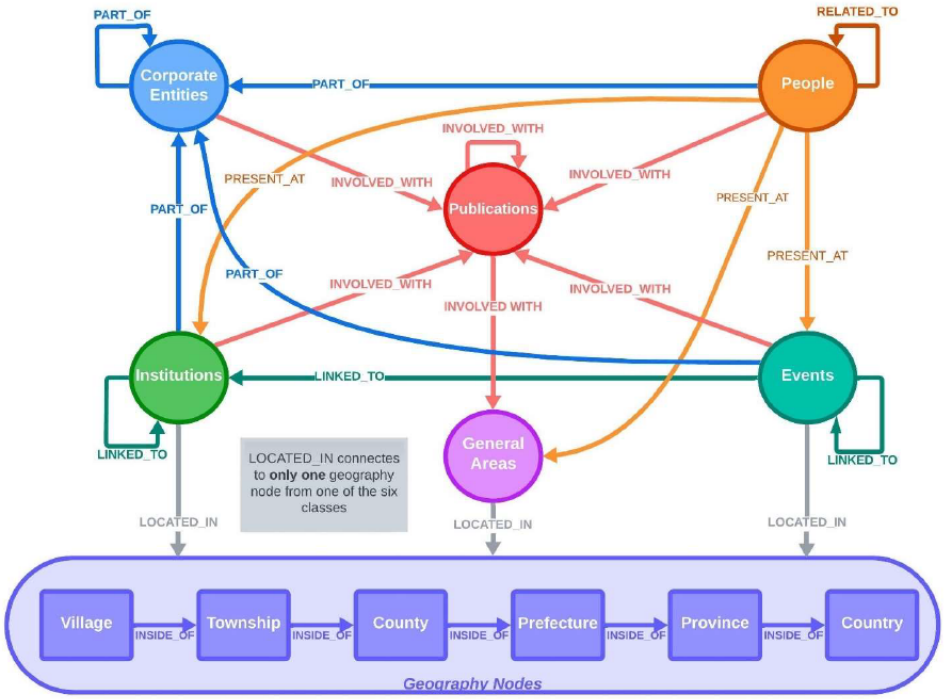
Appendix

Appendix A: Diffusion of Missionary Institutions, Banks, and Enterprises

Missionary Data Structure and Institution Types

Figure A1: Data Structure of CHCD



The CHCD includes nodes for people, corporate entities, institutions, publications, general areas, and events, along with six types of geographic nodes. This schema illustrates possible relationships among these nodes. Person nodes represent human beings. Corporate-entity nodes represent organizations that do not have a direct geographic footprint. Institution nodes include churches, hospitals, and schools. Publication nodes represent textual documents.

Table A1: Category of Religious Institutions

Institution Category	**Freq.**	**Percent**
Ecclesial	4,880	71.18%
Education	1,353	19.73%
Medical	517	7.54%
Other	52	0.76%
Rescue	23	0.34%
Press	16	0.23%
Business	12	0.18%
Scientific	3	0.04%
Total	6,856	100.00%

Notes: This table counts each baseline CHCD institution once after matching to 1911 prefectures, and adds new directory-based CHCD school records not already matched to CHCD v1.

Table A2: CHCD Institution Coverage in the Descriptive Data

Measure	Count
Baseline CHCD institution-location records	20,213
Unique baseline CHCD institution IDs	6,883
Unique baseline CHCD institutions matched to 1911 prefectures	5,885
Usable CHCD directory-based school records	1,042
New directory-based records before prefecture restriction	975
New directory-based records added to descriptives	971
Directory records matched to existing CHCD v1 institutions	67
Combined unique institutions in prefecture-level descriptives	6,856

Notes: Baseline institution-location records are from the current CHCD extract. New directory-based records are added only when they are not already matched to CHCD v1. Records with placeholder or missing prefectures are excluded from the prefecture-level descriptive counts.

Table A3: CHCD Institutions and CMS/Stauffer Missionary Counts, 1920

Measure	Value
Matched prefectures	245
CMS/Stauffer Protestant missionaries	10,715
CHCD institutions incl. new schools	2,242
Positive in both sources	208
Positive only in CMS/Stauffer	19
Positive only in CHCD institutions	5
Pearson correlation	0.766

Notes: The comparison is at the 1911 prefecture level. CMS/Stauffer records Protestant missionary persons in 1920, while CHCD records institution-location relationships. The CHCD row counts Protestant institutions from the baseline CHCD panel plus the new directory-based school records active in 1920. The totals are therefore not meant to match one-for-one; the table is used as an external consistency check on whether the two sources identify similar places of missionary activity.

Summary Statistics and Historical Diffusion

Table A4: Summary Statistics: Prefecture-Year Level Regressions

Variables	Obs	Mean	Std. Dev.	Median	5th P.tile	95th P.tile
Cum. Banks	19,760	0.76	6.16	0.00	0.00	3.00
Cum. Enterprises	15,561	5.02	42.77	0.00	0.00	18.00
Foreign Banks	19,760	0.10	1.16	0.00	0.00	0.00
Private Banks	20,007	0.55	14.06	0.00	0.00	1.00
Government Banks	19,760	0.29	1.35	0.00	0.00	2.00
Foreign Enterprises	15,561	0.05	0.49	0.00	0.00	0.00
Government Enterprises	15,561	0.34	1.45	0.00	0.00	2.00
Total Railways	20,007	0.28	1.37	0.00	0.00	2.00
First Treated	18,792	1,897.89	17.09	1,902.00	1,857.00	1,926.00
Total Mission Institutions	20,007	3.74	9.00	0.00	0.00	18.00
Mission Education Institutions	19,985	0.28	1.46	0.00	0.00	2.00
Missionary People	19,035	5.94	24.00	0.00	0.00	25.00
Government Investment (000s)	19,116	21.66	249.65	0.00	0.00	0.07

New Treaty Ports	19,116	0.11	0.37	0.00	0.00	1.00

Summary statistics of main variables at the prefecture-year level, 1857–1937. Mission institutions and mission education institutions include the new CHCD directory-based schools that are not already matched to CHCD v1. First treated is non-missing only for prefectures that eventually received missions. Government investments are reported in thousands.

Table A5: Summary Statistics: Prefecture Level Regressions

Variables	Obs	Mean	Std. Dev.	Median	5th P.tile	95th P.tile
Cum. Banks	247	0.76	3.01	0.06	0.00	3.01
Cum. Enterprises	247	5.02	26.23	0.48	0.00	20.94
Total Railways	247	0.28	0.88	0.00	0.00	1.70
First Treated	232	1,897.89	17.13	1,902.00	1,857.00	1,926.00
Total Mission Institutions	247	3.74	5.74	2.20	0.00	12.12
Mission Education Institutions	247	0.28	0.74	0.01	0.00	1.64
Missionary People	235	5.94	14.08	2.14	0.00	22.26
Government Investments (000s)	236	21.66	231.62	0.00	0.00	7.59
New Treaty Ports	236	0.11	0.31	0.00	0.00	0.80
Main River	247	0.63	0.48	1.00	0.00	1.00
Provincial Capital	247	0.08	0.27	0.00	0.00	1.00
Rice Suitability	247	2.01	1.06	2.20	0.16	3.62
Population 1880 (000s)	247	1,408.31	1,273.26	1,018.48	143.90	4,008.94
Coast	247	0.14	0.35	0.00	0.00	1.00
Protestant Mission Institutions	247	3.31	4.88	2.10	0.00	10.84
Catholic Mission Institutions	247	0.36	2.22	0.00	0.00	1.00
Leader	235	0.18	0.28	0.02	0.00	0.88
Britain and USA	235	0.23	0.21	0.25	0.00	0.69

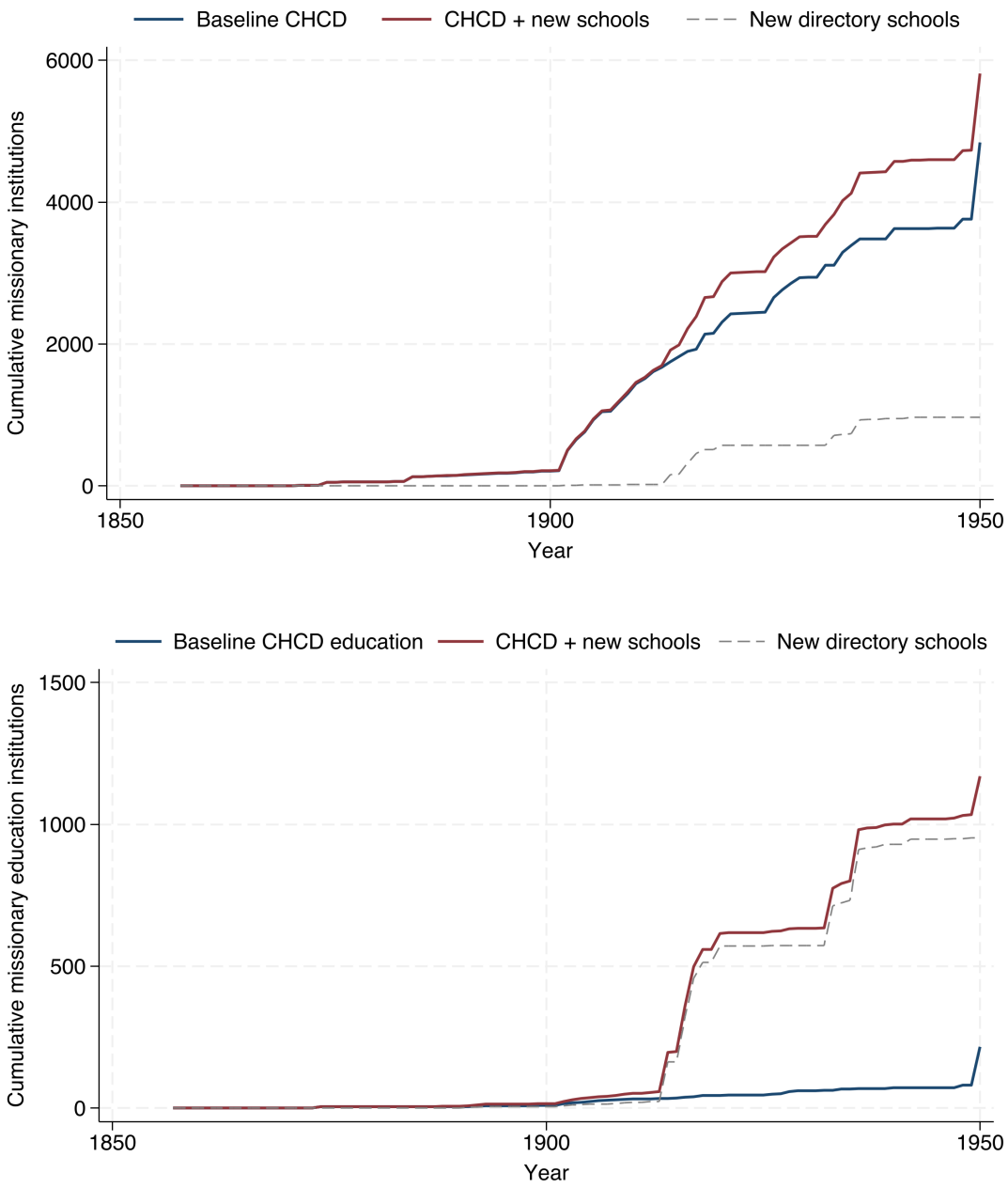
Summary statistics at the prefecture level, averaging yearly values over the analysis panel. Mission institutions and education institutions include the new CHCD directory-based schools that are not already matched to CHCD v1. First treated is non-missing only for prefectures that eventually received missions. Population and government investments are in thousands.

Table A6: Three Types of Financial Institutions

Feature	Piaohao	Qianzhuang	Bank
Main Function	Long-distance remittances	Short-term local lending	Deposit and lending
Clients	Governments, Large merchants	Small businesses, artisans	All economic agents
Branch Networks	Many branches	No branches, locally operated	Many branches
Lending Focus	Limited lending, high-trust clients	Small, short-term loans	Large mortgage loan

Notes: The table compares the differences among the three main types of financial institutions in China between 1840 and 1936, focusing on their primary functions, clientele, branch networks, and lending focus. Notably, only modern banks operated as contemporary enterprises with deposit and loan services as their core business and adopted a limited liability organizational structure.

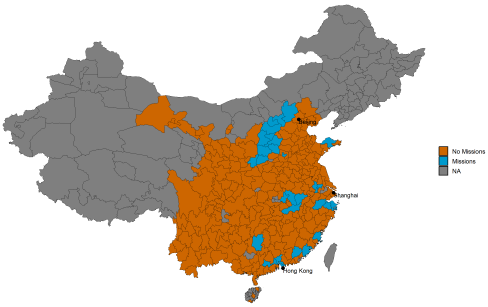
Figure A2: Evolution of Missionary Institutions Over Time



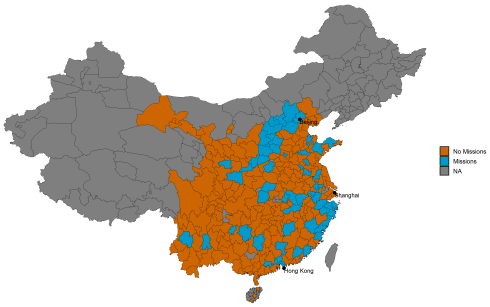
Notes: The first panel plots cumulative missionary institutions. The second panel plots cumulative missionary education institutions. Baseline CHCD counts use the current CHCD institution panel; the added series includes new directory-based school records not already matched to CHCD v1.

Figure A3: Expansion of Missionaries

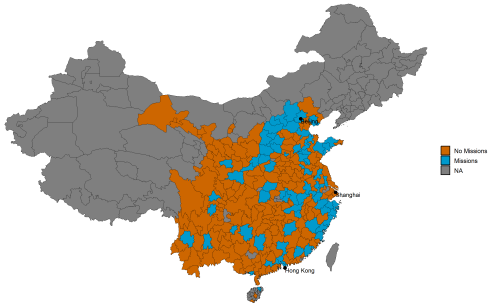
(a) 1875



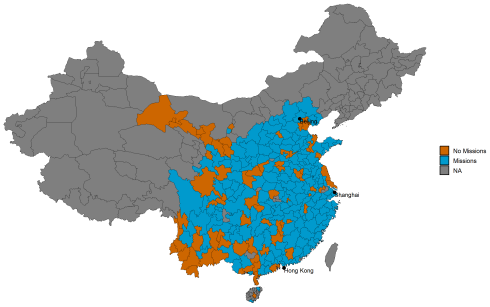
(b) 1885



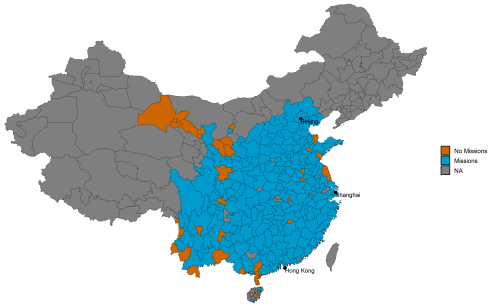
(c) 1900



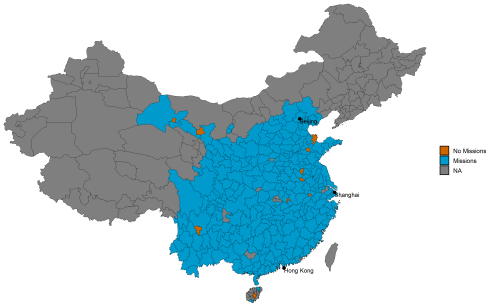
(d) 1905



(e) 1926



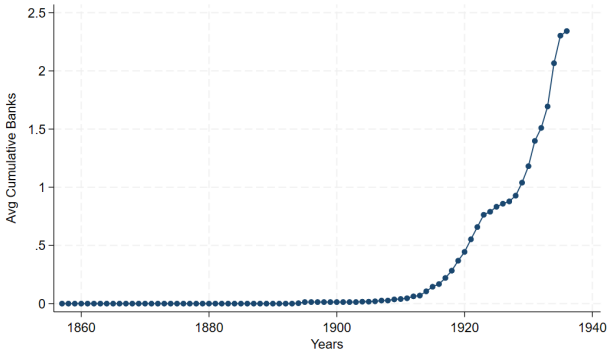
(f) 1950



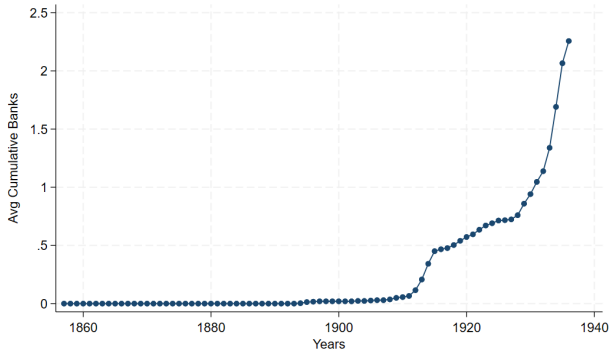
Notes: These maps show the expansion of missionaries over time for selected periods. Prefectures with missionary presence are shown in blue, those without missionaries in orange, and prefectures not included in the main analysis are in gray. Panel a shows prefectures with missionaries by 1875, panel b by 1885, panel c by 1900, panel d by 1905, and so on. Data on missions are from the CHCD, and prefecture boundaries are from CHGIS 1911.

Figure A4: Evolution of Different Modern Banks Over Time

(a) Private Modern Banks



(b) Government Modern Banks



(c) Foreign Modern Banks

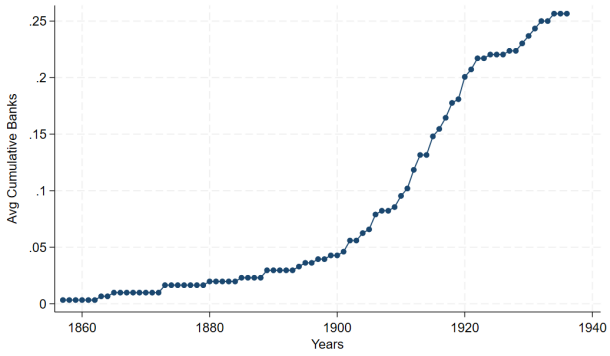
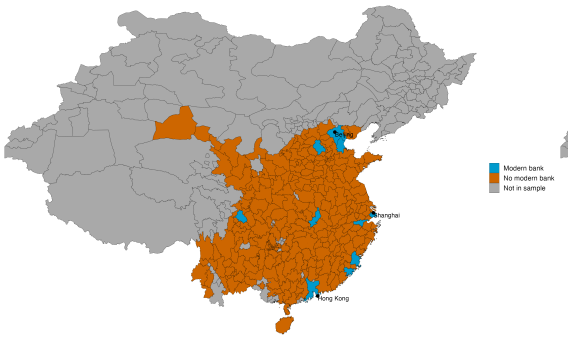
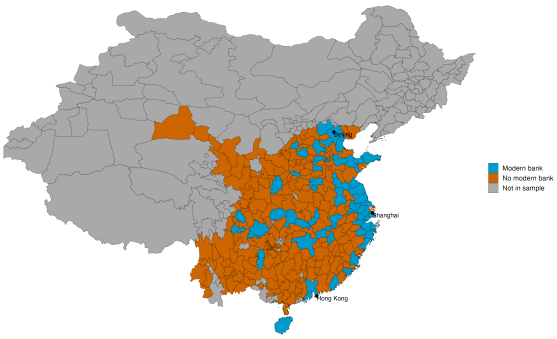


Figure A5: Expansion of Modern Banks

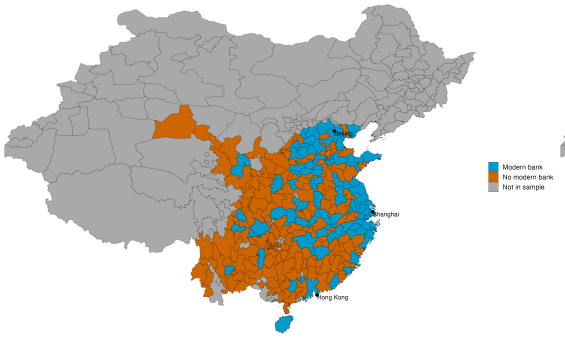
(a) By 1905



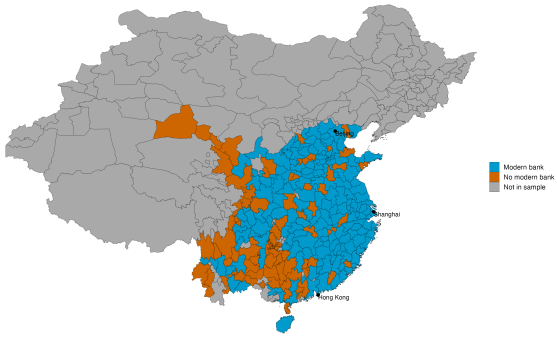
(b) By 1915



(c) By 1926

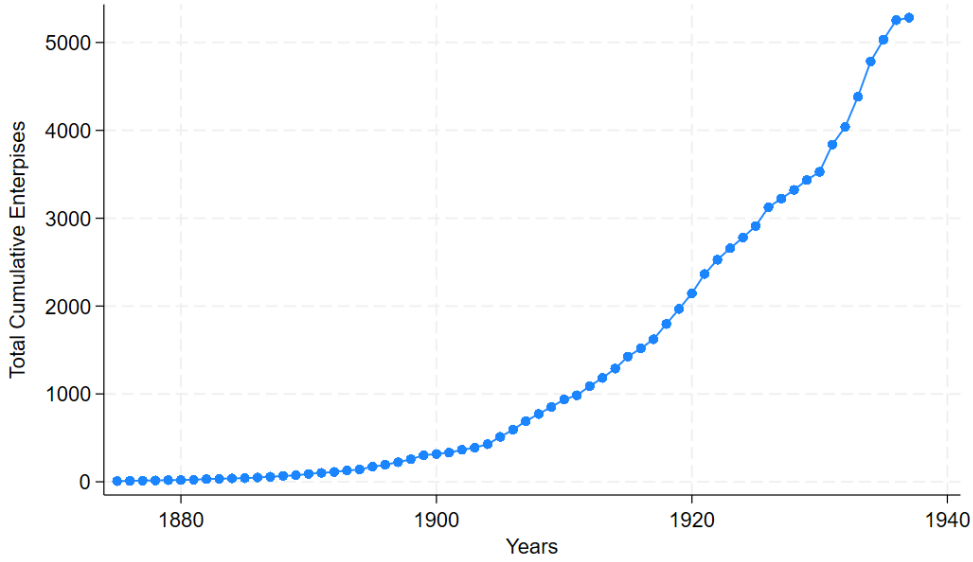


(d) By 1936



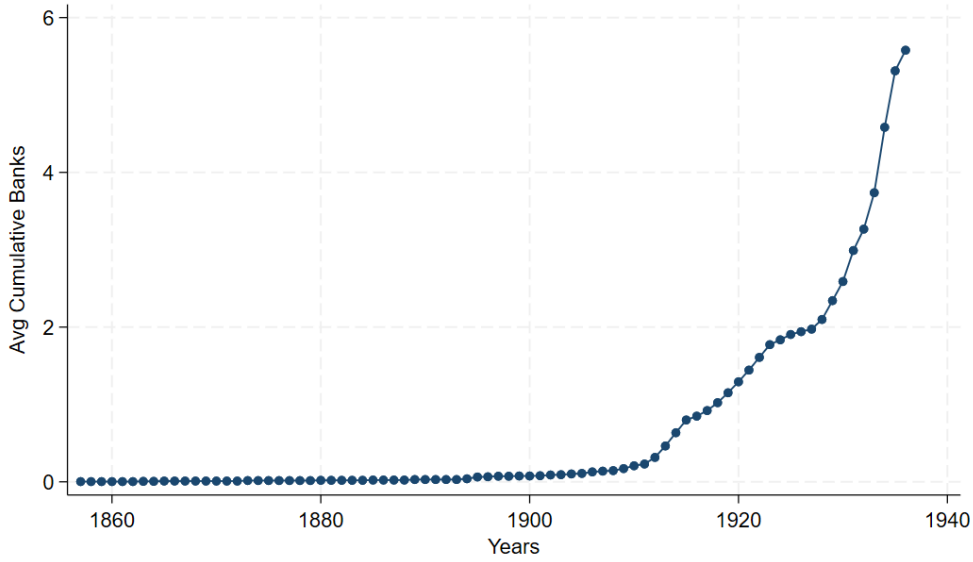
Notes: These maps show the expansion of modern banks in the current prefecture-year panel. Prefectures with at least one modern bank are shown in blue, sample prefectures without modern banks are shown in orange, and prefectures outside the analysis sample are shown in gray. Data on modern banks are from the Bank of China Economic Research Office, the *National Banking Yearbook*, and Huang (1995). Prefecture boundaries are from CHGIS 1911.

Figure A6: Evolution of Enterprises Over Time



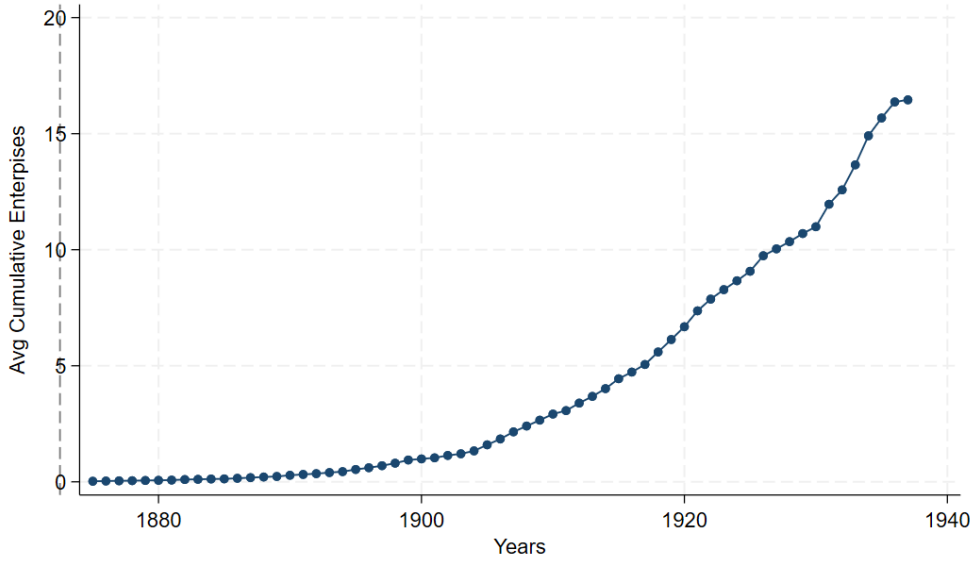
Data Sources: Du (1991, 2019) - Domestic Capitalism and Old Chinese Government, 1840-1937

Figure A7: Evolution of Average Total Modern Banks Over Time



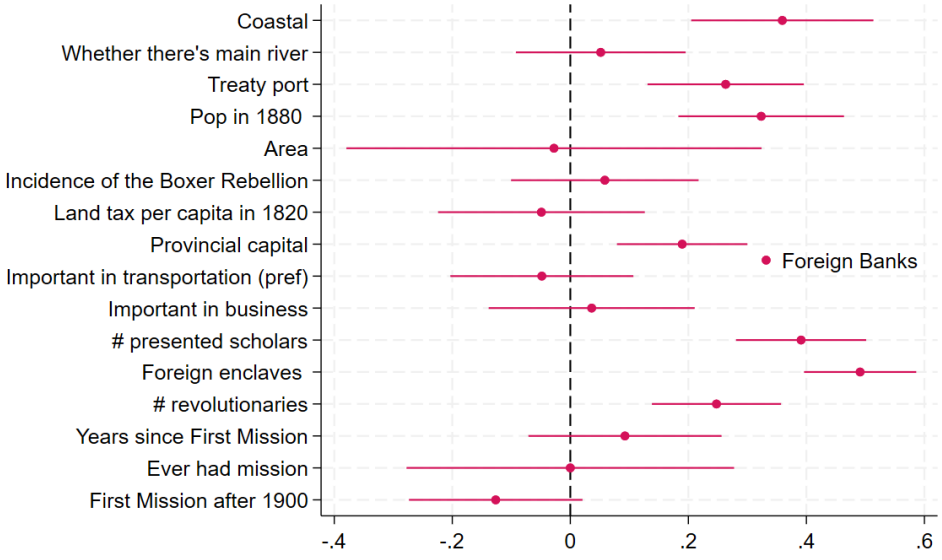
Sources: Bank of China Economic Research Office & National Banking Yearbook

Figure A8: Evolution of Average Enterprises Over Time



Data Sources: Du (1991, 2019) - Domestic Capitalism and Old Chinese Government, 1840-1937

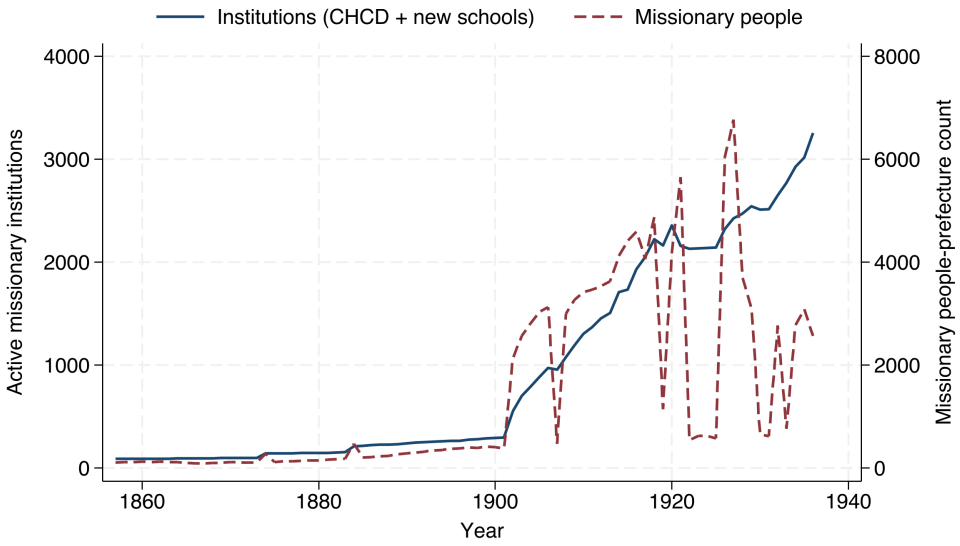
Figure A9: Predictors of Receiving Foreign Modern Banks First



Notes: CI at 95%, 253 observations, all variables are standardized

Appendix B: Missionary Traditions and Individuals

Figure B1: Missionary People and Institutions Over Time



Notes: This figure compares active missionary institutions and missionary people in the CHCD prefecture-year panel through 1936. The institution series includes new directory-based CHCD school records not already matched to CHCD v1. The figure is descriptive; the main treatment is based on institutional arrival.

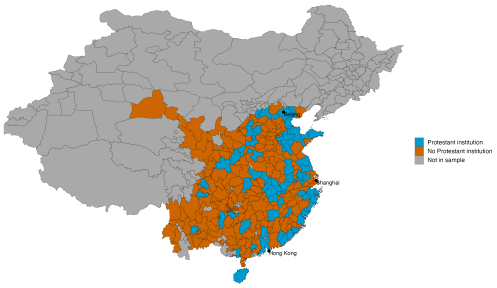
Table B1: Distribution of Protestant and Catholic Mission Institutions

	Pre-1857		1857–1899		1900–1904		1905–1925		1926–1936		1937–1950		Undated		Total	
Institution Tradition	Obs.	Perc.	Obs.	Perc.	Obs.	Perc.	Obs.	Perc.	Obs.	Perc.	Obs.	Perc.	Obs.	Perc.	Obs.	Perc.
Protestant	4	4.1	204	99.5	548	100.0	1,664	99.9	1,024	100.0	1,292	99.8	265	36.5	5,001	89.9
Catholic	93	95.9	1	0.5	0	0.0	1	0.1	0	0.0	2	0.2	462	63.5	559	10.1

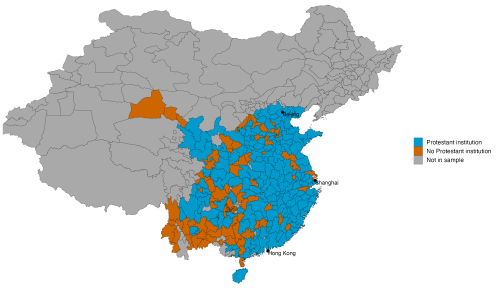
Notes: This table counts unique CHCD mission institutions with prefecture matches, using the institution tradition field. The "Undated" column reports institutions with known tradition and location but no usable start year. Orthodox, non-religious, unknown, and missing traditions are excluded from the two-way Protestant–Catholic split. Source: CHCD.

Figure B2: Expansion of Protestant Mission Institutions

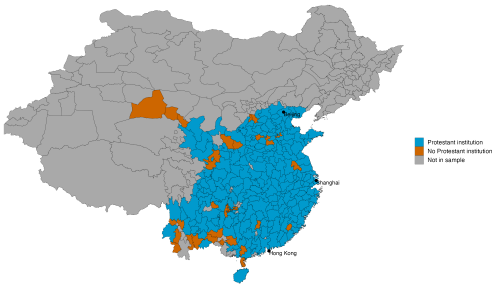
(a) By 1899



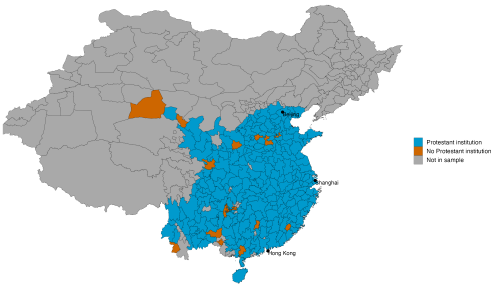
(b) By 1904



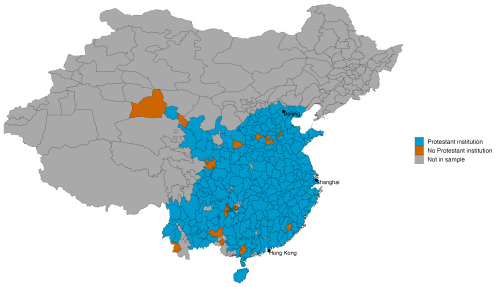
(c) By 1925



(d) By 1936



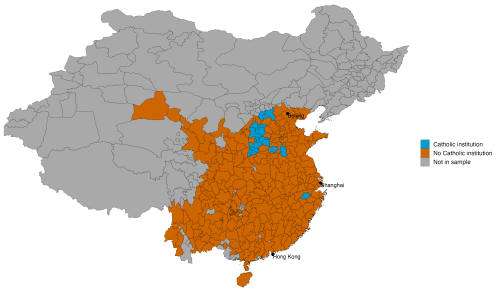
(e) By 1950



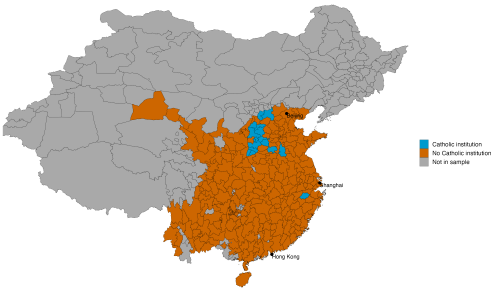
Notes: These maps show the cumulative expansion of Protestant mission institutions over time. Prefectures with at least one Protestant institution are shown in blue, sample prefectures without a Protestant institution are shown in orange, and prefectures outside the analysis sample are shown in gray. The split uses the CHCD institution tradition field. Prefecture boundaries are from CHGIS 1911.

Figure B3: Expansion of Catholic Mission Institutions

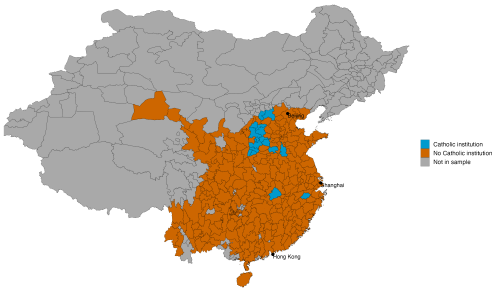
(a) By 1899



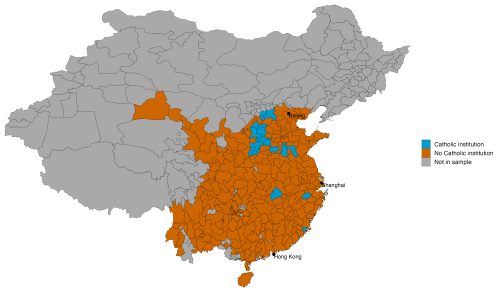
(b) By 1904



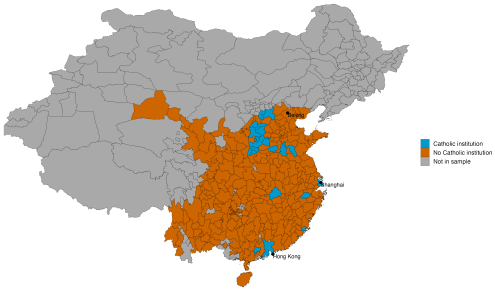
(c) By 1925



(d) By 1936



(e) By 1950



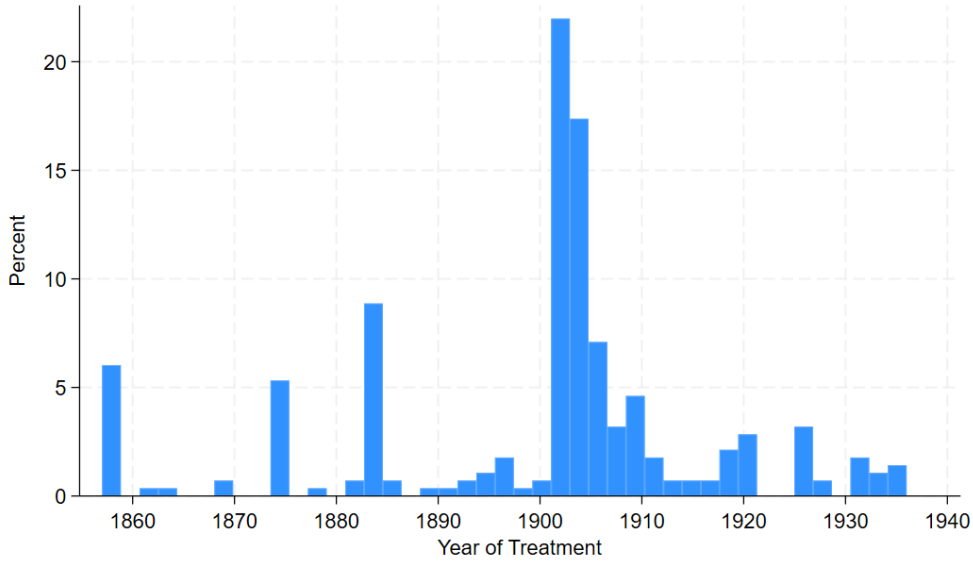
Notes: These maps show the cumulative expansion of Catholic mission institutions over time. Prefectures with at least one Catholic institution are shown in blue, sample prefectures without a Catholic institution are shown in orange, and prefectures outside the analysis sample are shown in gray. The split uses the CHCD institution tradition field. Prefecture boundaries are from CHGIS 1911.

Table B2: Distribution of Missionary Subdenominations

	Pre-1857		1857–1899		1900–1904		1905–1925		1926–1936		1937–1950		Total	
Religious Family	Obs.	Perc.	Obs.	Perc.	Obs.	Perc.	Obs.	Perc.	Obs.	Perc.	Obs.	Perc.	Obs.	Perc.
Interdenominational	4	33.3	63	12.5	368	12.4	1,710	17.9	1,047	17.0	0	0.0	3,192	16.4
Presbyterian	0	0.0	116	23.1	500	16.8	1,323	13.8	838	13.6	0	0.0	2,777	14.3
Methodist	1	8.3	82	16.3	358	12.0	1,214	12.7	678	11.0	2	1.0	2,335	12.0
Anglican	0	0.0	67	13.3	385	13.0	872	9.1	506	8.2	0	0.0	1,830	9.4
Lutheran	0	0.0	10	2.0	167	5.6	806	8.4	626	10.1	0	0.0	1,609	8.3
Baptist	1	8.3	23	4.6	519	17.5	630	6.6	356	5.8	0	0.0	1,529	7.9
Congregational	1	8.3	91	18.1	267	9.0	751	7.9	353	5.7	1	0.5	1,464	7.5
Other Protestant	3	25.0	24	4.8	396	13.3	2,111	22.1	1,414	22.9	10	5.1	3,958	20.4
Maryknoll	0	0.0	0	0.0	0	0.0	12	0.1	30	0.5	42	21.5	84	0.4
Passionist	0	0.0	0	0.0	0	0.0	0	0.0	56	0.9	21	10.8	77	0.4
Other Catholic	2	16.7	27	5.4	12	0.4	131	1.4	266	4.3	119	61.0	557	2.9

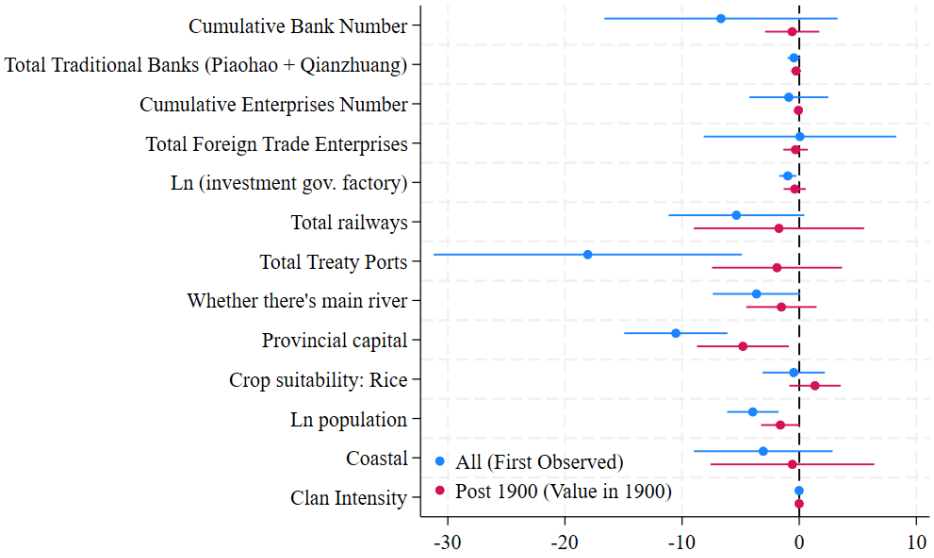
Notes: This table counts unique missionary people in the most recent CHCD person-prefecture file. It uses people data because detailed religious-family information is recorded at the person level. Smaller Protestant families are grouped as other Protestant, and smaller or missing Catholic families are grouped as other Catholic. Source: CHCD.

Figure C1: Distribution of Treatment Variable G_i



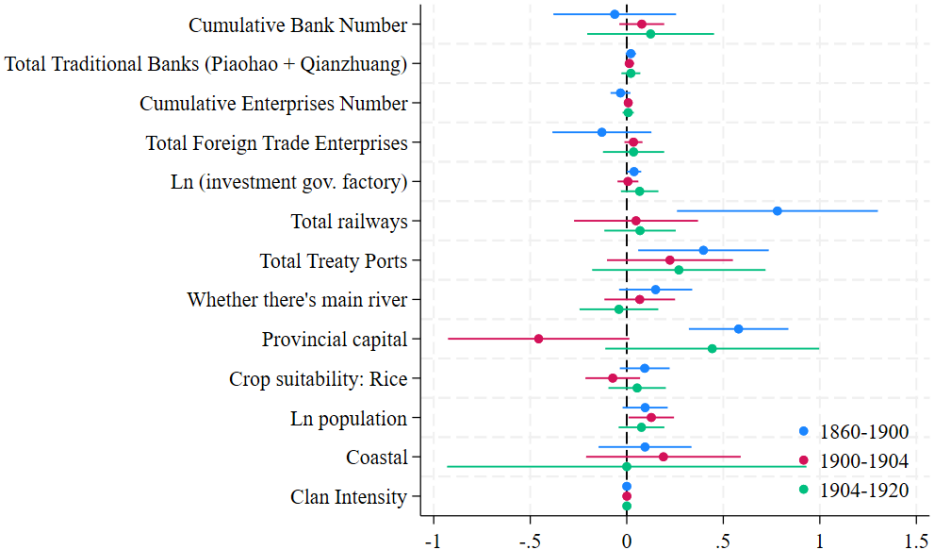
Appendix C: Balance & Identification

Figure C2: Predictors of Mission Establishment Year - One-by-One Regressions



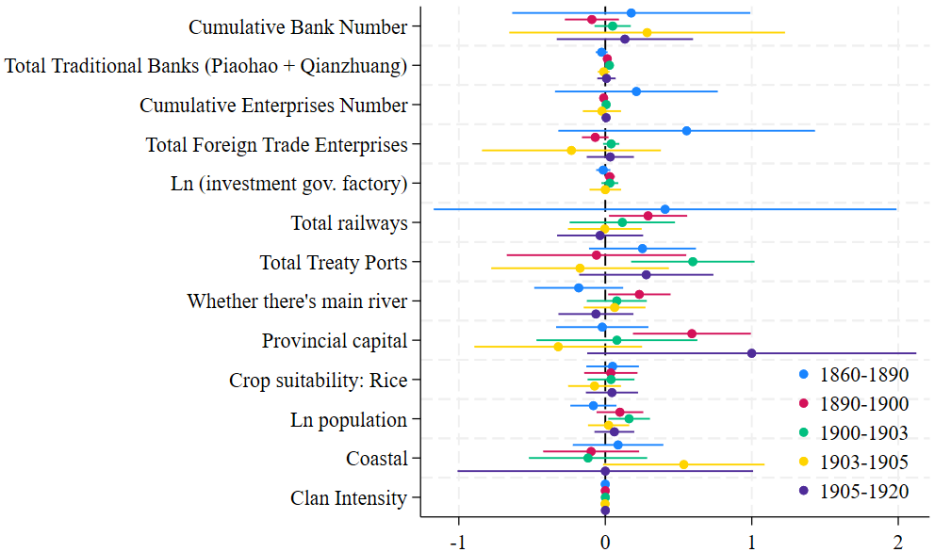
Notes: Predetermined covariates are separately regressed on missionary establishment year. The figure plots the coefficients corresponding to columns 1 and 2 of Table 2. All regressions include province fixed effects. Covariates are in raw units.

Figure C3: Predictors of Mission Establishment by Broad Treatment Cohort - One-by-One Regressions



Notes: Univariate regressions of the treated-cohort dummy on each covariate. This figure reports adjacent broad-cohort comparisons as a complementary local-timing diagnostic. All regressions include province fixed effects. Covariates are in raw units.

Figure C4: Predictors of Mission Establishment by Narrow Treatment Cohort - One-by-One Regressions



Notes: Univariate regressions of the treated-cohort dummy on each covariate. This figure uses a coarser five-bin cohort partition. All regressions include province fixed effects. Covariates are in raw units.

Appendix D: Historical DiD Results and Robustness

D.1 Main Estimates, Pre-Period Variation, and Outcome Transformations

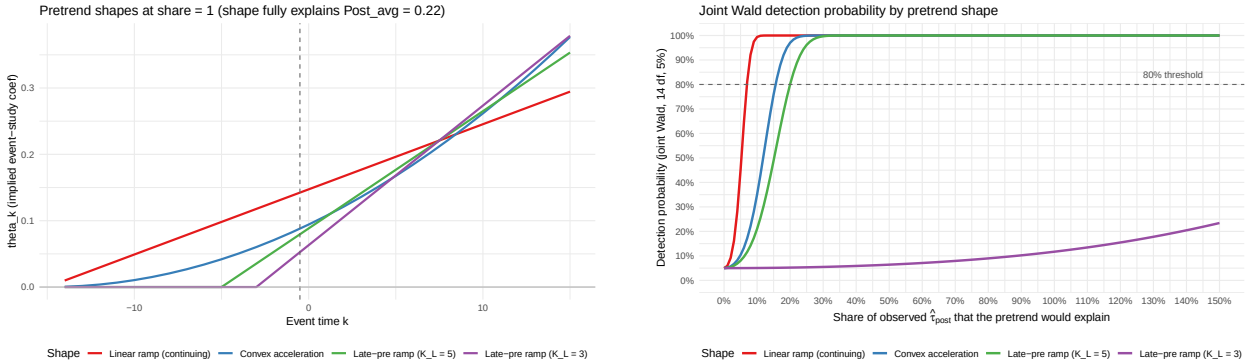
Table D1: Pre- and Post-Treatment Estimates for Main Historical Outcomes

VARIABLES	(1) Modern banks	(2) Enterprises	(3) Log banks	(4) Bank growth	(5) New banks
Pre-treatment ATT	0.024	0.060*	0.013	0.007	0.011
	(0.016)	(0.036)	(0.009)	(0.004)	(0.007)
Post-treatment ATT	0.221***	1.292**	0.075***	0.019***	0.059**
	(0.071)	(0.610)	(0.021)	(0.005)	(0.024)
Prefecture FE	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes
Period	1857–1936	1875–1936	1857–1936	1857–1936	1857–1936
Observations	18,560	13,268	18,560	18,328	18,560
Prefectures	232	214	232	232	232
Years	80	62	80	79	80
Mean Dep. Var.	0.761	4.072	0.164	0.014	0.082
S.D. Dep. Var.	6.320	41.477	0.540	0.090	0.680

Notes: The first two rows report average pre-treatment and post-treatment ATT estimates from the event-study aggregation over the event-time window $[-15, 15]$. Standard errors are in parentheses. Column 1 corresponds to Figure 4; column 2 corresponds to Figure 5. Columns 3–5 report alternative modern-bank outcomes: log(total modern banks + 1), one-year growth in this log outcome, and new modern banks. The post-treatment estimates imply about 31% more modern banks and 27% more enterprises using the outcome means reported in Figures 4 and 5. The log specification implies a 7.8% increase in total modern banks plus one; the growth specification implies a 1.9 percentage-point increase in annual log growth; and new-bank flows rise by about 73% relative to their mean. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

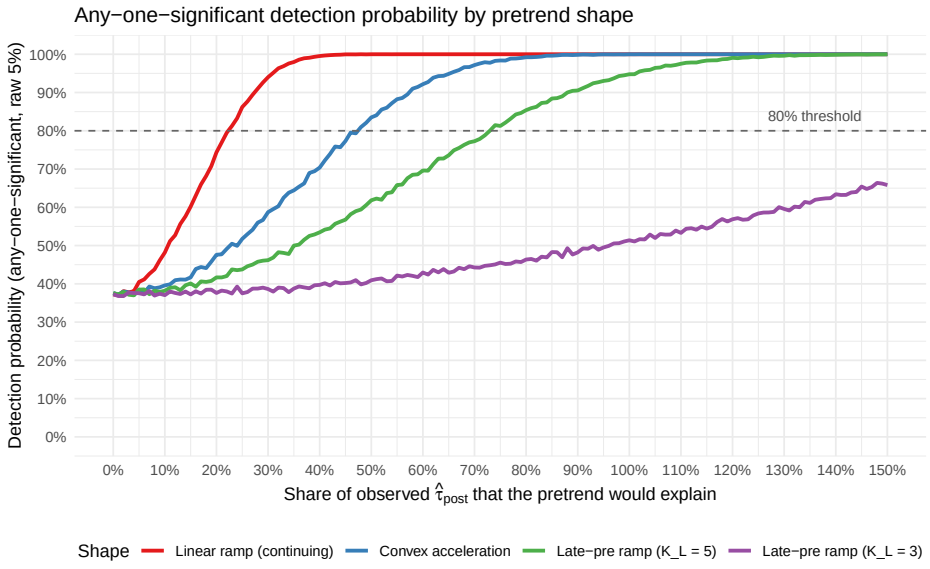
Pre-period variation. A natural concern is that modern banks are rare in the early part of the sample, so flat pre-treatment coefficients may partly reflect limited pre-period variation. We therefore complement the event-study pre-trend tests with a design-based minimum detectable effect exercise. The exercise uses the estimated pre-period coefficients and covariance matrix from the baseline modern-bank event study. It then asks how large different hidden pre-trend shapes would need to be for the design to detect them. The design is informative against several smooth pre-trend shapes, although a pre-trend that activates only in the final few pre-treatment years is harder to detect. This exercise is intended as a diagnostic for the baseline design, not as a separate identification assumption.

Figure D1: Design-Based Power Against Hidden Pre-Trends



Notes: The left panel shows candidate hidden pre-trend shapes, scaled relative to the observed post-treatment effect. The right panel reports how often the joint Wald test over pre-treatment coefficients would reject for each candidate shape. The exercise uses the estimated pre-period coefficients and covariance matrix from the baseline modern-bank event study.

Figure D2: Alternative Pre-Trend Detection Rule



Notes: The figure reports rejection probabilities under an alternative rule based on whether any individual pre-treatment coefficient is statistically significant. This rule is more mechanical than the joint Wald test but gives a useful check that the pre-period is not completely uninformative.

Alternative transformations. We also re-estimate the historical DiD using alternative transformations of the modern-bank outcome. These specifications address the concern that the baseline level outcome may be affected by zeros or limited early variation. Table D2 reports the post-treatment ATT for each specification, and Figures D3–D5 plot the corresponding event studies.

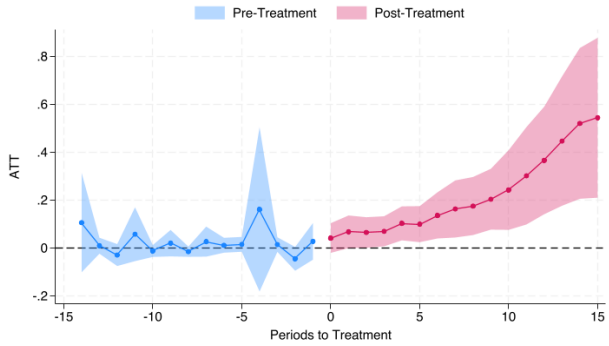
Table D2: Post-Treatment ATT Under Alternative Modern-Bank Outcomes

Specification	ATT	SE	p-value
Baseline: total modern banks	0.221	0.071	0.002
$\log(y+1)$	0.075	0.021	< 0.001
Growth rate	0.019	0.005	< 0.001
Extensive margin ($y > 0$)	0.110	0.046	0.017
New modern banks	0.059	0.024	0.014
Province-conditioned levels	0.221	0.071	0.002
Drop pre-1900, levels	0.258	0.092	0.005
Drop pre-1900, $\log(y+1)$	0.084	0.026	0.001

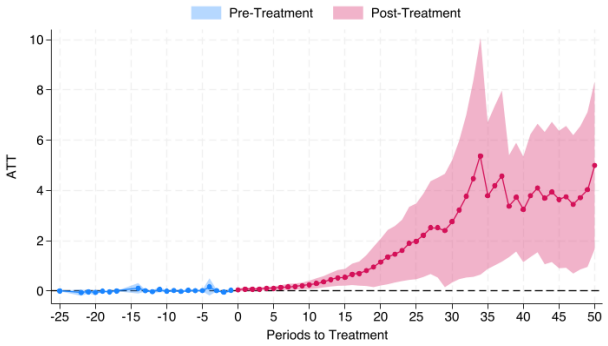
Notes: The table reports post-treatment ATT estimates averaged over event times 0 through 15. The baseline reproduces the main effect reported in Figure 4. The remaining rows use alternative transformations or definitions of the modern-bank outcome.

Figure D3: Alternative Outcome Transformations: Baseline, Logs, and Growth

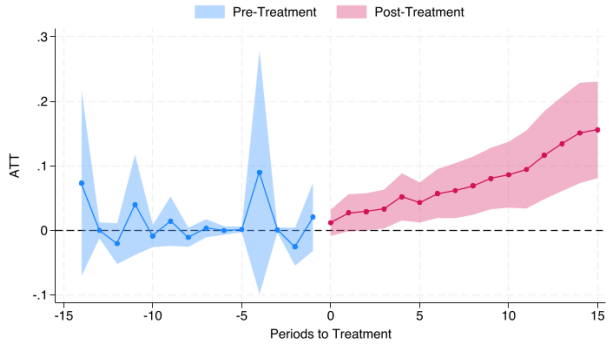
(a) Baseline, 15 periods



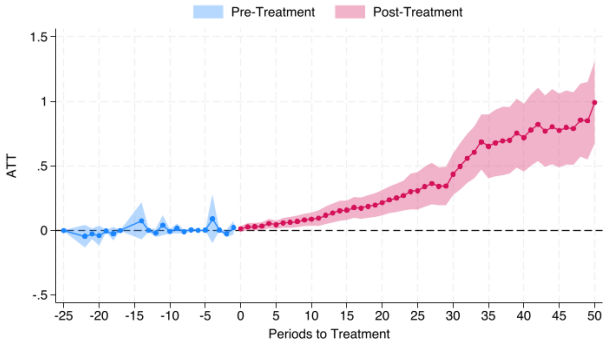
(b) Baseline, 50 periods



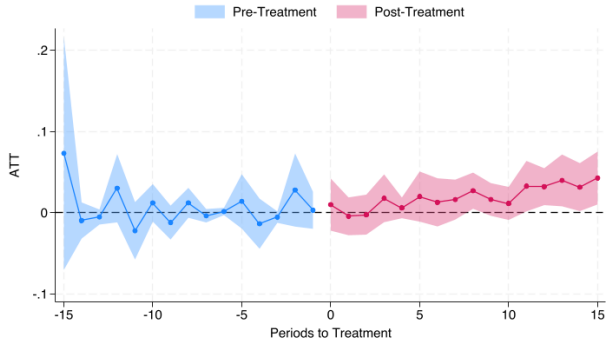
(c) $\log(y+1)$, 15 periods



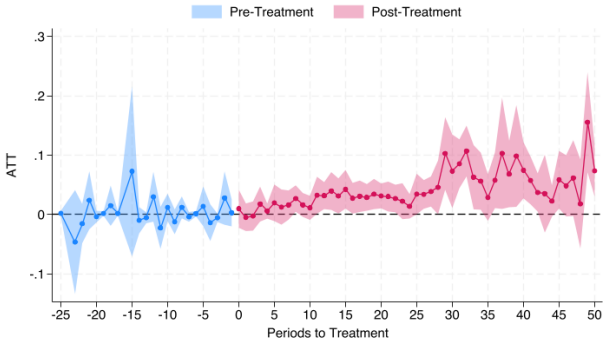
(d) $\log(y+1)$, 50 periods



(e) Growth rate, 15 periods



(f) Growth rate, 50 periods

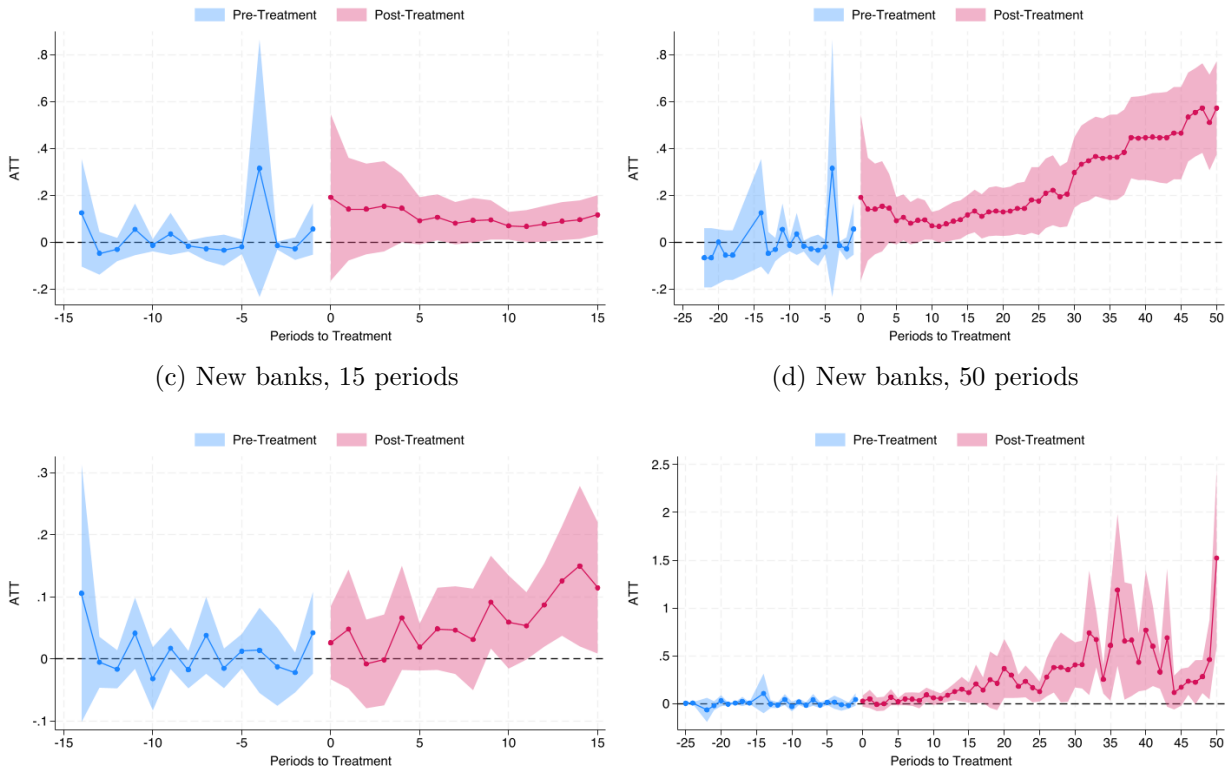


Notes: The figure reports event studies for alternative transformations of the modern-bank outcome. Panels use the same treatment definition as the baseline specification.

Figure D4: Alternative Outcome Transformations: Extensive Margin and New Banks

(a) Extensive margin, 15 periods

(b) Extensive margin, 50 periods



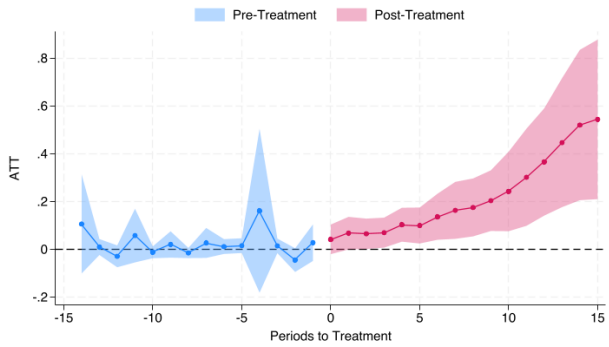
(c) New banks, 15 periods

(d) New banks, 50 periods

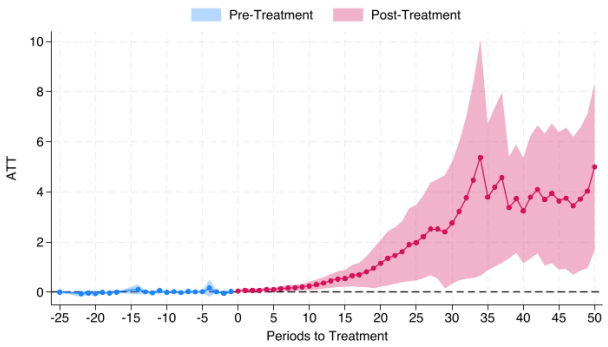
Notes: The figure reports additional outcome transformations. The post-treatment averages corresponding to these figures are reported in Table D2.

Figure D5: Alternative Outcome Transformations: Province-Conditioned and Restricted Samples

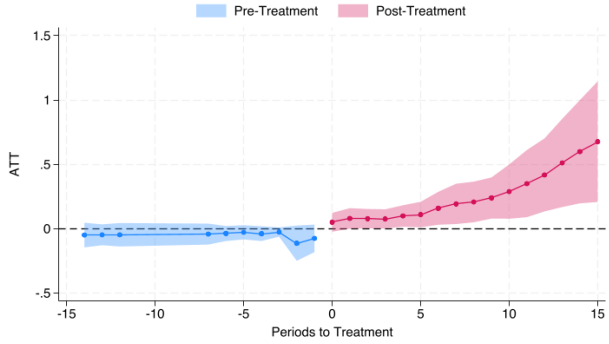
(a) Province-conditioned, 15 periods



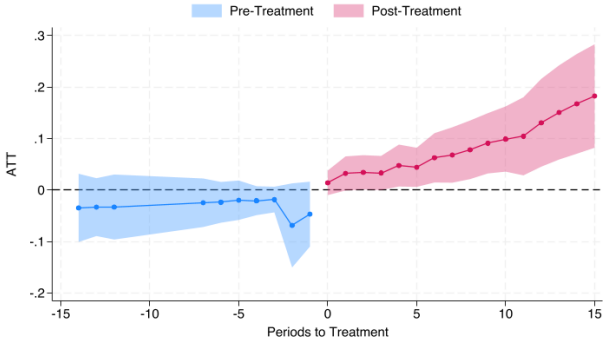
(b) Province-conditioned, 50 periods



(c) Drop pre-1900, levels



(d) Drop pre-1900, $\log(y+1)$



Notes: The figure reports province-conditioned specifications and sample restrictions. The post-treatment averages corresponding to these figures are reported in Table D2.

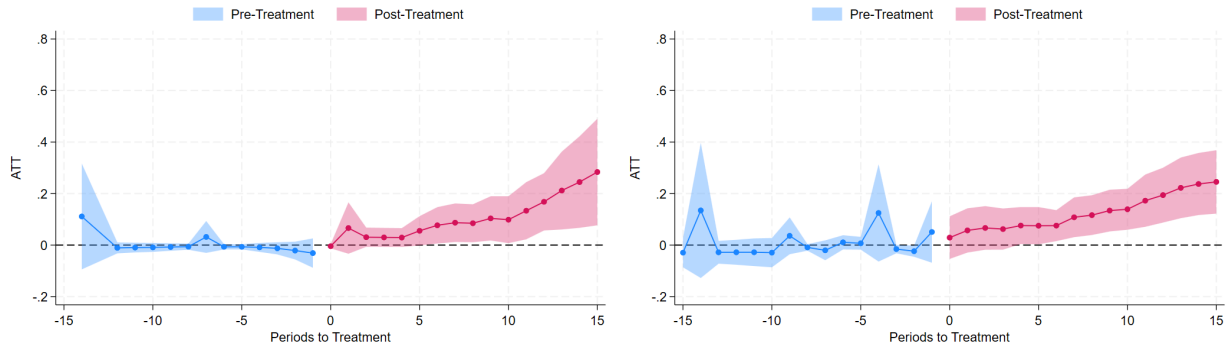
D.2 Propagation Across the Banking Sector

The baseline outcome counts all modern banks. We next show that the result is not driven by a single bank type or by a purely extensive-margin count. Figure D6 reports event studies separately for private, government, and foreign banks. All three outcomes move in the same direction after missionary arrival, suggesting that missionary exposure affected the broader modern-banking sector rather than only one ownership category.

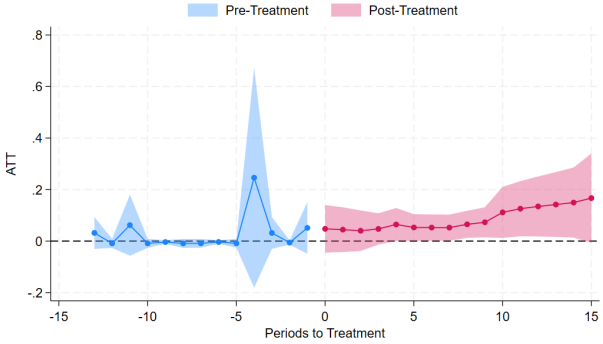
Figure D6: Missionary Presence and Modern Banks by Ownership Type

(a) Private banks

(b) Government banks



(c) Foreign banks



Notes: Each panel reports the event-study estimates from the historical DiD design using the indicated bank type as the outcome. The estimation window is 15 periods before and after missionary arrival.

We also use balance-sheet data to study whether missionary exposure is associated with the scale of banking activity. These exercises are supporting evidence rather than the baseline DiD specification, but they point in the same direction: places with greater missionary exposure have larger deposits, loans, assets, and related measures of bank size. The prefecture-level table uses the branch/location balance-sheet records from the 1910s, aggregated to 1911 prefectures, and relates them to the predicted missionary exposure constructed from the railway-flow instrument

in Section 4.2. The bank-level table uses the 1932–1936 bank balance sheets and constructs each bank's missionary exposure from its branch network across prefectures.

Table D3: Missionary Exposure and Bank Balance Sheets: Prefecture Level

Variables	(1) Ln Deposits	(2) Ln Banknotes	(3) Ln Surplus Reserves	(4) Ln Capital Paid	(5) Ln Capital	(6) Total Banks (1936)
Predicted Tot Missions	0.448**	0.498***	0.396***	0.379**	0.368**	1.634*
	(0.175)	(0.183)	(0.151)	(0.166)	(0.180)	(0.959)
Railway Duration	-0.0268	-0.0396	-0.0311	-0.0261	-0.0245	-0.179
	(0.0266)	(0.0282)	(0.0227)	(0.0251)	(0.0270)	(0.130)
Railway Density	323.8***	259.9**	265.9**	259.3**	269.2**	1,438**
	(109.6)	(124.2)	(113.8)	(108.7)	(113.2)	(597.7)
Obs.	247	247	247	247	247	247
Mean Dep. Var.	2.271	2.062	0.848	1.458	1.520	3.622

Notes: The table reports prefecture-level balance-sheet regressions using the 1910s branch/location records. Outcomes are measured using historical bank balance-sheet data described in the data section. Predicted total missions is constructed using the railway-flow instrument described in Section 4.2. Standard errors are in parentheses. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

Table D4: Missionary Exposure and Bank Balance Sheets: Bank Level

Variables	(1) Ln Deposits	(2) Ln Loans	(3) Ln Assets	(4) Ln Income	(5) Ln Security	(6) Ln Surplus Reserves	(7) Tot Branches	(8) Ln Net Income
Mission Exposure (STD)	0.954***	0.858***	0.867***	0.689***	0.844***	1.262***	0.676	0.585***
	(0.125)	(0.107)	(0.117)	(0.106)	(0.143)	(0.141)	(0.799)	(0.120)
Exposure to Population (STD)	0.488***	0.472***	0.479***	0.396***	0.457***	0.268***	17.47***	0.329***
	(0.0867)	(0.0784)	(0.0824)	(0.0782)	(0.120)	(0.0849)	(0.776)	(0.0669)
Obs.	155	156	157	156	136	144	160	153

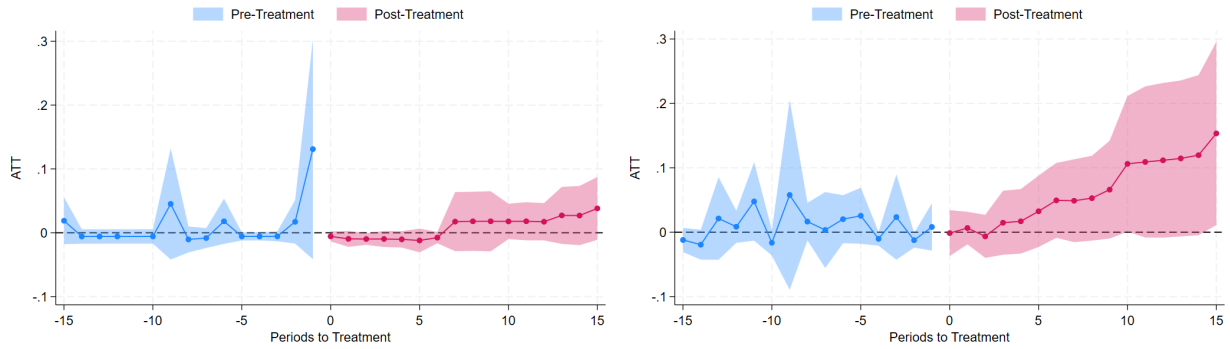
Notes: The table reports bank-level regressions using 1932–1936 historical balance-sheet data. Mission exposure is standardized and is based on the historical missionary exposure of the prefectures in which each bank operated branches. Population exposure is constructed analogously using historical population. Standard errors are in parentheses. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

D.3 Downstream Market Outcomes

The main text reports the effect of missionary presence on total enterprises. This appendix provides additional evidence on downstream market activity. First, we separate enterprises by ownership type. The positive enterprise result is mainly driven by private enterprises, which account for most of the enterprise panel. Government and foreign enterprises move in the same direction but are less precisely estimated.

Figure D7: Missionary Presence and Enterprises by Ownership Type

(a) Foreign enterprises (b) Government enterprises



Notes: The figure reports event studies for foreign and government enterprises. The total enterprise result is reported in the main text. Private enterprises account for most of the enterprise panel.

Second, we use trade data from 1934–1936 to examine whether missionary exposure is associated with broader market exchange. We treat this as downstream evidence, not as a mechanism. The trade data come from a government census of trade product types, production volumes, prices, and sales areas. In 1934, local postal offices were entrusted with collecting the census at the county and township levels, and the data collection was completed in 1936 (Ministry of Communications, 1937). The data report domestic and international export activity, including trade values and commodity types.

We use these data to classify enterprise industries as trade-oriented or domestic-oriented. The idea is that treaty ports were the main departure points for overseas-bound goods, so products disproportionately exported from treaty ports are more likely to be linked to international trade. We compare export composition across treaty and non-treaty ports, compute the relative importance of each product category, and identify products with the largest positive and negative differences in treaty-port export shares. Products with high treaty-port export intensity are classified as "trade-

likely," while products with low treaty-port export intensity are classified as "domestic-likely." We then map these products to enterprise industries in the historical enterprise panel. This gives us two downstream outcomes: trade-likely enterprises and domestic-likely enterprises.

Table D5 reports the resulting classification. Figure D8 plots the aggregate evolution of these enterprise categories, and Figure D9 estimates the historical DiD separately for trade-likely and domestic-likely enterprises. The trade-likely response appears only after a delay, mirroring the timing of the total-enterprise result in the main text. Table D6 also reports the relationship between missionary exposure and export transactions in 1936. These exercises show that missionary exposure is associated with stronger trade-related activity, consistent with modern banks supporting broader market integration.

Table D5: Trade-Likely and Domestic-Likely Enterprise Categories

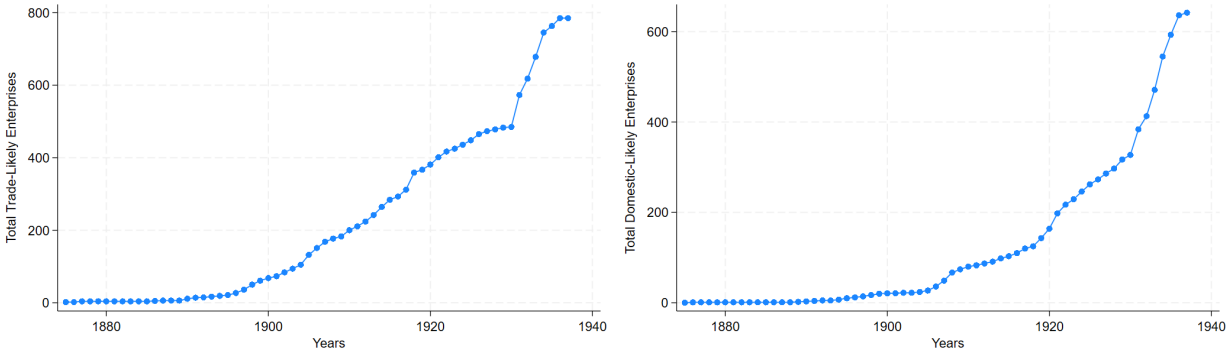
Trade-Likely Enterprises	**Domestic-Likely Enterprises**
Silk	Brick
Tea	Cement
Tobacco	Construction
Seafood	Building
Fish	Real Estate
Herbal Products	Services
Shipping	Textile
Foreign Trade	Animal Products
Transhipment	Agriculture
Beverages	Farming
Porcelain	Clothing
Cigarette	Entertainment
	Rice

Notes: Product groups are classified using differences in export composition between treaty ports and non-treaty ports in the 1930s trade data. We then map these products to enterprise industries.

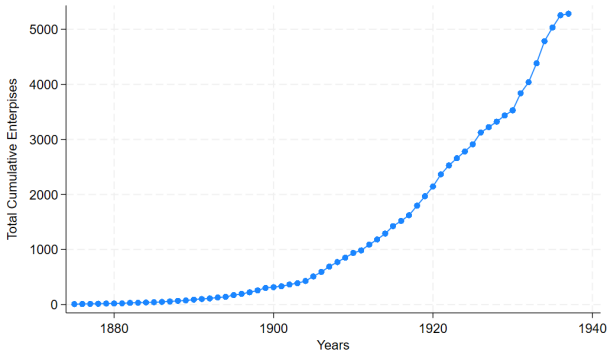
Figure D8: Evolution of Trade-Likely and Domestic-Likely Enterprises

(a) Trade-likely enterprises

(b) Domestic-likely enterprises



(c) All enterprises

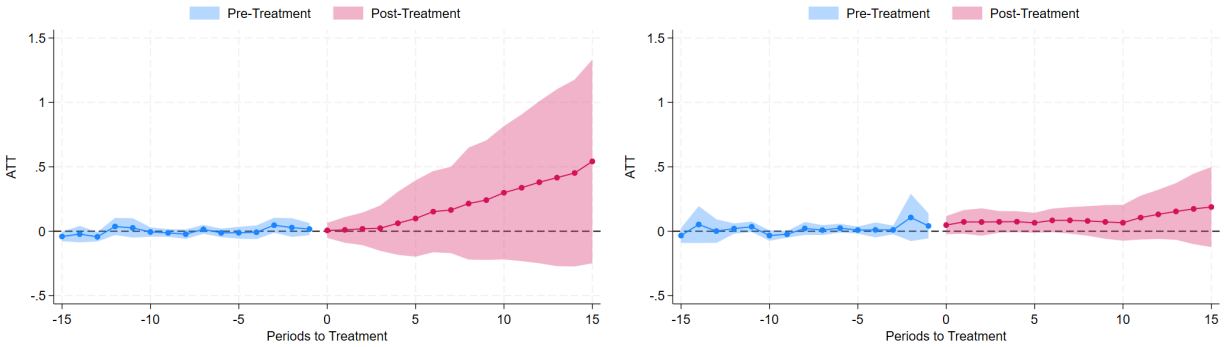


Notes: The figure plots aggregate enterprise categories over time. Data on enterprises are from Du (1991, 2019).

Figure D9: Missionary Presence and Trade-Likely Enterprises

(a) Trade-likely enterprises

(b) Domestic-likely enterprises



Notes: Panel A uses trade-likely enterprises as the outcome, and Panel B uses domestic-likely enterprises. Trade-likely and domestic-likely categories are defined using the export data described in Table D5. The delayed response in Panel A is consistent with interpreting trade as a downstream market outcome.

Table D6: Missionary Exposure and Export Transactions in 1936

Variables	IV Export Transactions	OLS Export Transactions
Tot Miss Inst	0.865*	0.289***
	(0.496)	(0.0893)
RR Duration	0.00212	0.185**
	(0.146)	(0.0719)
RR Density	-595.0	-617.4
	(637.4)	(491.6)
Province FE	Yes	Yes
Observations	231	231
Adj. R-squared	-0.214	0.385
Mean Dep. Var.	16.07	16.07
S.D. Dep. Var.	33.66	33.66
K-P F-Stat	11.68	NA

Notes: The dependent variable is the number of export transactions in 1936. The IV specification instruments total missionary institutions with the railway-flow instrument described in Section 4.2. Standard errors are in parentheses. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

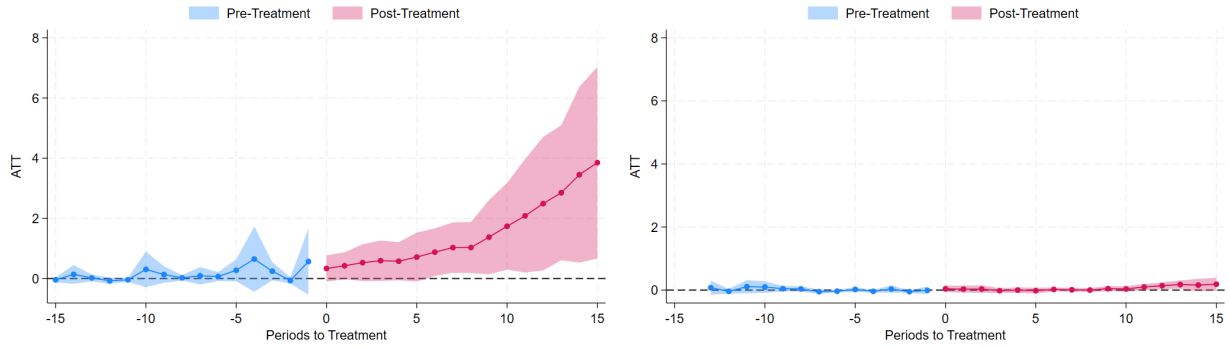
D.4 Traditional Finance and Financial Interaction

This section studies how missionary exposure interacted with traditional financial institutions. The main text emphasizes the transition from traditional finance to modern banking. We therefore begin with *Piaohao*, where the substitution pattern is clearest.

Modern banks in places with preexisting *Piaohao*. We first split the sample by whether a prefecture had *Piaohao* before missionary arrival. Prefectures with preexisting *Piaohao* experienced a sharper rise in modern banks following missionary entry, suggesting that modern banks expanded where financial demand was already present.

Figure D10: Modern Banks in Places With and Without Preexisting *Piaohao*

(a) Prefectures with preexisting *Piaohao* (b) Prefectures without preexisting *Piaohao*



Notes: The outcome is the number of modern banks. Panel A includes prefectures with *Piaohao* before missionary arrival and never-treated prefectures. Panel B includes prefectures without *Piaohao* before missionary arrival and never-treated prefectures.

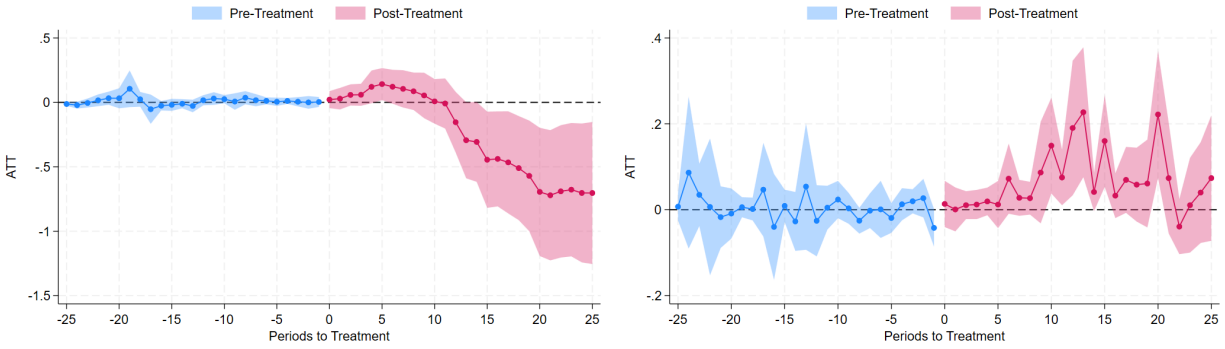
Piaohao. We then use *Piaohao* as the outcome. The event study shows that *Piaohao* initially rise but later decline after missionary arrival, consistent with modern banks eventually replacing older remittance institutions. The lack of a clear *Piaohao* pre-trend is also useful because these institutions were already active before the modern-bank wave. Unlike the modern-bank outcome, the pre-period has meaningful variation, so the flat pre-period is less likely to be only a mechanical consequence of early zeros.

Qianzhuang. The pattern for *Qianzhuang* is different. Because *Qianzhuang* were local money shops with dense merchant networks, they could complement modern banks that initially lacked

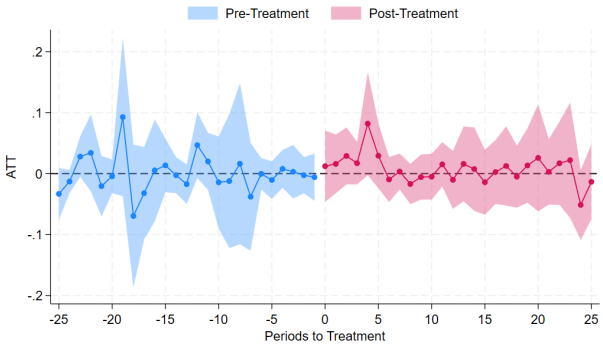
Figure D11: Missionary Presence and *Piaohao*

(a) Total *Piaohao*

(b) New closings



(c) New openings

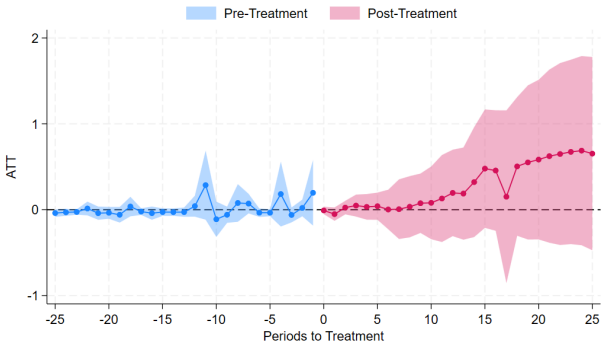


Notes: The figure reports event studies using total *Piaohao*, new *Piaohao* closings, and new *Piaohao* openings as outcomes. The absence of a clear pre-trend is informative because *Piaohao* have substantial pre-period variation and branch-level opening and closing dates.

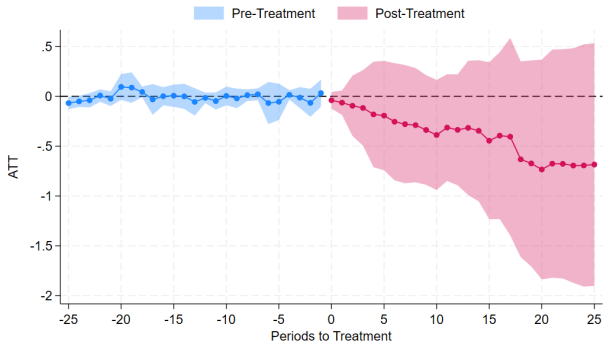
local trust and information. We therefore treat the *Qianzhuang* results as evidence on financial interaction rather than simple substitution. Taken together, the traditional-finance results suggest that missionary exposure did not mechanically erase all older institutions; the substitution pattern is clearest for *Piaohao*, while *Qianzhuang* appear more complementary.

Figure D12: Missionary Presence and *Qianzhuang*

(a) Total *Qianzhuang*, eight provinces



(b) Total *Piaohao*, same eight provinces



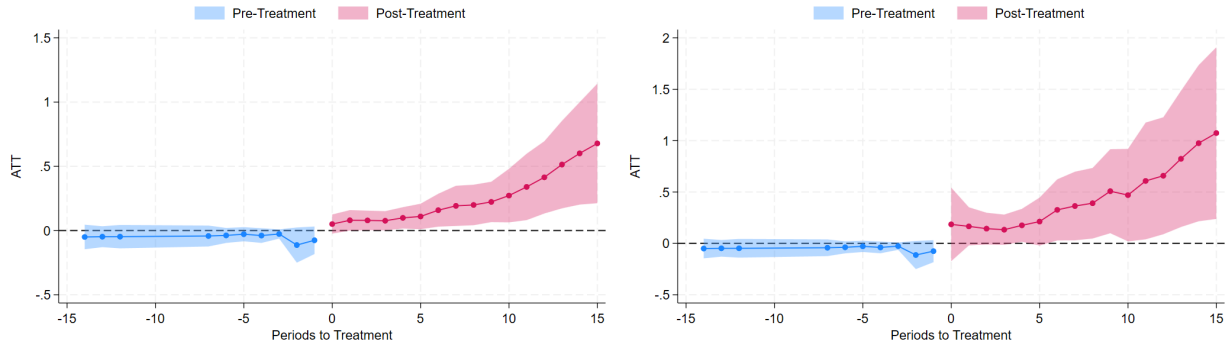
Notes: Panel A uses total *Qianzhuang* in eight major provinces as the outcome. Panel B uses total *Piaohao* in the same eight provinces for comparison.

D.5 Identification Robustness

This section reports additional checks for the historical DiD design. First, we restrict the sample to the post-1900 and post-1905 periods, when selection into missionary entry is weaker and the modern-bank outcome has more pre-period variation. Second, we exclude treaty ports to address the concern that the result is driven by locations with early foreign presence. Third, we use longer event windows, balanced pre/post windows, and group-specific ATTs. Fourth, we add railway controls and examine pre-trends in other predetermined outcomes. Across these exercises, the qualitative pattern remains similar to the baseline result: the effect is not driven by the earliest part of the sample, treaty-port prefectures, one particular cohort, or one event-window choice.

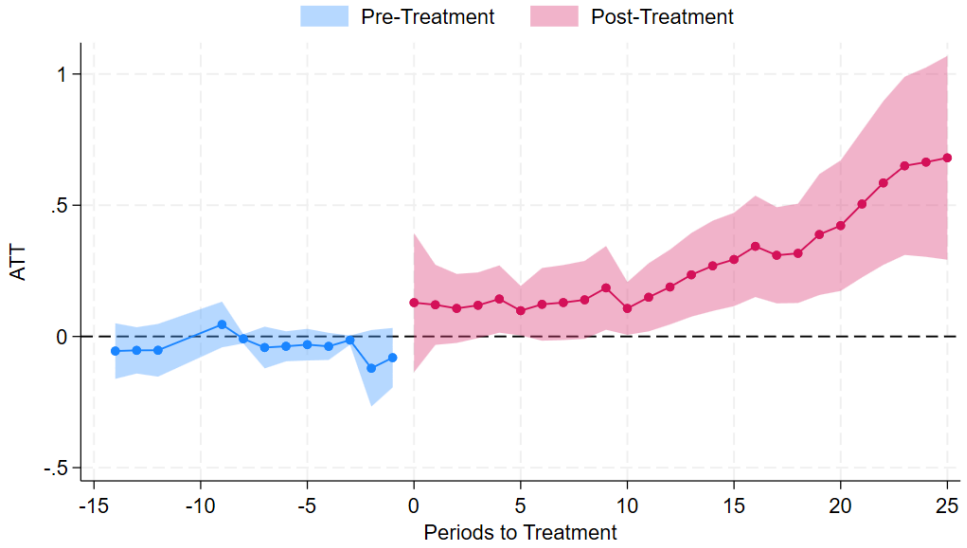
Figure D13: Missionary Presence and Modern Banks: Post-1900 and Post-1905 Samples

(a) Sample restriction: 1900–1936 (b) Sample restriction: 1905–1936



Notes: The figure reports the baseline event study after restricting the estimation sample to later periods. The dependent variable is the total number of modern banks. The positive post-treatment pattern remains when the early years with sparse modern-bank activity are excluded.

Figure D14: Missionary Presence and Modern Banks: Excluding Treaty Ports

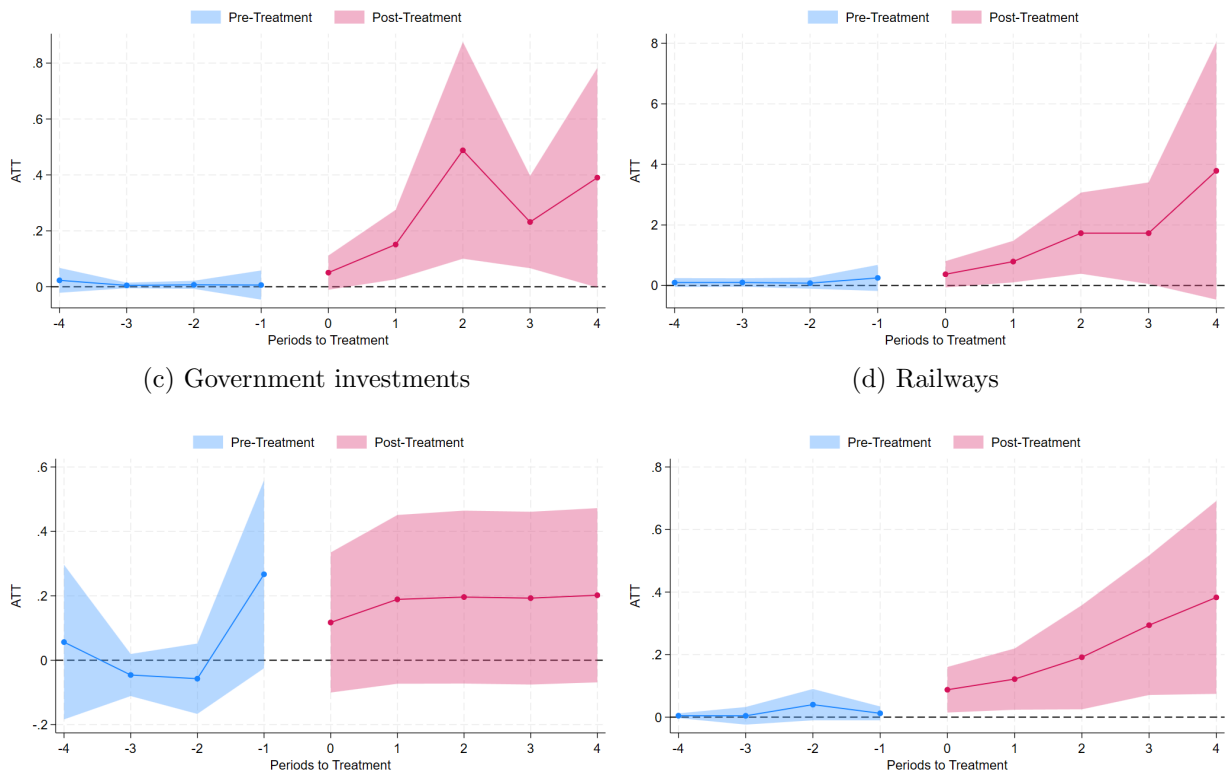


Notes: The figure reports the baseline event study after excluding treaty-port prefectures. The dependent variable is the total number of modern banks. The persistence of the effect outside treaty ports suggests that the result is not only a treaty-port foreign-presence effect.

Figure D15: Pre-Trends in Other Predetermined Outcomes

(a) Modern banks

(b) Enterprises

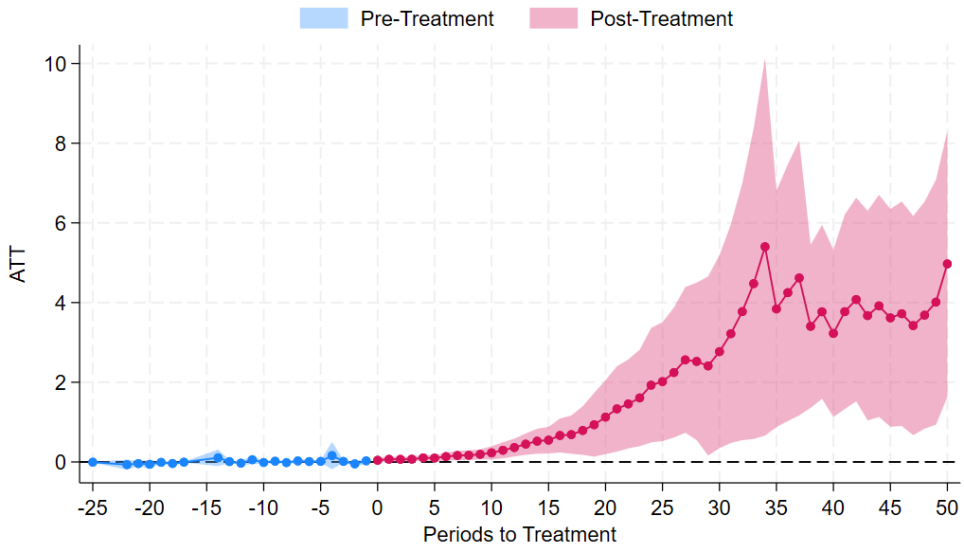


(c) Government investments

(d) Railways

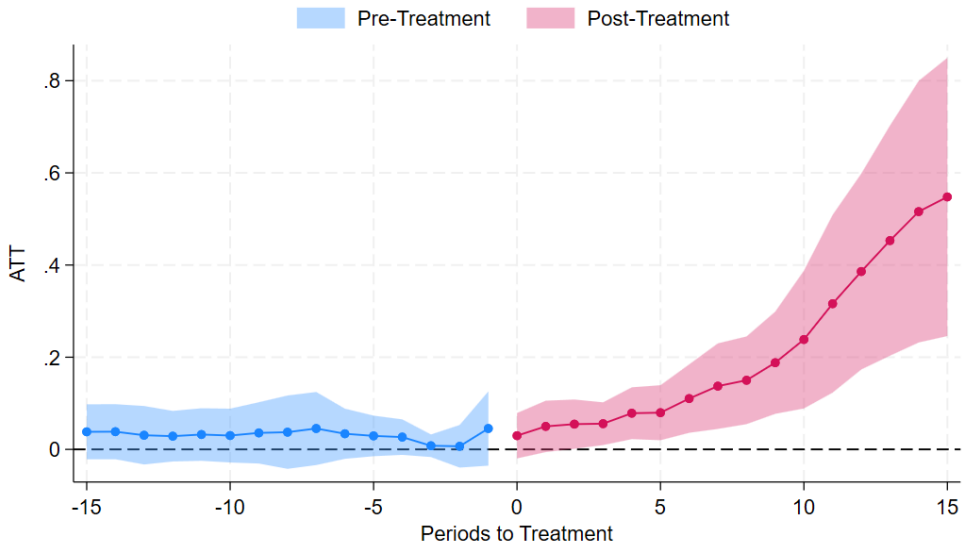
Notes: The figure reports cohort-based pre-trend diagnostics for outcomes and covariates measured before missionary entry. These checks compare treated cohorts before missionary arrival and ask whether they were already diverging in other predetermined outcomes. The panels show no systematic pre-treatment divergence.

Figure D16: Missionary Presence and Modern Banks: Longer Event Window



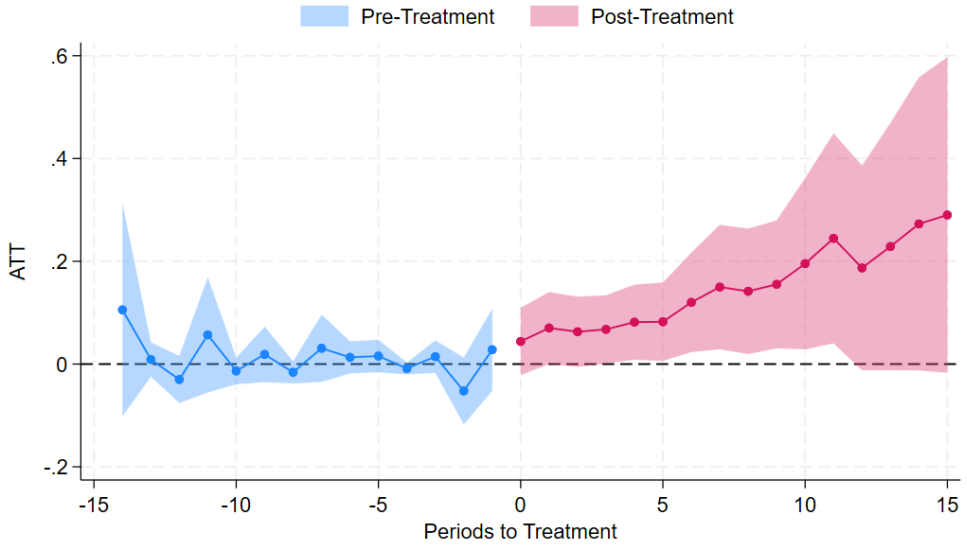
Notes: The figure reports the event study using the longer event window. The dependent variable is the total number of modern banks. The longer window shows a similar post-treatment increase.

Figure D17: Missionary Presence and Modern Banks: Long Gaps in the Pre-Period



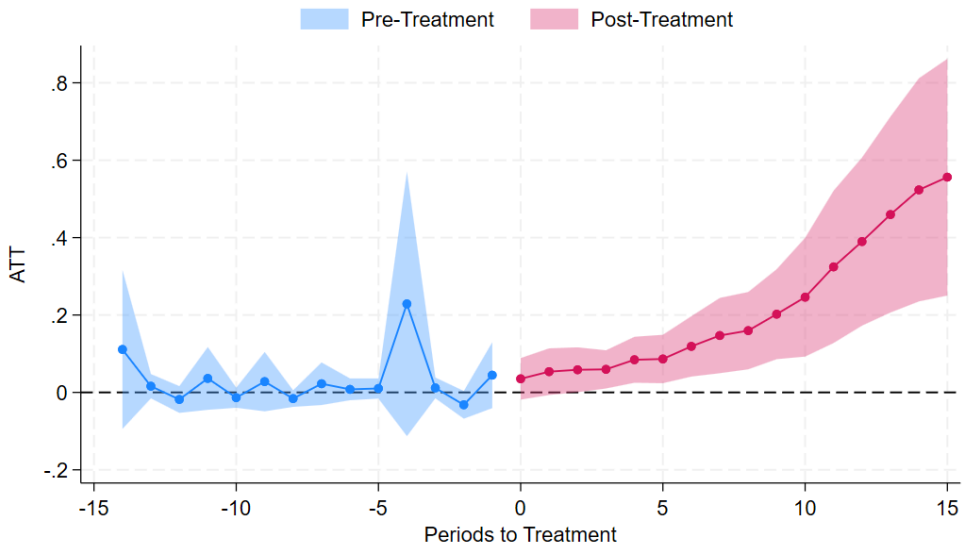
Notes: The figure reports the event study allowing for longer gaps in the pre-period. The exercise checks that the result is not an artifact of how long pre-treatment gaps are handled.

Figure D18: Missionary Presence and Modern Banks: Number of Railways as Control



Notes: The figure reports the baseline event study after adding the number of railways as a control. The result is similar, suggesting that railway expansion is not driving the historical DiD pattern.

Figure D19: Missionary Presence and Modern Banks: Balanced Pre/Post Window

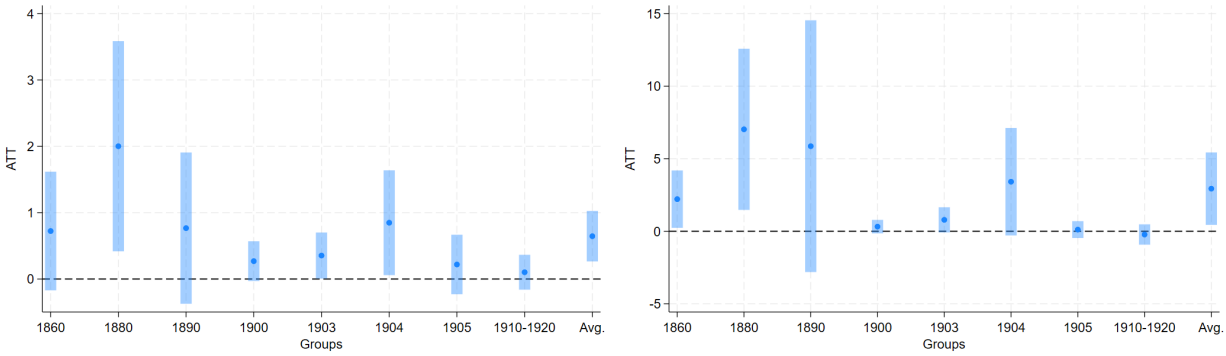


Notes: The figure reports the event study using a balanced number of pre- and post-treatment periods. The pattern remains similar after imposing the balanced event window.

Figure D20: ATT by Cohort Group

(a) Modern banks

(b) Enterprises



Notes: The figure reports average treatment effects by treatment-cohort group for modern banks and enterprises. The estimates do not point to the result being driven by a single treatment cohort.

Appendix E: Mechanism Results and Examples

Mechanism 1: Missionaries spread economic ideas through translating and education

Missionary Interview Evidence

As additional qualitative evidence, we reviewed 44 short interview summaries from Christian missionary workers in China held in the Claremont Colleges Special Collections and coded the summaries into broad topics. This exercise is descriptive and does not enter the causal analysis, but it helps discipline the historical interpretation of the education mechanism.

Table E1: Topics in Missionary Interview Summaries

Topic	**% of summaries mentioning**
Economic contribution to local economy	18%
Banking link: banks, credit, or bookkeeping	9%
Enterprise link: firms or entrepreneurship	7%
Mentions mission schools	62%
Curriculum: modern subjects, science, math, or English	27%
Girls' education	16%

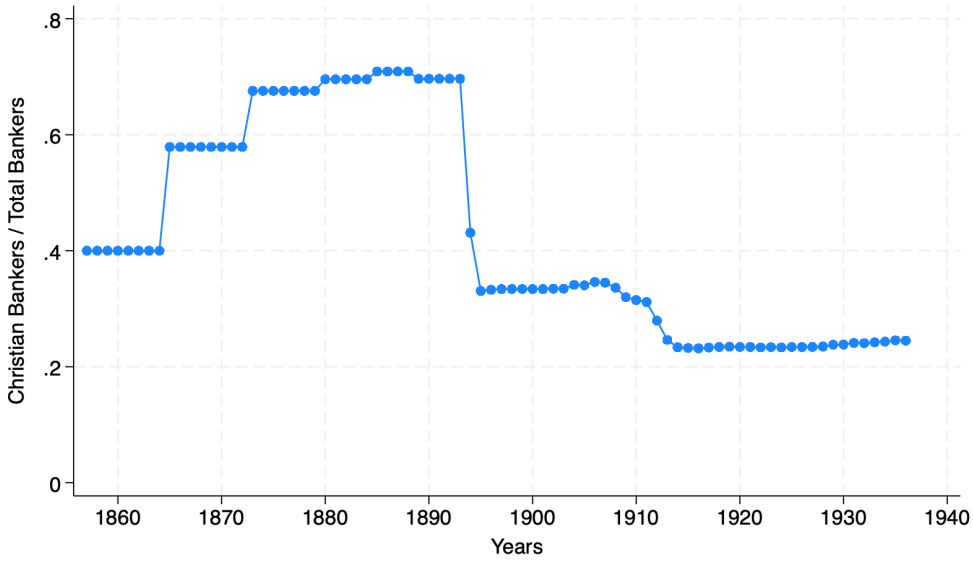
Notes: The table reports preliminary AI-assisted coding of 44 short interview summaries. The underlying interviews are from the Claremont Colleges Special Collections.

Table E2: Selected Short Excerpts from Missionary Interviews

Interviewee	**Description**	**Selected excerpt**
Glen Fuller	Methodist; set up a business administration school	"Several graduates went into Chinese banks."
Francis Price Jones	Methodist; professor and translator	"Government had no plan for universal primary education"; "Superior instruction in English"
Katherine Ward	Methodist; educator and community services	"First schools for girls"; "Higher academic standards"

Notes: These excerpts illustrate themes that appear in the interview material: links between mission education and banks, English instruction, and girls' schooling. Excerpts are shortened from the interview summaries.

Figure E1: Evolution of the Ratio of Total Christian Bankers to Total Bankers

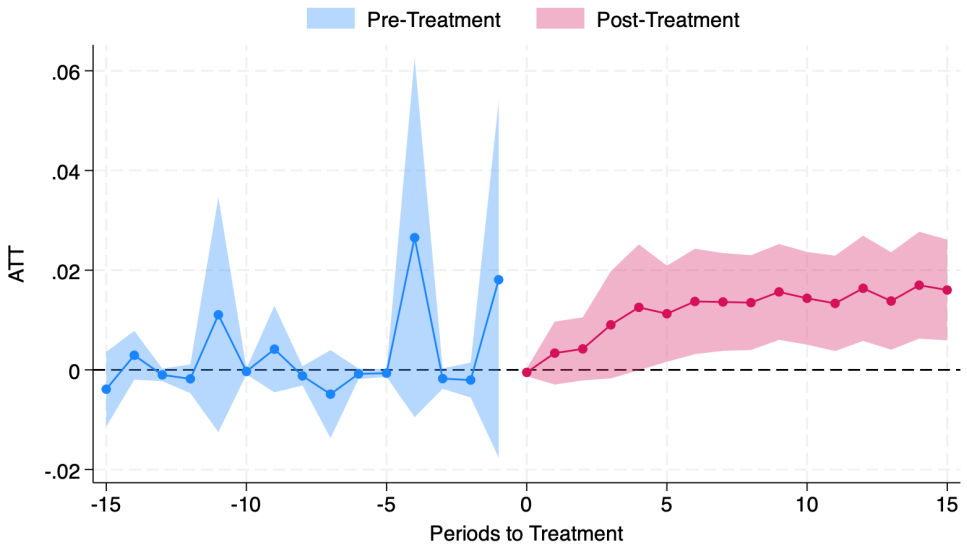


Notes: This figure shows the evolution of Total Christian Bankers to Total Bankers. Spikes in the number of non-Christian bankers correspond to periods when the Chinese government either actively responded to foreign banks, such as in the years leading up to 1897 with the establishment of the first government banks or promoted efforts to boost the economy following the establishment of the Republic in 1911.

Heterogeneity Magnitudes and Difference Tests

This appendix summarizes the magnitude comparisons behind the heterogeneity discussion in the main text. The table reports average pre- and post-treatment differences between high-exposure and low-exposure groups. The figures then plot coefficient-by-coefficient differences at each event time. These exercises are best read as suggestive heterogeneity checks: they compare magnitudes across groups, but some average pre-period differences are nonzero.

Figure E2: Missionary Presence and the Share of Christian-educated Bankers

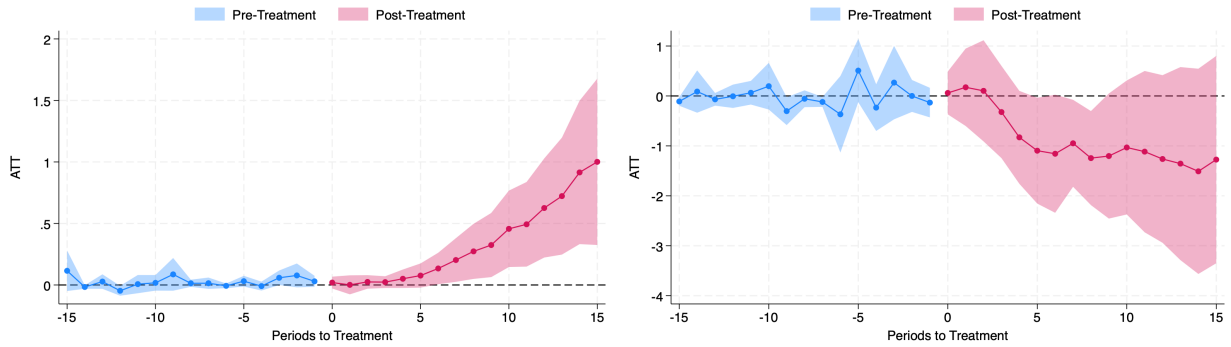


Notes: This figure shows the result using equation 1 using the share of Christianity-related bankers as the outcome. Post ATT: 0.012; Dep var mean: 0.016; 0.032 in 1920, 0.066 in 1936.

Figure E3: Missionary Presence on Modern Banks: Protestant and Catholic (with controls)

(a) Protestant

(b) Catholic

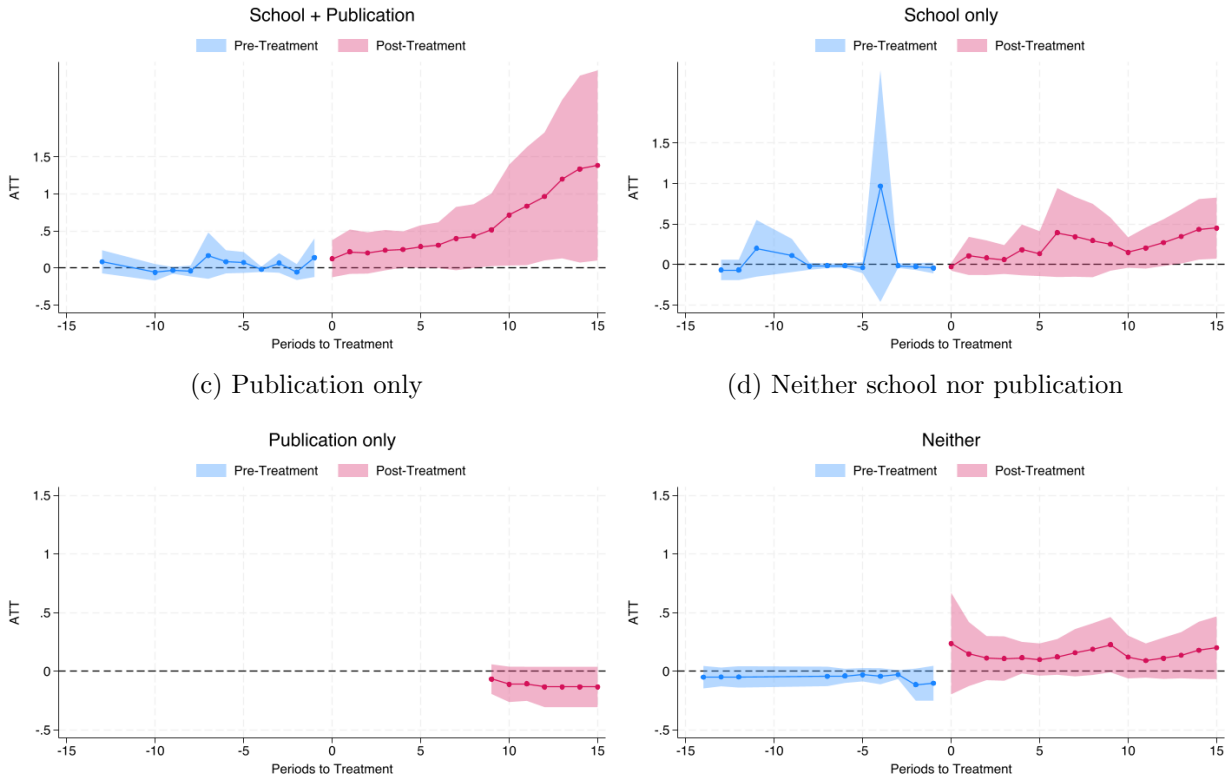


Notes: This figure shows the result using equation 1 by changing the explanatory variable to an indicator for the years after the first Protestant (or Catholic) mission institution entered that prefecture. Each panel controls for the time-varying exposure to the other missionary tradition.

Figure E4: School and Publication Cells

(a) School and publication

(b) School only



(c) Publication only

(d) Neither school nor publication

Notes: The figure splits treated prefectures into four cells according to whether missionary exposure included a school and whether missionary publication activity is recorded. Never-treated prefectures are included as controls in each panel.

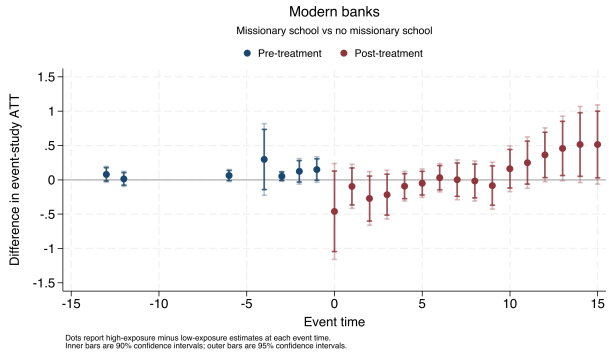
Table E3: Average Heterogeneity Differences

Outcome	High-exposure group	Low-exposure group	Pre diff.	Post diff.
Modern banks	Missionary school	No missionary school	0.121**	0.063
Modern banks	School and publication	Neither	0.172***	0.441
Enterprises	Missionary school	No missionary school	0.046	1.998**
Enterprises	School and publication	Neither	0.298	5.141
Trade-likely enterprises	Missionary school	No missionary school	-0.320***	0.679*
Domestic-likely enterprises	Missionary school	No missionary school	0.015	0.006

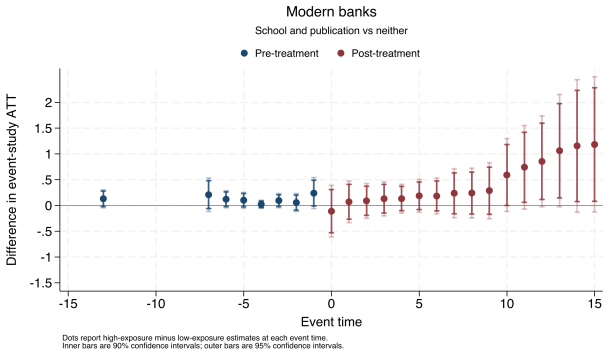
Notes: The table reports high-exposure minus low-exposure differences in average pre- and post-treatment event-study estimates. Standard errors for the differences are computed as the square root of the sum of the two group-specific variances; this is conservative because the groups share the never-treated comparison units. Stars denote two-sided significance using this conservative standard error. The table is intended to summarize magnitudes, so it should be read together with the event-time plots in Figure E5. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

Figure E5: Coefficient-by-Coefficient Heterogeneity Differences

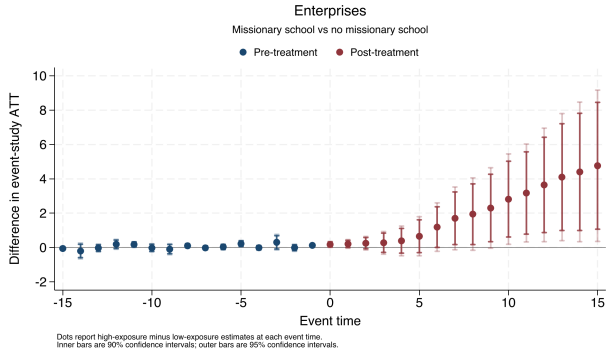
(a) Modern banks: school vs no school



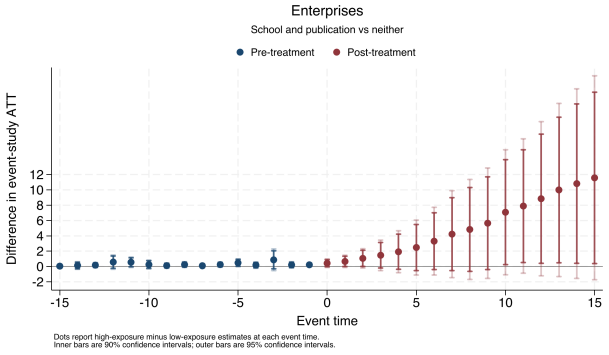
(b) Modern banks: school and publication vs neither



(c) Enterprises: school vs no school



(d) Enterprises: school and publication vs neither



Notes: Each dot is the high-exposure event-study estimate minus the low-exposure estimate at the same event time. Confidence intervals use conservative standard errors computed from the two group-specific standard errors. The bank differences are small early and become more positive at long horizons. The enterprise differences grow more strongly after treatment, consistent with the interpretation that education and school-publication complementarities matter especially for downstream market outcomes.

Compradores and Foreign-Bank Intermediaries

This section reports descriptive evidence on a possible intermediary-network channel. Compradores were Chinese intermediaries who worked with foreign firms and banks. They could therefore serve as bridges between foreign financial practices and Chinese financial institutions. The evidence in this section is descriptive and does not enter the baseline causal analysis.

Our data contain compradore information at two levels. First, the foreign-enterprise data include a firm-level flag for whether a foreign firm involved a recorded compradore. Second, the banker biography data include an individual-level flag for whether a Chinese banker had a compradore background. The individual-level data are especially useful because they can be linked to the same banker biographies used in the Christian-banker analysis.

Table E4: Compradore Data and Descriptive Patterns

Measure	**Value**
Cleaned foreign-firm compradore records, relative to raw flags	76.5%
Bankers flagged as compradore-related, Sheet 1	4.1%
Share Christianity-related among compradore-flagged bankers	28%
Share Christianity-related among non-compradore bankers	15%
Compradore-flagged bankers who founded a Chinese bank, *Qianzhuang*, *Yinhao*, or *Piaohao*	63%
Compradore-flagged bankers who worked at both foreign and Chinese banks	72%

Notes: The table summarizes descriptive evidence from the foreign-enterprise data and the banker biography data. The foreign-firm row reports the cleaned compradore records as a share of raw compradore flags (202 of 264). The banker rows use Sheet 1 of *Bankers CV.xlsx*, which contains 1,041 bankers; 43 are flagged as compradore-related. A separate supplemental sheet contains a small number of additional compradore-flagged bankers but is not used for the percentages reported here. A banker is coded as Christianity-related if the biography indicates Christian schooling, Christian family background, Christian affiliation, or work for a Christian organization. The founder measure is based on a keyword scan of the biography text for founding-action verbs near banking-institution keywords. These statistics are descriptive and are not interpreted causally.

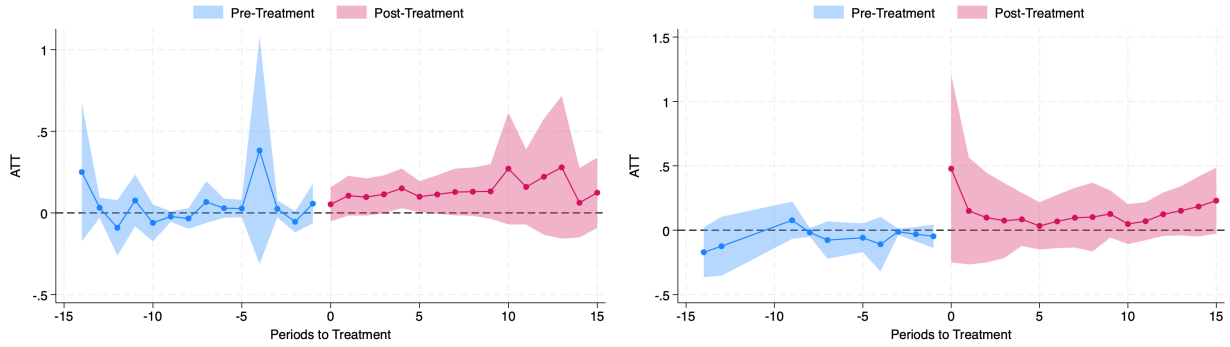
Several patterns are consistent with the idea that compradores could act as intermediaries between foreign and Chinese finance. First, Christianity-related bankers are more common among compradore-background bankers than among other bankers. Second, most compradore-background bankers worked at both foreign and Chinese banks. Third, a large share later founded or invested in Chinese financial institutions. This suggests that compradores may have transmitted institution-specific knowledge from foreign firms and banks into Chinese banking, complementing the education and publication channels emphasized in the main text.

Clan Institutions as an Alternative Explanation

One alternative explanation is that missionary activity weakened kin-based institutions, which then created space for modern banks. This is relevant because Confucian clan institutions and financial markets may operate as substitutes (Chen, Ma, and Sinclair, 2022). Missionary activity may also weaken kin-based institutions more generally (Henrich, 2020; Schulz, Bahrami-Rad, Beauchamp, and Henrich, 2019). The exercises below suggest that the bank effect is not simply a clan-substitution result.

Figure E6: Missionary Presence and Modern Banks by Clan Intensity

(a) Above-median clan intensity (b) Below-median clan intensity



Notes: The figure reports historical DiD estimates for the effect of missionary presence on the total number of modern banks, separately for prefectures above and below the median of clan intensity among prefectures with positive clan records. Never-treated prefectures are included as controls in both panels.

Table E5: Missionary Exposure and Clan Intensity: Horse Race

	(1)	(2)	(3)	(4)
VARIABLES	Modern banks in 1936	Modern banks in 1936	Modern banks in 1936	Modern banks in 1936
Missionary Count	0.252***	0.245***	1.634*	1.678*
	(0.063)	(0.065)	(0.917)	(0.952)
Clan Intensity (per 100 books)		0.315		-0.695
		(0.261)		(1.080)
Estimator	OLS	OLS	2SLS	2SLS
Clan Control	No	Yes	No	Yes
Railway Controls	Yes	Yes	Yes	Yes
Province FE	Yes	Yes	Yes	Yes
Obs.	247	247	247	247
R sq.	0.452	0.453	-0.423	-0.472
Mean Dep. Var.	5.850	5.850	5.850	5.850
S.D. Dep. Var.	13.59	13.59	13.59	13.59

Notes: The table reports cross-sectional regressions for modern banks in 1936. Missionary exposure is the total number of missionary institutions. Clan intensity is measured using clan records per 100 genealogy books. The IV columns use the railway-based missionary exposure instrument introduced in Section 4.2. Standard errors are in parentheses. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

Table E6: Missionary Exposure and Clan Intensity per Capita: Horse Race

VARIABLES	(1) Modern banks in 1936	(2) Modern banks in 1936	(3) Modern banks in 1936	(4) Modern banks in 1936
Missionary Count	0.252***	0.255***	1.634*	1.675*
	(0.063)	(0.065)	(0.917)	(0.932)
Clan per 10,000 People		-1.029		-5.634
		(1.742)		(5.134)
Estimator	OLS	OLS	2SLS	2SLS
Clan Control	No	Yes	No	Yes
Railway Controls	Yes	Yes	Yes	Yes
Province FE	Yes	Yes	Yes	Yes
Obs.	247	247	247	247
R sq.	0.452	0.452	-0.423	-0.463
Mean Dep. Var.	5.850	5.850	5.850	5.850
S.D. Dep. Var.	13.59	13.59	13.59	13.59

Notes: The table reports cross-sectional regressions for modern banks in 1936. Missionary exposure is the total number of missionary institutions. Clan intensity is measured per 10,000 people. The IV columns use the railway-based missionary exposure instrument introduced in Section 4.2. Standard errors are in parentheses. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

Examples from Historical Narratives

- Zifeng Lin, the founder of Kiawah Savings Bank (It's now known as China CITIC Bank International Limited). He studied at the Christian-founded Baptist Jieyang Truth High School, Shantou Queshi High School and the Peking Union Medical College. He became a Christian at the age of 14. He was recruited because of his knowledge of English and the West and was sent to Hong Kong to help develop the local market for the Rice Company. He then recognized the opportunity to expand his banking business.

- The secondary school curriculum of the Tengchow College in Shandong recorded that in the sixth year of students' enrolment, the school would offer a course on the "policy of enriching the country", which taught Western economics. Calvin Wilson Mateer, founder of Tengchow College, argues that the Chinese are eager to learn what makes the West so powerful in their quest to make China rich and strong, and that studying economics is necessary.

- Yuan Cudeng (1874 - 1954), formerly known as Xianan, a native of Yin County, Zhejiang Province, affiliated with the Anglican Church and the YMCA, was a famous entrepreneur in Shanghai's commerce and industry. When he was young, his mother worked as a maid in the house of the British missionary Hai He De in the Ningbo Christian Association (the predecessor of the Methodist Church). Mrs. Hai sent Xian An to the Kai Ming Street Fidelity School, which was run by the Methodist Church, to study free of charge. Two years later, she also sent him to Fidei Secondary School on the north bank of the river, where he was baptized as a believer in Christ.

- Kung Hsiang-hsi, a famous banker and politician in the Republic of China, suffered from mumps in 1889, and was cured by Ding Jiali's Renjiu Hospital in Taigu. 1890, Kung was enrolled in the Chinese-American Public School run by the church, and after graduation, he went to the Luhe Academy run by the American Congregationalist Church of North China in Tongzhou, Zhili, and was baptized as a Christian in 1894.

- Feng Yuxiang, a Christian general and one of the leaders of the Kuomintang (Nationalist Party) in the Republic of China era, began to believe in Christianity in the second half of March 1918 when he was stationed at Changde with his troops, and under the influence of

the doctor who treated him, he often went to church to listen to sermons by the pastor. In April 1925, he founded the Northwest Bank in Zhangjiakou, Hebei Province.

- Kesheng Xu, born in Shanghai to a Supervisory Board Christian family. In his early years of business in Shanghai, he recognized the market potential of the emerging insurance industry and participated in the founding of Zhaotai Water and Fire Insurance Company, one of the earliest private insurance companies in China.

- Charles Sung, the father-in-law of Dr. Sun Yat-sen, President of the Republic of China, is engaged in church-related businesses, having established the Meihua Bookstore, specializing in the printing of printed Bibles, and a flour mill, among others.

- -Translate: Xiong (2010) argues that missionaries were the main protagonists in the spread of Western knowledge to China. Before the Opium War, missionaries are the only one who translated and printed science-related readings.

- -Newspapers: From 1880, Missionaries in China pursued religious goals through secular endeavors (Wang, 1997 p.18). Publication of newspapers and magazines and establishment of schools for the transformation of Chinese culture and the spread of Christian civilization (Wang, 1997 p.18)

Figure E7: Zifeng Lin

Mechanism 2: Missionaries as Pioneers

Table E7: Effect of Total Missionary Institutions on Export Transactions in 1936

	IV	OLS
	(1)	(2)
Variables	Export Transactions	Export Transactions
Tot Miss Inst	0.865*	0.289***
	(0.496)	(0.0893)
RR Duration	0.00212	0.185**
	(0.146)	(0.0719)
RR Density	-595.0	-617.4
	(637.4)	(491.6)
Province FE	Yes	Yes
Observations	231	231
Adj. R-squared	-0.214	0.385
Mean Dep. Var.	16.07	16.07
S.D. Dep. Var.	33.66	33.66
K-P F-Stat	11.68	NA

Notes: OLS and IV regression from the 2SLS of Equation 7, introduced in Section 4.2. Outcome: total export transactions, explanatory variables: total missionary institutions, length of connection to the railway, and railway density.

- Example of Hunan province. During Qing dynasty, Hunan is one of China's relatively closed inland provinces. According to Hunan Gazetteer and records from missionaries, the Hunanese are more xenophobic and resistant to foreigners entering the province. Griffith John, a missionary of the London Society, and B.H. Alexander, a British minister of the American Missionary Church, were the first foreigners to enter Changsha. B.H. Alexander went into the city to sell books and preach during the day and stayed on the ship at night, persisting in his activities for half a year. After years of this activity, the doors of Changsha were gradually opened for the cause of Christ.

- Example of Yunan Province. Missionaries were the first foreigners to enter Yunnan. In 1988, Samuel Pollard, a Methodist missionary from the United Kingdom, made the long and arduous journey overland as well as on foot into Yunnan, a landlocked region of southwestern China. Pollard not only succeeded in converting the local Miao people to Christianity, but also built a series of hospitals, schools, and other public facilities in the area, and managed to

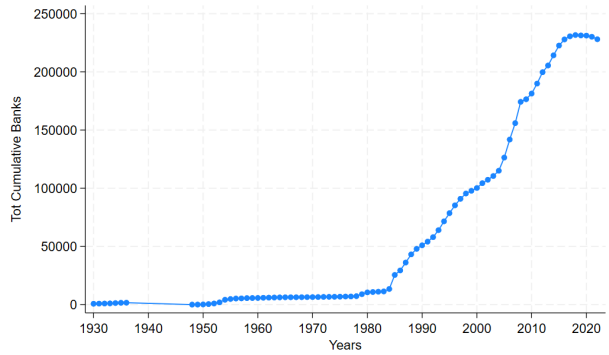
Figure E8: Yunan Province Example

improve local customs and introduce various sports and cultural activities, making the remote Miao village of Shimenkan one of the most advanced and civilized areas in southwestern China at one time.

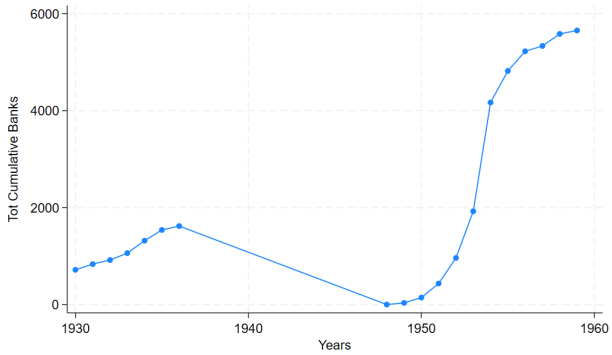
Appendix F: Long-Term Analysis

Figure F1: Raw Data - Total Banks Dynamics - 1930-1936 & 1949-2023

(a) All Years



(b) 1930-1960



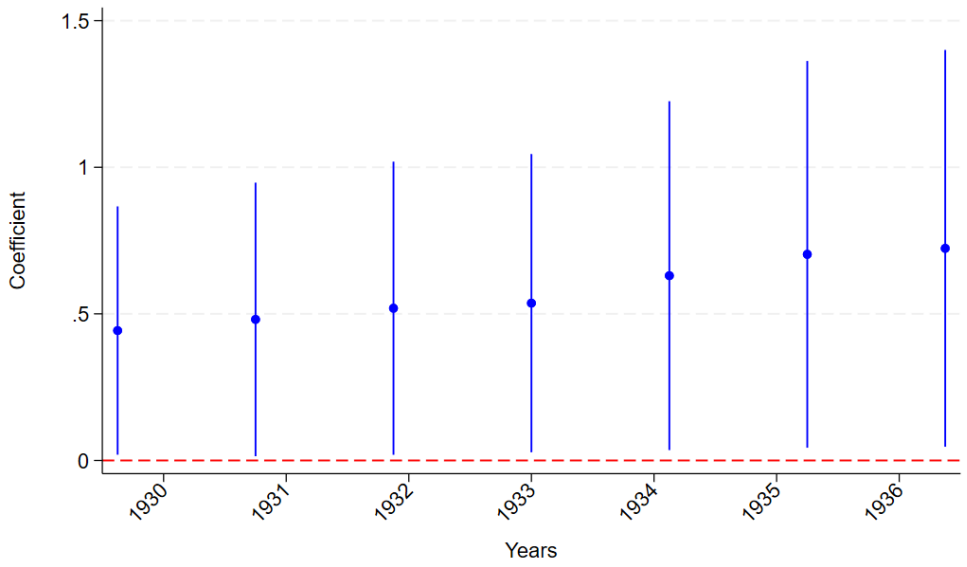
Notes: by 1936 we have more than 2,000 modern banks. in 1949 many banks are closed, merged, and nationalized. However, this period is not one without banks, but mostly a period of reformation and nationalization. By 1960 we already see triple the number of banks compared to 1936. We do not have any data between 1936 and 1948

Recentered IV with Simulated Missionary Flows

This section reports a robustness check for the exposure structure of the long-run IV. The concern is that prefectures with earlier or denser railway histories may be more exposed to any national flow process through transport networks. In this setting, average missionary flows interacted with railway access could therefore proxy for generic railway-mediated exposure rather than the realized timing of missionary inflows. Following Borusyak and Hull (2023), we compute the expected instrument under simulated counterfactual missionary-flow histories and subtract that expected component from the original instrument.

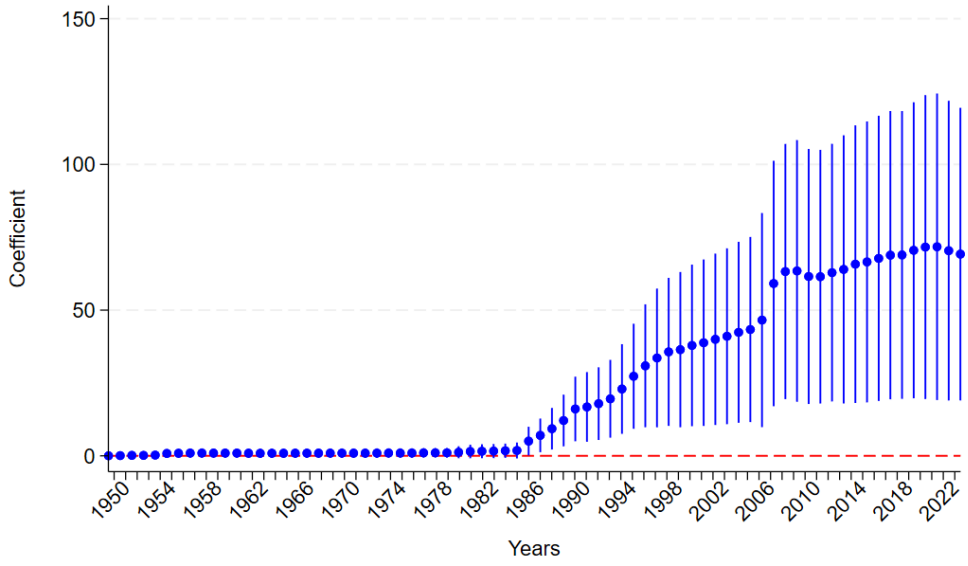
Let F_t be the national missionary flow in year t, and let $R_{i,t-1}$ be prefecture i's lagged cumulative railway stock. The original instrument is $Z_i = \sum_t \widehat{\beta} F_t R_{i,t-1}$. For each simulation, we permute the national missionary-flow series across years, keep each prefecture's railway path fixed, and compute the instrument implied by this counterfactual timing. Averaging over 1,000 simulated flow histories gives μ_i, the component of the instrument mechanically predicted by the prefecture's railway exposure profile under average missionary-flow timing. The recentered instrument is $\widetilde{Z}_i = Z_i - \mu_i$. We use two versions: a full-year permutation and a 10-year block permutation that preserves within-decade serial structure in missionary flows.

Figure F2: 2SLS - Total Modern Banks 1930-1936



Notes: these are the coefficients from equation 7 on individual regressions year by year using the historical modern-bank data used in the DiD design. As a reminder, the post ATT DiD is 0.22. Dep. var. mean: 0.7; effects between 10% and 30%. The IV effects are between 9% and 17% (mean in 1930 is 2.9, and mean in 1936 is 6.5).

Figure F3: 2SLS - Total Banks 1949-2022



Notes: these are the coefficient from equation 7 on individual regressions year by year.Total banks mean 1949-2022: 1050; 836 in 1990 (2%), 3745 in 2022 (2%). Source: China Financial Supervision and Administration Bureau.

Table F1: Headline IV Estimates

	(1) Std. modern banks 1936	(2) Std. total banks 2020	(3) GDP 2019
Missionary institutions	0.1205*	0.0676**	12,771***
	(0.0707)	(0.0284)	(4,529)
RR Duration	-0.0132	-0.0040	-869.4
	(0.0096)	(0.0044)	(705.3)
RR Density	106.1	23.40	-464,481
	(44.1)	(18.97)	(2,798,360)
Province FE	Yes	Yes	Yes
Observations	247	231	231
K–P F-stat	12.47	12.90	12.90
Mean dep. var.	0.000	0.360	267,699
SD dep. var.	1.002	0.976	172,929

Notes: The table reports 2SLS estimates from equation 7. Treatment is total missionary institutions, instrumented with predicted missionary exposure from the railway-flow instrument. Column (1) uses standardized modern banks in 1936, the last pre-war year in the historical panel. Column (2) uses standardized total banks in 2020. Column (3) uses GDP in 2019, measured in millions of 2017 US dollars. RR Duration is years connected to the railway network as of 2000. RR Density is cumulative railway stock divided by prefecture area. Robust standard errors are in parentheses. K–P F-stat is the Kleibergen–Paap first-stage F-statistic. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

Table F2: Recentered IV with Simulated Missionary Flows

Outcome	Instrument	Coef.	SE	K–P F	Obs.
Std. total banks, 2020	Original IV	0.0676**	0.0284	12.90	231
Std. total banks, 2020	Recentered, full permutation	0.0578**	0.0270	15.07	231
Std. total banks, 2020	Recentered, 10-year blocks	0.0585**	0.0272	15.14	231
GDP, 2019	Original IV	12,771***	4,529	12.90	231
GDP, 2019	Recentered, full permutation	12,407***	4,539	15.07	231
GDP, 2019	Recentered, 10-year blocks	12,448***	4,516	15.14	231

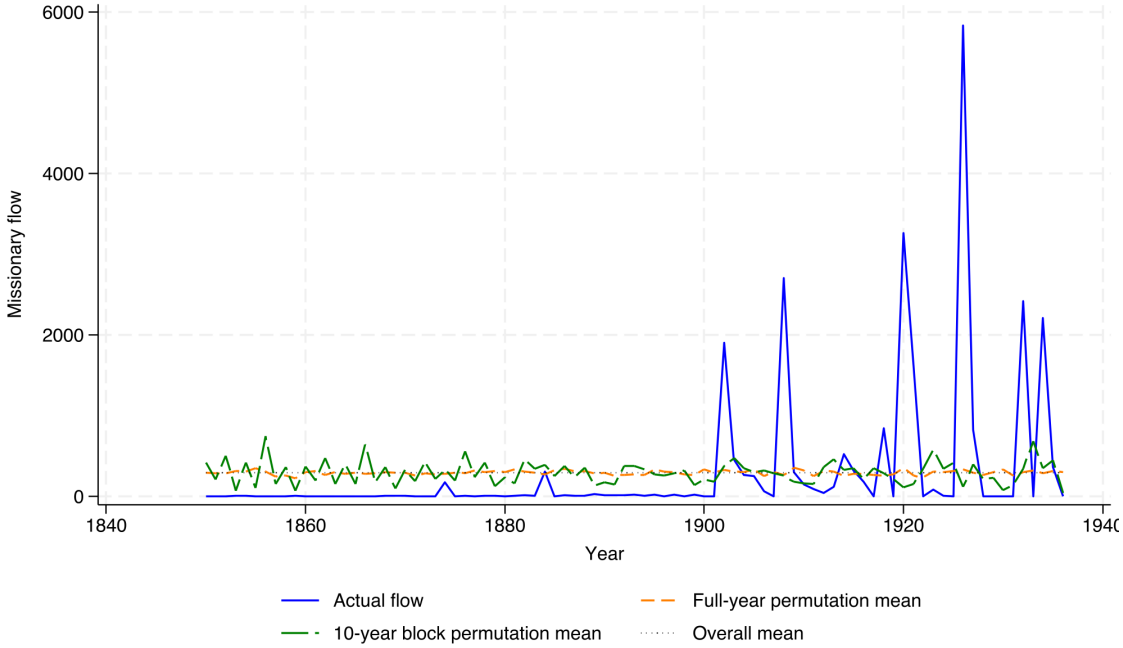
Notes: The table reports headline 2SLS estimates for the original long-run IV and two recentered instruments. The full permutation treats the realized annual missionary-flow values as exchangeable across years. The 10-year block permutation randomly reorders decade-sized blocks while preserving the within-block sequence of flows. All specifications use the same controls as the baseline long-run IV: railway duration, railway density, and province fixed effects. GDP is measured in millions of 2017 US dollars. Table F3 reports the corresponding first and second stages. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

Table F3: First and Second Stages for Recentered Missionary-Flow IV

	Original IV	Recentered, full-year	Recentered, 10-year blocks
Panel A. First stage: missionary institutions			
Instrument	3.858***	6.718***	6.682***
	(1.092)	(1.762)	(1.748)
RR Duration	0.0844***	0.0818**	0.0817**
	(0.0321)	(0.0326)	(0.0324)
RR Density	-812.2***	-794.7***	-796.8***
	(167.9)	(151.3)	(153.0)
Province FE	Yes	Yes	Yes
Observations	247	247	247
K–P F	12.90	15.07	15.14
Panel B. Second stage: standardized total banks, 2020			
Missionary institutions	0.0676**	0.0578**	0.0585**
	(0.0284)	(0.0270)	(0.0272)
RR Duration	-0.00403	-0.00268	-0.00277
	(0.00437)	(0.00401)	(0.00404)
RR Density	23.40	20.13	20.36
	(18.97)	(17.12)	(17.22)
Province FE	Yes	Yes	Yes
Observations	231	231	231
K–P F	12.90	15.07	15.14
Mean dep. var.	0.360	0.360	0.360
SD dep. var.	0.976	0.976	0.976
Panel C. Second stage: GDP, 2019			
Missionary institutions	12,771***	12,407***	12,448***
	(4,529)	(4,539)	(4,516)
RR Duration	-869.4	-819.1	-824.7
	(705.3)	(701.9)	(700.6)
RR Density	-464,481	-586,156	-572,579
	(2,798,000)	(2,786,000)	(2,787,000)
Province FE	Yes	Yes	Yes
Observations	231	231	231
K–P F	12.90	15.07	15.14
Mean dep. var.	267,699	267,699	267,699
SD dep. var.	172,929	172,929	172,929

Notes: Robust standard errors are in parentheses. The first-stage dependent variable is missionary institutions in the outcome year. The first-stage coefficients are the same for the bank and GDP headline years in this exercise because the missionary-institution stock is unchanged between 2019 and 2020. All specifications include railway duration, railway density, and province fixed effects. GDP is measured in millions of 2017 US dollars. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

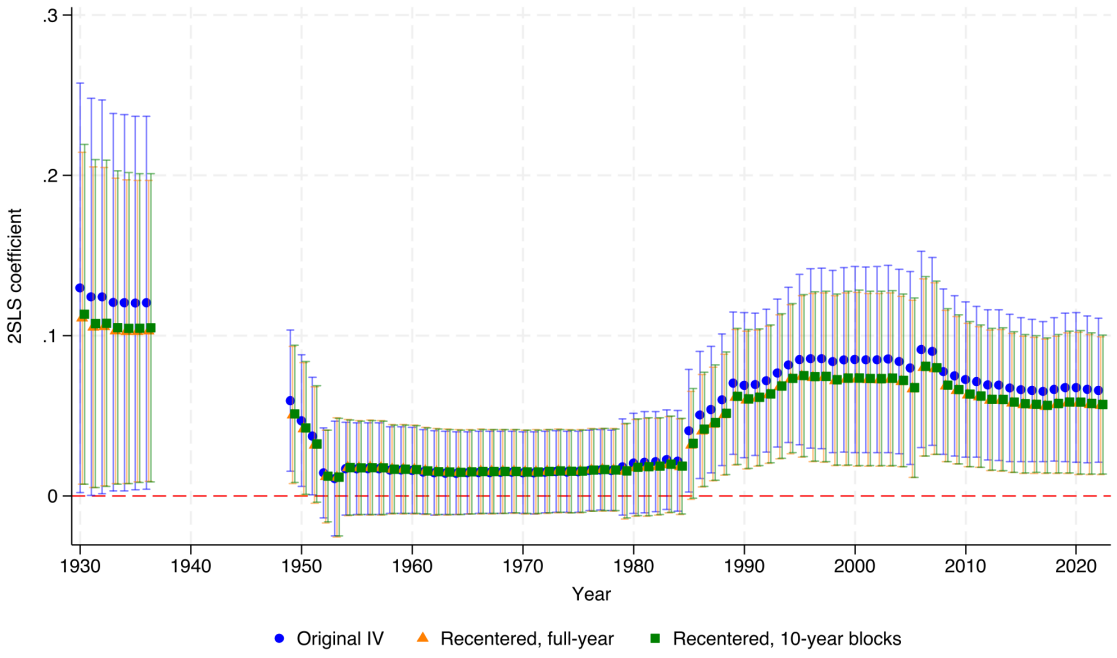
Figure F4: Actual and Simulated Missionary-Flow Histories



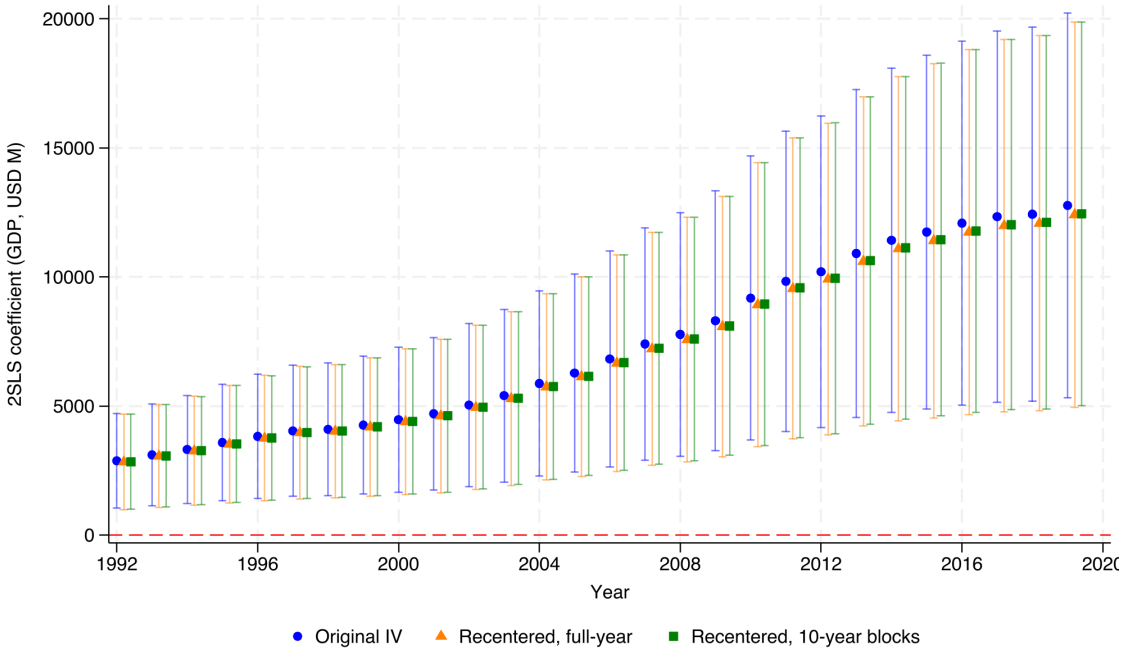
Notes: The figure compares the realized national missionary-flow series with the average counterfactual flow series generated by full-year and 10-year block permutations. These simulated flow histories are used to compute the expected instrument that is subtracted from the original IV.

Figure F5: Long-Run IV Estimates with Recentered Instruments

(a) Standardized total banks



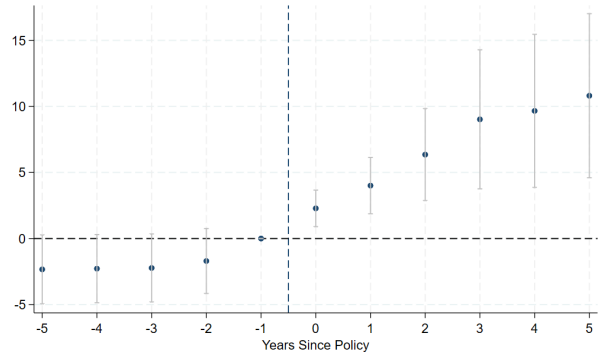
(b) GDP



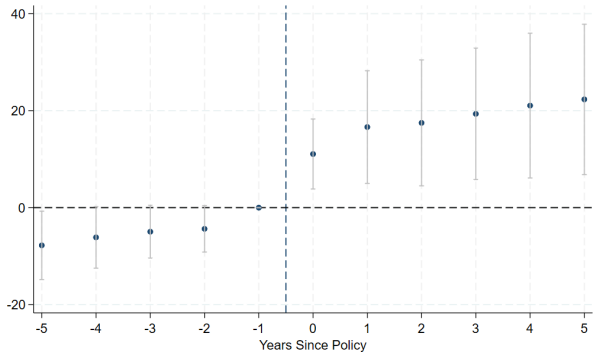
Notes: The figure compares the baseline long-run IV estimates with the recentered-IV estimates based on simulated missionary-flow histories. The point estimates are slightly smaller after recentering but follow the same time pattern as the baseline estimates.

Figure F6: Interacting Missionary Treatment with Regulations on Banking - Total banks

(a) Minimal Government Control (1886)

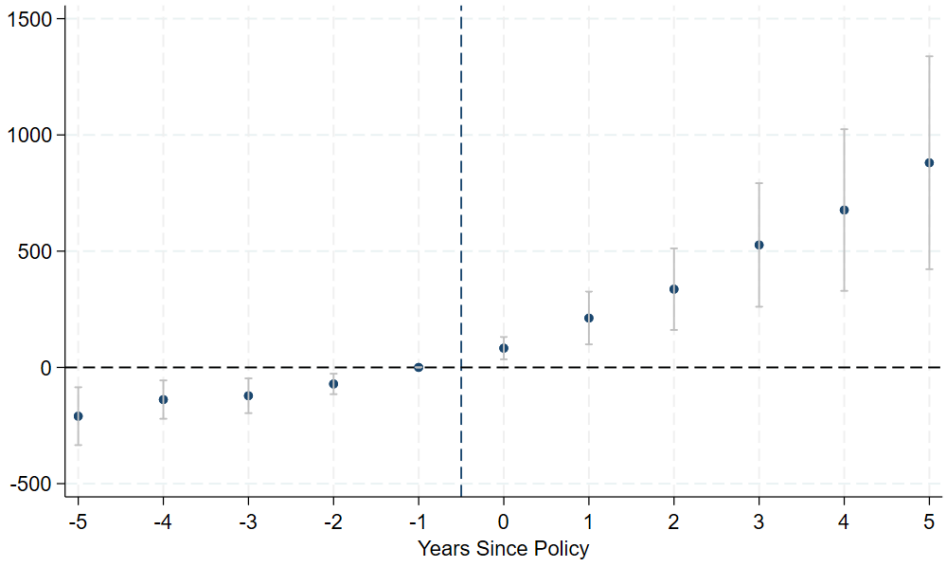


(b) WTO Transition Period (2006)



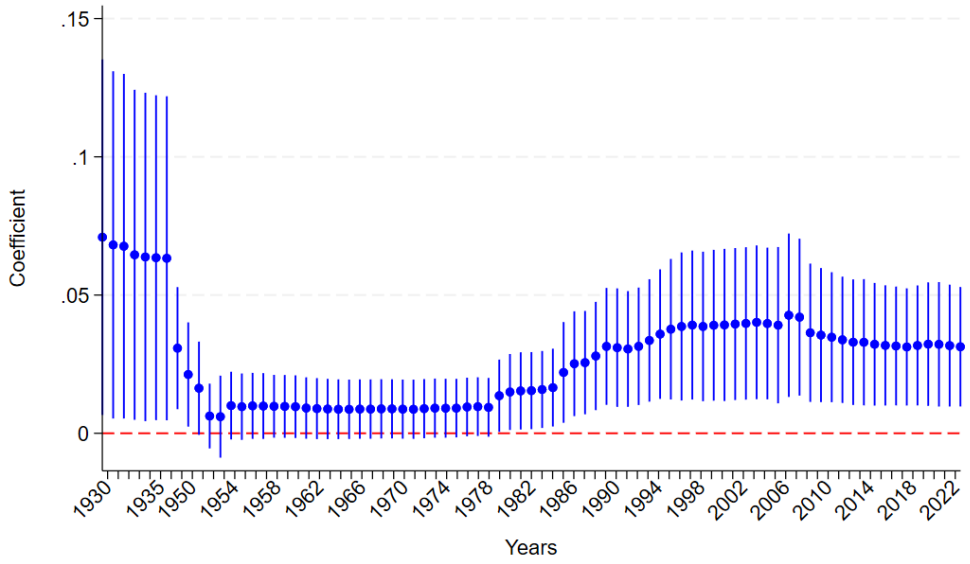
Notes: event study regression from Equation 8 5 years prior and post a nationwide policy change using total banks as the outcome. 95% confidence intervals shown. Standard errors clustered at the Prefecture level.

Figure F7: Interacting Missionary Treatment with WTO Accession (2001) - GDP



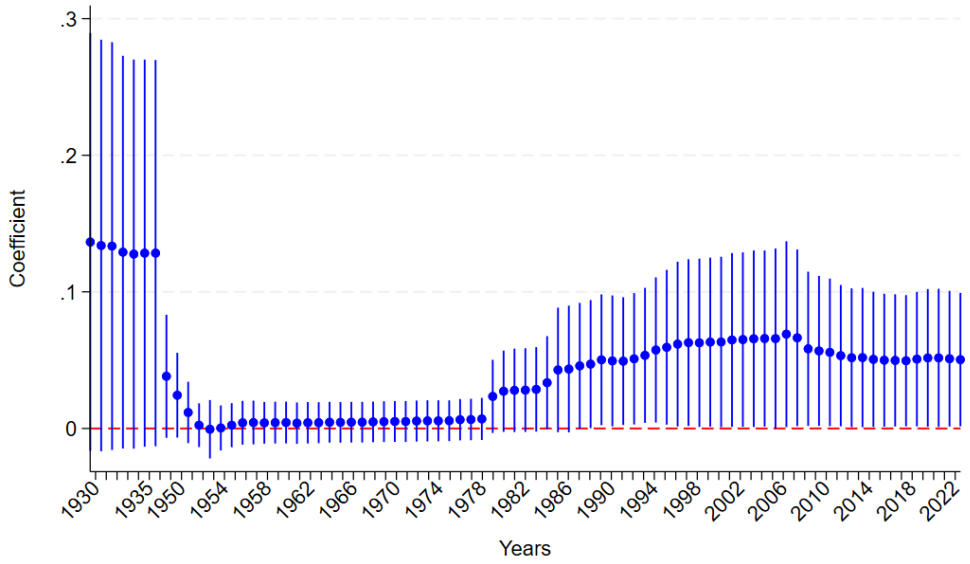
Notes: event study regression from Equation 8 5 years prior and post a nationwide policy change using GDP as the outcome. 95% confidence intervals shown. Standard errors clustered at the Prefecture level.

Figure F8: 2SLS - Controlling for Railway Duration + Railway Density + 2 Railway Bins



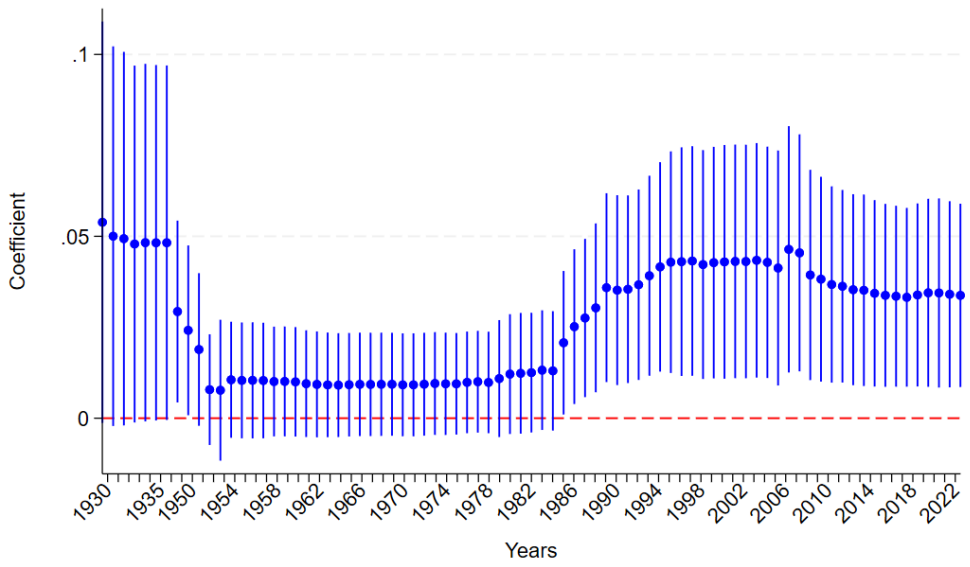
Notes: the outcome is the standardized number of total banks, 1930-1936, 1949-2022. These are the coefficients from equation 7 on individual regressions year by year using both the historical modern-bank data used in the DiD design (as a reminder, DiD effects ranged between 10 and 30%) and recent data from 1949 until 2022. 90% CI are shown. Source: China Financial Supervision and Administration Bureau.

Figure F9: 2SLS - Controlling for Railway Duration + Railway Density + 6 Railway Bins



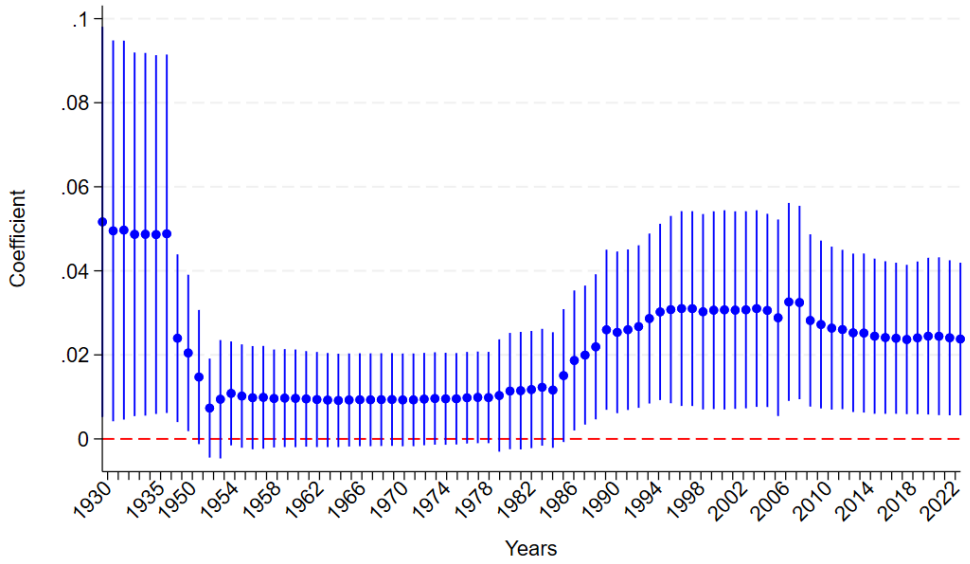
Notes: the outcome is the standardized number of total banks, 1930-1936, 1949-2022. These are the coefficients from equation 7 on individual regressions year by year using both the historical modern-bank data used in the DiD design (as a reminder, DiD effects ranged between 10 and 30%) and recent data from 1949 until 2022. 90% CI are shown. Source: China Financial Supervision and Administration Bureau.

Figure F10: 2SLS - Controlling for Railway Duration + Railway Density + Milage per km^2



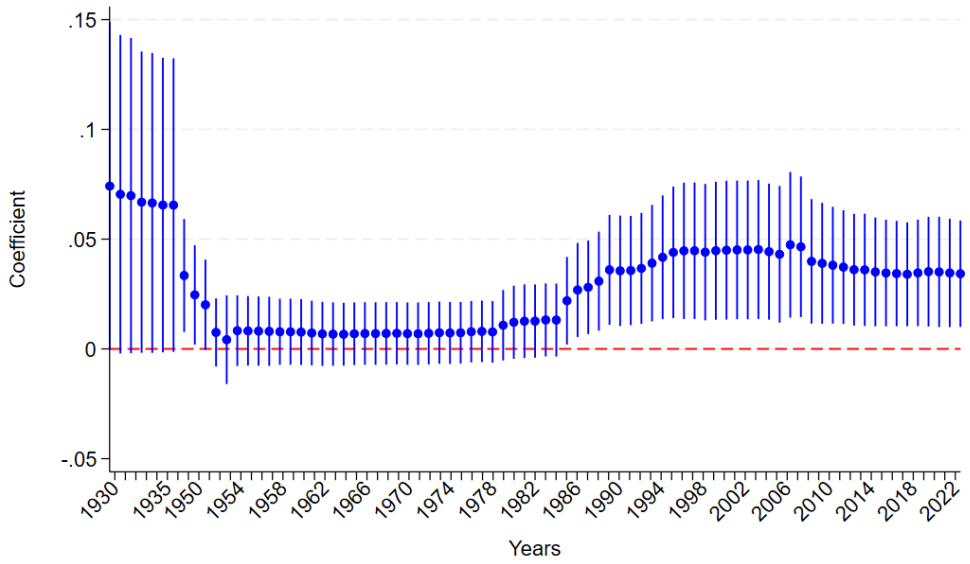
Notes: the outcome is the standardized number of total banks, 1930-1936, 1949-2022. These are the coefficients from equation 7 on individual regressions year by year using both the historical modern-bank data used in the DiD design (as a reminder, DiD effects ranged between 10 and 30%) and recent data from 1949 until 2022. 90% CI are shown. Source: China Financial Supervision and Administration Bureau.

Figure F11: 2SLS - Controlling for Railway Duration + Railway Density + Lat and Long



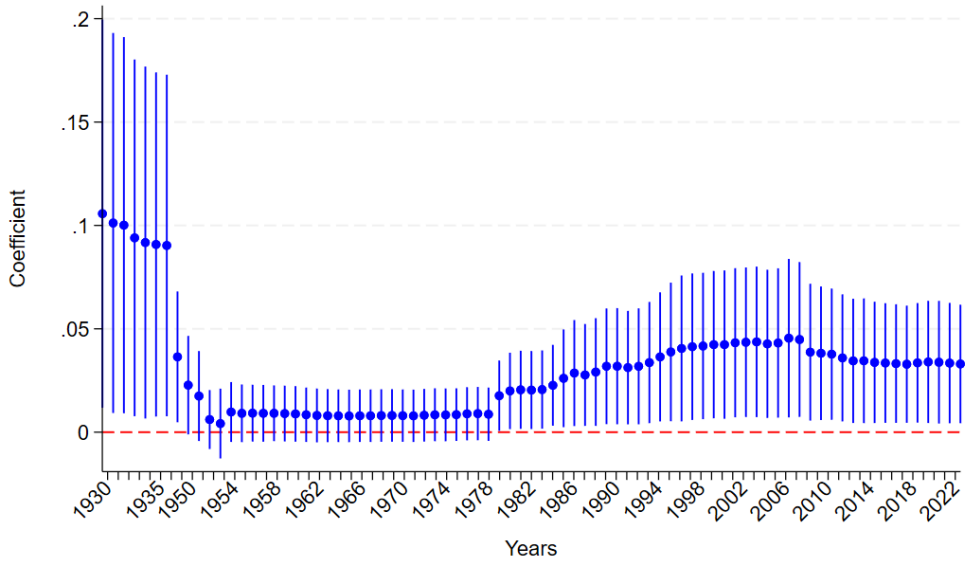
Notes: the outcome is the standardized number of total banks, 1930-1936, 1949-2022. These are the coefficients from equation 7 on individual regressions year by year using both the historical modern-bank data used in the DiD design (as a reminder, DiD effects ranged between 10 and 30%) and recent data from 1949 until 2022. 90% CI are shown. Source: China Financial Supervision and Administration Bureau.

Figure F12: 2SLS - Controlling for Railway Duration + Number of Railways in 1936



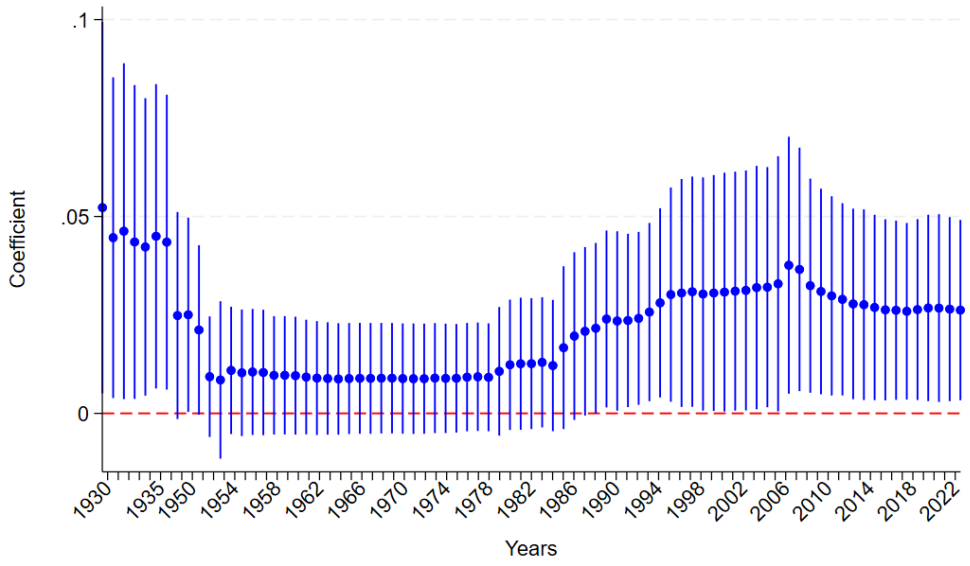
Notes: the outcome is the standardized number of total banks, 1930-1936, 1949-2022. These are the coefficients from equation 7 on individual regressions year by year using both the historical modern-bank data used in the DiD design (as a reminder, DiD effects ranged between 10 and 30%) and recent data from 1949 until 2022. 90% CI are shown. Source: China Financial Supervision and Administration Bureau.

Figure F13: 2SLS - Controlling for Railway Duration + 2 Railway Bins



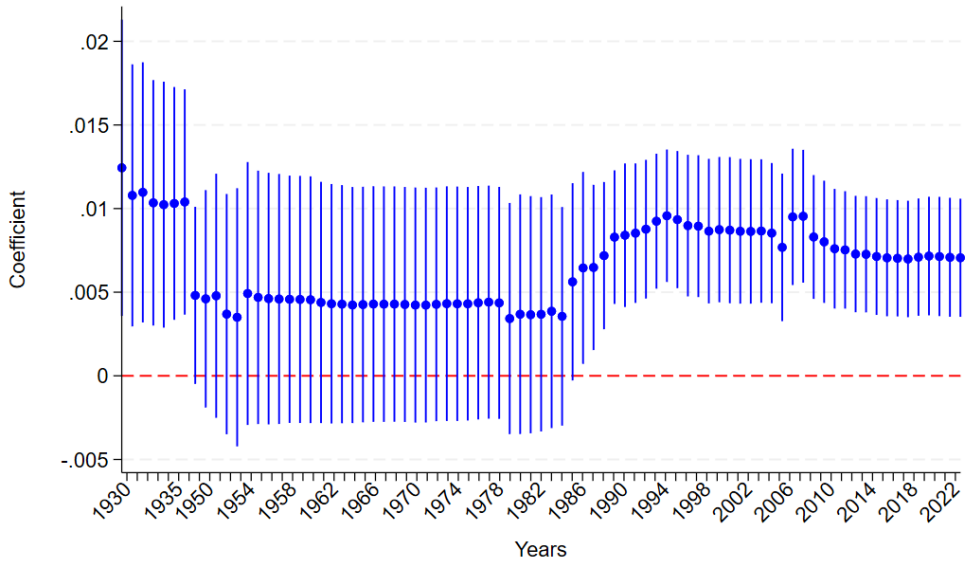
Notes: the outcome is the standardized number of total banks, 1930-1936, 1949-2022. These are the coefficients from equation 7 on individual regressions year by year using both the historical modern-bank data used in the DiD design (as a reminder, DiD effects ranged between 10 and 30%) and recent data from 1949 until 2022. 90% CI are shown. Source: China Financial Supervision and Administration Bureau.

Figure F14: 2SLS - No Treaty Ports in the Sample



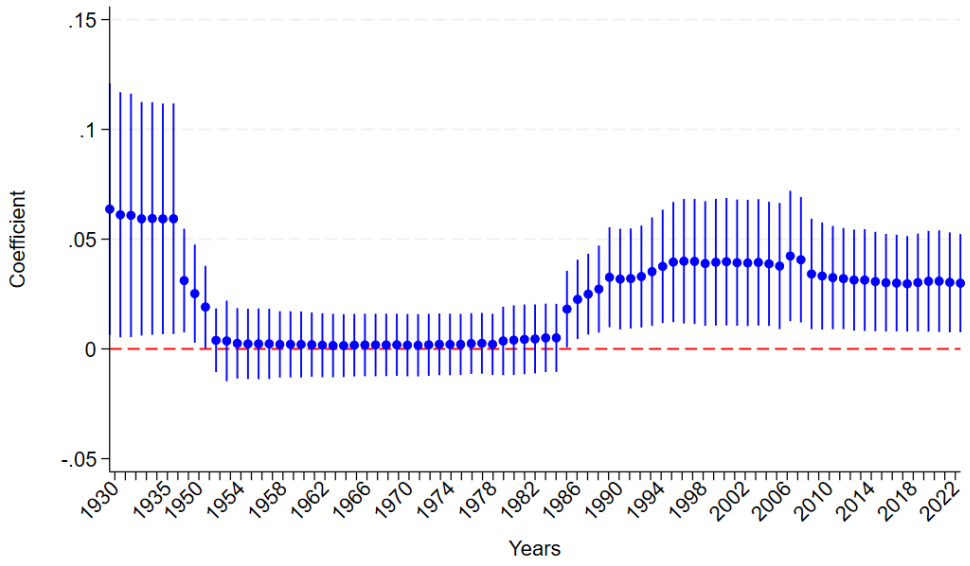
Notes: the outcome is the standardized number of total banks, 1930-1936, 1949-2022. These are the coefficients from equation 7 on individual regressions year by year using both the historical modern-bank data used in the DiD design (as a reminder, DiD effects ranged between 10 and 30%) and recent data from 1949 until 2022. 90% CI are shown. Source: China Financial Supervision and Administration Bureau.

Figure F15: 2SLS - No Top 3 Railway Outliers in the Sample



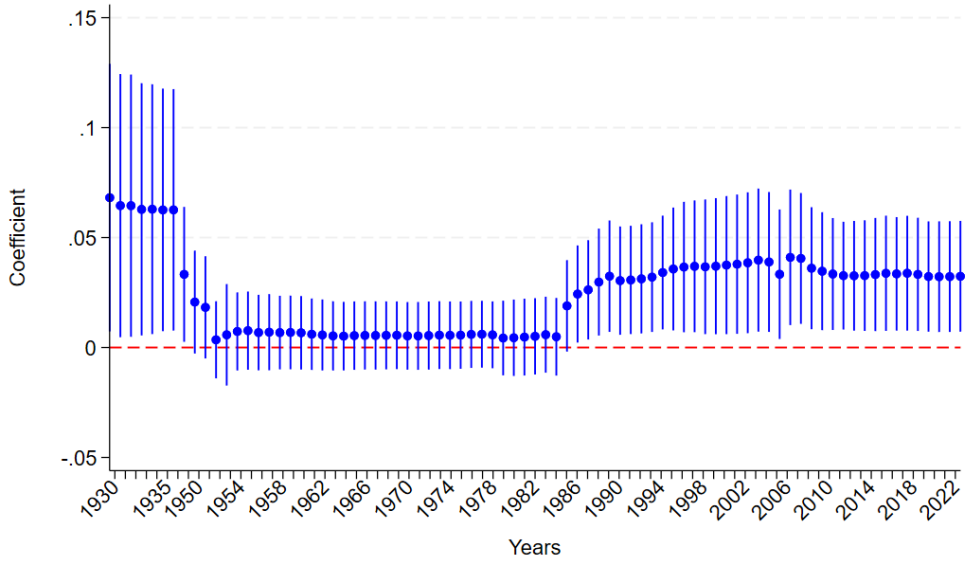
Notes: the outcome is the standardized number of total banks, 1930-1936, 1949-2022. These are the coefficients from equation 7 on individual regressions year by year using both the historical modern-bank data used in the DiD design (as a reminder, DiD effects ranged between 10 and 30%) and recent data from 1949 until 2022. 90% CI are shown. Source: China Financial Supervision and Administration Bureau.

Figure F16: 2SLS - Using 1850-1950 in the Zero Stage



Notes: the outcome is the standardized number of total banks, 1930-1936, 1949-2022. These are the coefficients from equation 7 on individual regressions year by year using both the historical modern-bank data used in the DiD design (as a reminder, DiD effects ranged between 10 and 30%) and recent data from 1949 until 2022. 90% CI are shown. Source: China Financial Supervision and Administration Bureau.

Figure F17: 2SLS - Winsorizing at the 99th Percentile



Notes: the outcome is the standardized number of total banks, 1930-1936, 1949-2022. These are the coefficients from equation 7 on individual regressions year by year using both the historical modern-bank data used in the DiD design (as a reminder, DiD effects ranged between 10 and 30%) and recent data from 1949 until 2022. 90% CI are shown. Source: China Financial Supervision and Administration Bureau.