Seeds of Market-Based Capitalism: Financial Innovation and China's Modernization *

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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 contributed to the emergence of modern financial and economic activity between 1857 and 1936. We then trace how these effects became dormant under the planned economy after 1949 and re-emerged following the market-oriented reforms of the 1980s. Using a staggered difference-in-differences design for the pre-1936 period, we find that missionary activity increased modern banks and enterprises. We use newly compiled data on mission schools and publications, Chinese bankers, and elites to test several mechanisms. We find evidence mostly consistent with two: practical education and the diffusion of knowledge through publications and translations. Missionaries, especially Protestants, introduced training in subjects such as mathematics, bookkeeping, economics, and English, helping form high-skilled local actors and connect them to foreign knowledge and institutions. They also translated Western texts into vernacular Chinese, helping diffuse useful knowledge relevant to modern economic and financial practices. Exploiting the coincidental timing of railway construction relative to national missionary migration, we document that these effects weakened during the planned economy but re-emerged after China's market reforms, shaping financial development and growth into recent decades. Banking infrastructure grew faster in less exposed areas between 1949 and 1978, suggesting that this re-emergence cannot be explained by physical capital. Instead, the return of high-skilled human capital and foreign investment help explain the re-emergence of these effects. Overall, the results suggest that missionaries transmitted not only human capital, but also institution-specific knowledge and transnational connections that helped plant the seeds of market-based capitalism in China.

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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 is especially important for understanding China. Since market-oriented reforms began in 1978, China has rapidly integrated into domestic and international markets, private enterprise has expanded, and GDP growth has averaged over 9 percent annually, lifting nearly 800 million people out of poverty (World Bank, 2024). Yet this transformation followed three decades in which private markets and international economic connections were sharply restricted. Did the effectiveness of China's post-1978 reforms depend partly on economic conditions formed before the Communist period?

This paper investigates whether historical exposure to Christian missionaries may help explain why China's reforms were so effective in setting the economy on a steep and durable growth path. We examine how missionaries affected the adoption of modern banks and enterprises between 1857 and 1936[1], and how this historical exposure interacted with the market-oriented reforms of the 1980s to shape banking and economic activity through recent times. Our argument has three parts. Before 1949, missions helped build market-relevant skills and practical knowledge among Chinese actors, while also expanding international connections. From 1949 to 1978, under Mao's central planning, when production and finance were largely state-directed, the returns to much of this expertise fell sharply: people who remained in China had limited scope to use their pre-1949 skills and knowledge, some high-skilled people left the mainland, and access to foreign markets closed. After 1978, reforms that reduced state control over markets and reopened China to the world increased the value of surviving skills and knowledge. Reopening also allowed foreign-exposed talent to reconnect with mainland institutions and foreign capital to flow toward historically exposed places. Studying the emergence of modern finance in China highlights a broader complementarity between the local knowledge and human capital needed to adopt new ideas and the policy environment that allows them to be put to productive use.

A central and measurable institution of market-based capitalism is banking, which mobilizes savings and channels credit toward investment. We focus on financial innovation and the emergence of modern banks, which introduced important changes relative to traditional forms of finance in China. Following the Opium Wars of 1839–1842 and 1856–1860, China was forced to open to the West after a long period of relatively restricted foreign access. Trade expanded, foreign banks entered treaty ports,[2] and Chinese reformers began to build modern financial institutions. Traditional banks, including draft banks (*Piaohao*) and money houses (*Qianzhuang*), relied more heavily on personal networks, relational enforcement, and owners' capital. Together, they provided long-distance remittances and local credit, but their reliance on personal networks, unlimited liability, and limited capital bases constrained their ability to finance activity at larger scale. Modern banks, by contrast, included limited-liability joint-stock corporations and state banks, mobilized deposits and capital at larger scale, and relied more on formal governance, standardized accounting, contracts, and collateral (Cheng, 2003; Lin et al., 2021). Traditional Chinese finance was well suited to the relational networks and domestic financial system in which it developed. However, as emphasized by Greif et al. (2025), China and Europe developed dif-

[1] The historical panel begins in 1857, when our modern-bank data begin, and ends in 1936, before the 1937 Japanese invasion disrupted economic activity and data coverage.

[2] Treaty ports were cities opened to foreign trade and residence under the treaties imposed on China following the Opium Wars.

ferent institutional arrangements for sustaining cooperation, and corporate forms facilitated cooperation beyond personal networks and at greater scale. China's opening increased the value of standardized organizations that could operate across distance and connect Chinese activity to international markets.

To study how market-relevant inputs formed historically, we combine newly available data from the China Historical Christian Database (CHCD) (Mayfield et al., 2024) with historical data on modern and traditional banks, bank balance sheets, enterprises, trade, railways, treaty ports, government investments, and biographies of Chinese bankers and elites. 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. The panel structure is important because common missionary atlases tend to oversample prominent missions established early (Jedwab et al., 2022). Consistent with this, in our data, early missionary entry is concentrated in more central and developed places, but this selection becomes much weaker after the initial treaty-port period and when comparing locations reached by missionaries at similar times.

We study the historical roots of market development between 1857 and 1936 by exploiting the yearly expansion of missionaries across Chinese prefectures in a staggered difference-in-differences design. Because missionary presence eventually spread to most prefectures, the design mainly compares places reached by missionaries at a given point in time with places reached later. Locations reached at similar times are generally balanced on pre-existing characteristics, and we find no systematic pre-trends in modern banks, enterprises, traditional banks, railways, treaty ports, government investment, or other predictors of modernization.

Missionary presence led to a large and persistent increase in modern banking. After missionary arrival, prefectures reached by missionaries experienced a 31% increase in modern banks relative to comparison areas. The effect grows gradually after entry and appears across private, government, and foreign banks. Newly digitized bank balance-sheet data show that bank size also expanded: increases in loans and deposits are consistent with a larger role for modern banks in local finance. These results remain similar when we restrict the sample to the post-1900 period, when missionary activity expanded much more broadly inland. Importantly, given the economic importance of treaty ports (Jia, 2014), the results are also similar when we exclude them from the sample. Because missionaries eventually expanded far beyond these initial hubs, the results suggest that missionary activity helped reshape the geography of modern finance in China's interior.

We also document how this process interacted with preexisting financial institutions, suggesting both complementarity and substitution depending on the specific functions of traditional banks. After missionary arrival, *Piaohao* initially expanded but later declined as modern banks rose. Their specialization in long-distance remittances put them in more direct competition with modern banks, which eventually substituted for some of their functions. *Qianzhuang*, by contrast, specialized more in local lending and could supply local information and networks of trust to modern banks, which sometimes used them as intermediaries for part of their lending. They therefore remained more complementary to modern banks and survived much longer. These patterns suggest that missionary exposure did not simply replace Chinese institutions. It helped Chinese actors combine new organizational forms with existing financial demand and locally embedded networks.

Finally, we examine broader market effects. Missionary activity also increased enterprises by 27%,

with the effect concentrated in private firms, and is associated with stronger trade-oriented activity. These broader effects could reflect both a direct role of missionaries in modernization and a downstream response to the expansion of modern banking. These findings are consistent with existing evidence on missionaries and economic development in China (Bai and Kung, 2015) and on missionary connections to international trade (Chen et al., 2025b). Both effects appear with a lag relative to the banking response, consistent with at least part of the broader market effect operating downstream of finance.

Adopting a new organizational form required access to new knowledge and the skills to operate and adapt it locally. Mission organizations could serve as intermediaries in this process. Through schools, publications, translations, and international links, they combined access to foreign knowledge with Chinese-language ability, long local residence, and extensive Chinese participation.[3] One important channel was practical education. Missionary schools, especially Protestant ones, taught subjects such as mathematics, science, bookkeeping, economics, and English. These skills were useful for working in, managing, and expanding modern financial institutions. English also helped Chinese actors work in foreign firms and banks, often as intermediaries, where they could learn foreign financial practices and later carry them into Chinese firms and banks.

Using newly digitized biographies of Chinese bankers, we identify bankers with Christian-school backgrounds or other recorded Christian connections. These bankers account for roughly 27% of matched historical banker observations, and their local share rises after missionary arrival. We also use 14,763 biographies of prominent Chinese elites, covering individuals in business, government, science, and other professions. Missionary arrival is followed by sustained increases in elites with Christian-school backgrounds and in elites who study abroad. Together, the banker and elite results suggest that mission education helped form high-skilled Chinese intermediaries with access to foreign institutions and experience. The banking response is also stronger in places with missionary schools and is driven by Protestant rather than Catholic missions, consistent with Protestant missions' emphasis on schooling and with the broader link between Protestantism and human capital (Becker and Woessmann, 2009; Bai and Kung, 2015; Bai, 2019).

The second channel is the diffusion of useful knowledge through publications and translations. Missionaries produced and translated educational, scientific, and economic materials into Chinese, often in vernacular or bilingual formats. These texts made modern economic and institutional practices accessible beyond the classroom. The effect of missionary presence on modern banks is substantially larger in locations with missionary publication or printing-press activity and largest where schools and publications were both present.[4] Publications made foreign knowledge more accessible, while schools helped people use it. We also find little support for the banking effect being driven by missionaries' own capital needs or by the weakening of Confucian clans, which have been shown to substitute for financial markets in China (Chen et al., 2022b).

To trace these historical differences through the Mao period and subsequent reforms, we connect the historical panel design to a long-run cross-sectional design using the total number of mission institutions

[3] Appendix Section E.1 documents missionaries' language training, inland residence, and reliance on Chinese personnel, which helped combine foreign access with the local knowledge needed to translate and adapt it.

[4] These comparisons exploit heterogeneity in mission activities, which often overlapped and was not randomly assigned. We therefore interpret them as informative about the mechanism rather than as separately identifying the contribution of each activity.

established by 1936 as our measure of historical exposure. Because missionary presence accumulated endogenously across places, we adapt the strategy developed by Sequeira et al. (2020) to instrument for missionary exposure. Their study develops a strategy for isolating exogenous migration flows based on the coincidental timing of push and pull factors, which we adapt to missionary migration in China. In our setting, the idea is simple: railway expansion made prefectures more accessible to missionaries, but its effect was larger when unusually many missionaries happened to be entering China. We therefore compare prefectures with similar overall railway exposure whose railway expansion happened to occur just before periods of high rather than low national missionary inflows. The identifying variation comes from this timing rather than from differences in railway access itself, which we control for directly in the regression.

This approach allows us to trace the historical arc of missionary influence on banking across political regimes. In the final years of the historical period, the estimates reproduce the positive effect on modern banks and are close in magnitude to the difference-in-differences estimate. After 1949, however, the missionary-exposure gradient attenuates sharply and remains muted during the Mao period. This attenuation did not occur because historically exposed prefectures lost bank offices. Instead, the state expanded banking across China proportionally faster in the least mission-exposed prefectures, compressing the inherited geography of banking. This pattern is consistent with the broader goal of reducing regional differences under the planned economy (Jia, 2014). Such equalization can help explain why the historical banking advantage dissipated under Mao. But the fact that the same geographic gradient re-emerges after market reform suggests that this redistribution of physical banking infrastructure was not enough to erase the underlying differences across places.

The historical gradient re-emerges as China dismantles central planning and reopens domestic and international markets, and remains positive through 2022. The reforms unfolded in stages. By 1984, rural decollectivization had shifted production decisions from communes to households and the banking system had been reorganized into a two-tier structure separating central-bank functions from lending by specialized state banks; China's accession to the WTO in 2001 further deepened its integration into international markets (Lin, 1992; Erten and Leight, 2021). In our IV estimates, the missionary-exposure gradient in banking begins to rise in the 1980s, with the clearest changes around these two episodes. By 2022, the estimated effect corresponds to roughly 15% of the mean number of bank offices. The same IV also shows positive effects on broader market development: historical missionary exposure increases GDP throughout 1992–2019 and the number of industrial enterprises after reform, both by 16%, with stronger effects in industries that depend more heavily on external finance. Together, these results show that historically exposed places had an advantage when markets and international connections were allowed to operate, lost that advantage under closure and state allocation, and regained it when China reopened.

We next examine why the historical advantage of mission-exposed places weakened under Mao and re-emerged after reform. Before 1949, these places had produced more internationally oriented, high-skilled people and developed more trade-oriented activity. Biographical data show a larger technical diaspora from these origins: mainland-born engineers and scientists from mission-exposed prefectures are disproportionately observed in Taiwan during the Maoist period. Because these places were also more connected to trade, they had more to lose when China closed to international exchange. The scope

to use pre-1949 expertise narrowed, part of that talent moved outside the mainland, access to foreign markets closed, and bank offices were redistributed toward previously underbanked areas. Together, these changes help explain why the earlier advantage of mission-exposed places weakened during the Mao period.

After reopening, surviving human capital, practical knowledge, and earlier international connections could become economically valuable again. Some people carrying pre-1949 financial expertise remained economically active after reform. Among elites who survived into the reform period, those with foreign exposure from mission-exposed origins are also more likely to have recorded ties to mainland political, government, and scientific institutions, while historically mission-exposed prefectures receive more foreign direct investment. These patterns, together with the re-emergence of banking and broader market activity, provide suggestive evidence that the historical "seeds" were not simply physical bank infrastructure or persistent schooling. They included Chinese human capital, institution-specific knowledge, and connections to external markets whose value depended on the policy environment. Consistent with this interpretation, we find less support for explanations based on the direct survival of mission schools or publications, persistent religiosity, or greater Mao-era state investment.

This paper makes three contributions to our understanding of the origins and evolution of market-based capitalism. Our first contribution is to the literature on the deep roots of development. This literature studies how specific historical shocks and interventions reshape institutions, human capital, beliefs, and social organization in ways that influence economic outcomes after the original exposure has ended (Acemoglu et al., 2001; Nunn, 2008, 2009; Dell and Olken, 2020; Lowes and Montero, 2021). We extend this literature in two respects. We study the historical origins of a specific organizational innovation, modern banking, and shed light on how the effects of historical exposure evolve over time. Where historical persistence is often documented by relating a past exposure to a later outcome, our setting allows us to observe formation, suppression, and reactivation across political regimes. We thus contribute to a small number of studies that explicitly argue that persistence can vary over time and emphasize the role of political leaders (Charnysh, 2015; Ochsner and Roesel, 2024), the political context (Rozenas and Zhukov, 2019; Cantoni et al., 2019), and collective memory (Fouka and Voth, 2023). We add a human-capital and network-formation channel, showing that talent may be necessary for capitalist development and innovation, but that its effects still depend on the political context. This complements work on China's post-1978 reforms (Lin, 1992; Song et al., 2011; Xu, 2021; Erten and Leight, 2021): the rapid and spatially uneven effects of these policies have roots in the historical and institutional context. This perspective also relates to work showing that the effects of development policies depend on the environment in which they are implemented (Bau et al., 2025). Traditional and modern institutions can also coexist, as shown by the complementary relationship between traditional and modern banks, suggesting that such interactions may be important for development and innovation.

Second, we contribute to work on the diffusion and adoption of technologies, ideas, and organizational forms, which emphasizes human capital, absorptive capacity, locally usable know-how, and complementary managerial and organizational knowledge (Nelson and Phelps, 1966; Comin and Hobijn, 2010; Giorcelli, 2019; Verhoogen, 2023; Juhász et al., 2024; Giorcelli and Li, 2026). We show that both specialized human capital and access to new knowledge were required for the adoption of a new financial technology in China. Juhász et al. (2026) show that access to knowledge codified in the

vernacular was central to technology absorption in Meiji Japan, where the state coordinated the large-scale codification of foreign knowledge. In our setting, missionary organizations and Chinese actors instead helped translate and adapt foreign knowledge without a centralized state program, amid contested foreign influence and the later suppression of market institutions. In China, Ma (2021) shows that Jesuit exposure increased scientific production among Chinese literati, with the effect weakening after the Jesuits' expulsion. We study a later and broader diffusion process involving bankers, entrepreneurs, and other elites, and connect this exposure to the adoption and later re-emergence of a new organizational form. By emphasizing economically relevant specialists, our findings also relate to evidence on the importance of upper-tail knowledge for industrialization (Squicciarini and Voigtländer, 2015) and to the debate over institutions and human capital (Acemoglu et al., 2002; Glaeser et al., 2004). In our setting, these forces are complementary: modern banks provided a new organizational technology, while education, translation, and practical experience supplied the skills needed to operate it.

Third, we contribute to the literature on religion and development. Religious beliefs and organizations can affect development through human capital, technology, finance, public-goods provision, and political institutions (Becker et al., 2024; Lowes et al., 2026). The role of religion in capitalist development nevertheless remains debated. Classic work links Protestantism to Europe's economic development (Weber, 2001; Becker and Woessmann, 2009), while other studies show how religious law, political authority, and community organization can hinder credit and financial institutions (Rubin, 2011; Kuran, 2012; Pascali, 2016). Most empirical work on Christian missions emphasizes their long-run effects on human capital and income, political participation and institutions, and cultural and social outcomes (Woodberry, 2012; Nunn et al., 2014; Wantchekon et al., 2015; Valencia Caicedo, 2019; Bergeron, 2019; Deng et al., 2025). Missionary printing provides an important example of how missions could also transmit information beyond formal schooling (Cagé and Rueda, 2016). We shift attention toward market-based development and the adoption of modern banking. Education remains important in our setting, but it operated alongside translations, publications, foreign-language skills, and business networks that helped Chinese actors access and adapt knowledge useful for operating new organizations. Within the literature on missions in China, existing studies document effects on urbanization, women's education, and long-run income (Chen et al., 2014; Bai and Kung, 2015; Ma et al., 2022b), while more recent work links anti-Christian conflict to lower foreign investment and missionary connections to international trade and information flows (Huang et al., 2024; Chen et al., 2025b). We complement these findings by showing how missionary exposure contributed to the local adoption of modern banking by Chinese actors and by tracing this differential through Republican-era expansion,[5] Maoist suppression, and post-reform re-emergence.

Our focus on modern banking also connects to work on the historical development of finance in China, which emphasizes legal institutions, culture, communications technology, transport, patriotism, and upper-tail human capital.[6] More broadly, this connects to seminal work on finance and growth (King and Levine, 1993; Rajan and Zingales, 1998) and to evidence that bank access and banking reform affect

[5]The Republican era refers to mainland China from the establishment of the Republic of China in 1912 until the founding of the People's Republic of China in 1949.

[6]See Cheng (2003) for historical background and, among recent work, Levine et al. (2023) on legal institutions, Sun et al. (2024) on patriotism, Chen et al. (2022b) on Confucianism, Lin et al. (2021) on telegraphs, Zhao et al. (2023) on railways, and Lin et al. (2024) and Chen et al. (2025a) on upper-tail human capital.

lending quality, structural transformation, and development (Jayaratne and Strahan, 1996; Burgess and Pande, 2005; Heblich and Trew, 2019). This finance-based channel also offers one possible reconciliation between missionaries' limited direct reach relative to China's size and the sizable downstream effects reported in the China literature. The relevant knowledge did not need to reach a large share of the population: a relatively small group of bankers, managers, and entrepreneurs with specialized skills and international connections could help a pivotal institution take root.[7] Once established, banks could mobilize savings and allocate capital well beyond the individuals directly exposed to missionary organizations.

The remainder of the paper proceeds as follows. Section 2 develops the conceptual framework and provides historical background on China's financial transition and missionary expansion. Section 3 describes the data. Section 4 presents the historical staggered difference-in-differences design and results. Section 5 presents the long-run instrumental-variables design and results. Section 6 examines how the historical effects could dissipate and re-activate. Section 7 concludes.

2 Conceptual and Historical Background

This section provides the conceptual and historical foundations for our empirical analysis. We begin by providing a general framework for understanding how spatial differences in development can evolve nonlinearly yet persist over time. We then describe the history of financial institutions in post-Opium War China and missionary activity, which helps explain why modern banks were a key institution during this period and why missionaries may have affected financial innovation.

2.1 Conceptual Framework

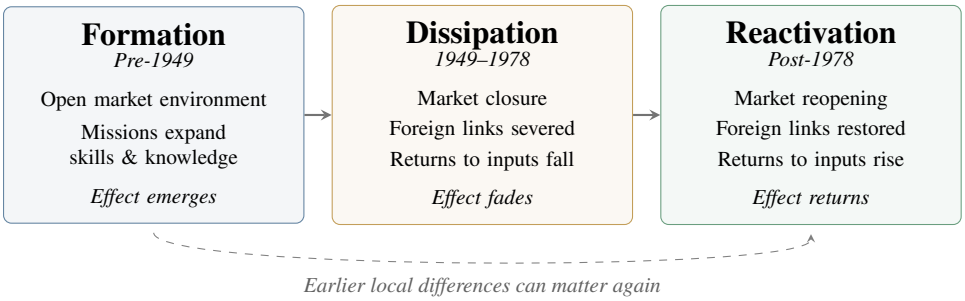
This paper revolves around a central conceptual claim: a complementarity between local market-relevant inputs and the policy environment. Missionary exposure could increase local human capital, practical knowledge, organizations, and networks relevant for market activity. A favorable policy environment raises the return to these inputs; when markets and international exchange are suppressed, differences in these inputs may generate little observed market activity even if some of them survive. Figure 1 helps organize the historical pattern we study: formation before 1949, dissipation under Mao, and reactivation after reform. Importantly, reactivation does not require all original inputs to survive unchanged. Earlier differences need only persist sufficiently, or shape the initial response to reform, for a geographic gradient to re-emerge and subsequently be sustained. The following section provides historical background for this framework.

2.2 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

[7] Related evidence from the United States shows that bank branching improved the geographic allocation of capital and generated persistent productivity gains (Quincy and Xu, 2025).

Figure 1: Conceptual Framework: Formation, Dissipation, and Reactivation



Notes: Local market-relevant inputs include human capital, knowledge, organizations, and networks. The policy environment indicates whether conditions are more or less favorable to markets and international exchange.

Qing government and large merchants through extensive branch networks (Cheng, 2003). *Qianzhuang* were smaller, locally operated money shops that accepted deposits, exchanged currencies, extended short-term merchant credit, and connected local merchants to the broader financial system.

Modern banks entered China after the First Opium War. The first were privately owned foreign banks established in treaty ports, where they were active in import–export finance, political loans, and other commercial ventures (Moazzin, 2022).[8] 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 Chinese-owned modern bank, the Imperial Bank of China, was founded in 1897 under official sponsorship. It was organized as a joint-stock corporation with limited liability and formal rules governing deposits, loans, and banknote issuance (Cheng, 2003).[9]

The key difference between traditional and modern banks was their organizational structure and ability to operate at scale. Traditional banks relied more heavily on kinship and native-place networks, local information, and relational enforcement. These features supported trust, including across the long-distance branch networks of *Piaohao*. But dependence on owners' capital and inside networks constrained their scalability. Modern banks included joint-stock corporations and state banks. They mobilized deposits and capital at larger scale, used more formal governance, and adopted standardized reporting, contracts, collateral practices, and telegraphic transfers (Cheng, 2003; Lin et al., 2021). Telegraphic transfers accelerated settlement, while rapid reporting improved the monitoring of distant branches. In joint-stock banks, limited shareholder liability facilitated risk sharing and larger institutions. At the same time, weaker personal exposure to losses and delegated management introduced risk-taking and agency trade-offs. These arrangements expanded banks' capacity not only to mobilize funding, but also to transform it into trade and industrial credit. Together, these features made modern banks better suited for an economy increasingly connected to trade, industry, and larger capital markets. Table 1 summarizes these differences.

Between 1911 and 1936, modern banks expanded rapidly in response to rising financial demand.

[8] Several elements of the European banking model later introduced into China developed in late medieval and Renaissance Europe, including deposit banking, book-entry transfers, bills of exchange, and merchant credit (de Roover, 1948; Spufford, 1988). Joint-stock ownership and limited-liability corporate forms developed later.

[9] The Imperial Bank was officially sponsored but not fully state-owned. The first state bank, the Bank of the Board of Revenue, followed in 1904. Modern Chinese banks subsequently included private joint-stock, state, and mixed public–private institutions.

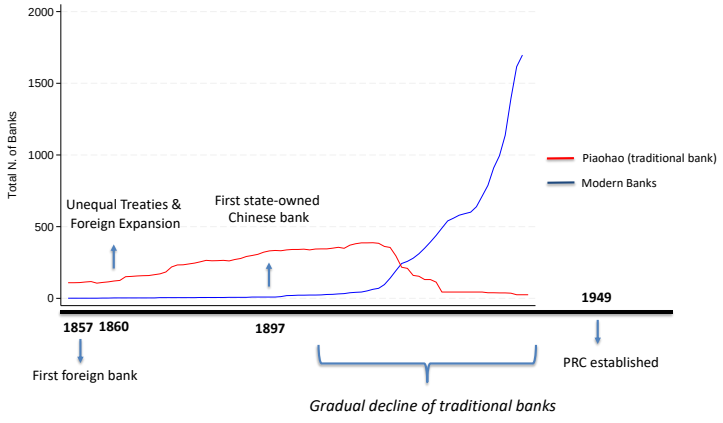
Table 1: Traditional and Modern Banks in China

Feature	Traditional banks	Modern banks
Organization and governance		
Institutional form	Proprietorships; kin-based partnerships	Joint-stock corporations; state banks
Owners' liability	Unlimited	Generally limited
Agency and control	Owner- and network-based monitoring	Boards, managers, and formal reporting
Financial intermediation		
Funding base	Owners' capital; short-term funds	Share capital; larger deposit base
Core intermediation	Remittances, exchange, merchant credit	Payments, trade finance, industrial credit
Screening and security	Reputation, guarantors, local information	Accounts, contracts, and collateral
Transfers and reporting	Mail transfers; branch correspondence	Telegraphic transfers; rapid reporting
Economic trade-offs		
Main advantage	Relational enforcement; local knowledge	Scale, diversification, standardization
Main constraint	Capital and network dependence	Agency costs; risk-taking incentives

Notes: The traditional-bank category pools *Piaohao* and *Qianzhuang*; "kin-based" refers broadly to family, lineage, and native-place ties rather than exclusively to family ownership. Entries describe broad tendencies rather than mutually exclusive practices. *Piaohao* operated long-distance remittance networks, whereas *Qianzhuang* were more locally embedded and sometimes intermediated between modern banks and local merchants. Traditional institutions also used sophisticated accounting, guarantees, and, in some cases, collateral; modern banks also continued to rely on relationships. The central distinction is the greater standardization and scalability of modern ownership, reporting, and lending practices. Appendix Table A.8 separates the two traditional institutions.

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. At the same time, modern banks often lent to and through *Qianzhuang*, which survived longer because their local information and networks of trust complemented the more standardized operations of modern banks. Figure 2 shows the aggregate transition: modern banks rose quickly, while *Piaohao* declined.

Figure 2: 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. PRC refers to the People's Republic of China. "Unequal Treaties" refers to the treaties imposed on Qing China by foreign powers following military defeats, particularly the Treaty of Nanking (1842), the Treaties of Tientsin (1858), and the Convention of Peking (1860), which opened treaty ports and expanded foreign commercial and missionary access. 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).

2.3 Missionary Expansion in China

Christian missions expanded in China during the same period as this transition to modern institutions.[10] Before the treaty-port era, missionary activity had little formal protection and depended on Qing and local approval (Liu et al., 1980). The treaty-port system created after the First Opium War gave missionaries greater access to coastal cities. The treaties concluded around the Second Opium War marked a further turning point: after 1860, missionaries obtained broader rights to enter inland regions and to build churches, residences, hospitals, and schools (Fairbank and Liu, 1980; Chen et al., 2014; Ma et al., 2022a).[11]

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). This hostility formed part of the broader conflict surrounding Western influence and the unequal treaties. At the same time, China's military defeats and growing interest in Western science, technology, and institutions made access to foreign knowledge increasingly valuable, placing missionaries in the unusual position of being both contested foreign actors and important intermediaries with the West.[12] The Boxer Rebellion was a severe but relatively temporary interruption to missionary expansion. Missionary activity resumed rapidly after its suppression, and the following two decades saw substantial further expansion. Figure 3 illustrates the geographic spread of missionary activity over this period. Christian believers increased from 95,943 in 1900 to 366,527 in 1920, while missionary presence reached 94% of China's counties (Stauffer, 1922; Liang, 1988).

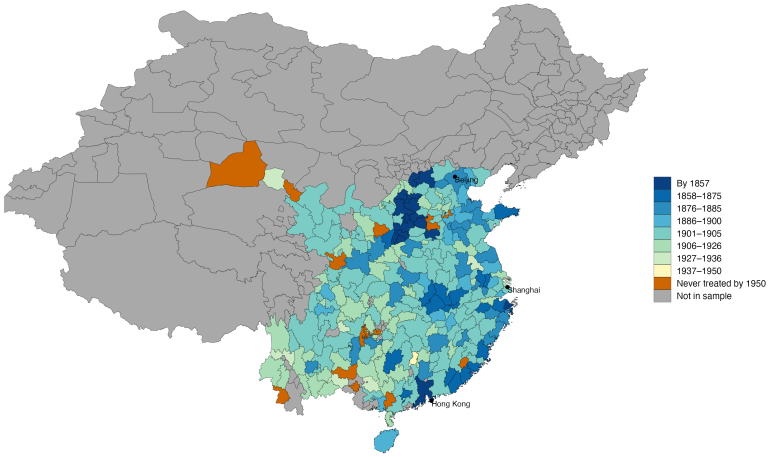
Missionary traditions also differed in ways that matter for our interpretation. Catholic missions often required converts to renounce traditional practices such as ancestor worship, while Protestant missions placed more emphasis on schools, vernacular publications, and practical training, and were more closely associated with ideas of hard work and material success (Fairbank and Liu, 1980; Liang, 1988; Bays, 2011). These differences motivate our Protestant–Catholic comparisons and also connect to the broader Weberian hypothesis linking Protestantism to economic development (Weber, 2001; Becker and Woessmann, 2009).

[10] Christianity had a much earlier Jesuit presence in China. Matteo Ricci entered China in the late sixteenth century and settled in Beijing in 1601. This presence later receded: Christianity was proscribed in 1724, missionaries outside Beijing were expelled or forced underground, and the papacy suppressed the Society of Jesus in 1773. Chinese Catholic communities nevertheless survived, although foreign missionary infrastructure remained sparse until renewed expansion in the 1840s (Bays, 2011; Mungello, 2012).

[11] The *Convention of Peking* of 1860 confirmed and expanded these rights. By the late nineteenth century, around 1,500 missionaries and more than 80,000 Protestant converts were recorded in China. Conversion remained the primary objective, but schools, hospitals, and material support also served educational and medical purposes while attracting students and potential converts; some schools provided food, housing, medical care, clothing, or stipends alongside religious and academic instruction (Spence, 1990; Nunn, 2010).

[12] China's defeats in the Opium Wars exposed Western military advantages, while later reliance on Western-officered forces such as the Ever-Victorious Army made the value of foreign expertise particularly visible. Missionary influence also reached prominent individuals and reform efforts: Protestant tracts shaped Hong Xiuquan's religious vision and the Taiping movement; Sun Yat-sen, founder of the Republic of China and the Kuomintang (KMT), encountered Christianity, democracy, and republican government in mission schools; and mission-trained figures and missionary translators contributed to Self-Strengthening projects through machinery procurement, foreign-language education, and technical translation (Spence, 1990).

Figure 3: Timing of Missionary Expansion



Notes: The map shows the first recorded arrival of any missionary institution in each prefecture through 1950. Colors identify arrival cohorts; orange prefectures have no recorded missionary institution by 1950. Gray prefectures are excluded because required outcome or control data are unavailable, yielding coverage comparable to other historical studies of China. The historical difference-in-differences analysis uses arrivals through 1936; the 1937–1950 cohort is shown descriptively to complete the historical expansion. Appendix Figure A.4 presents the same diffusion at selected dates. Mission data come from the CHCD, and prefecture boundaries are based on CHGIS 1911.

2.4 Missionary Education and the Diffusion of Useful Knowledge

Missionaries could affect modern banking and other new organizations through several channels. One important channel was the transmission of practical skills and knowledge useful for operating and adapting these institutions. China already had an advanced education system, but much formal schooling was oriented toward the civil service examination, a system of bureaucratic recruitment that had operated for more than 1,300 years (Bai and Jia, 2016; Bai, 2019). This system emphasized classical texts, literary training, and preparation for official careers. It produced a highly educated elite, but was less directly connected to the practical skills used in modern banks and enterprises, such as accounting, foreign languages, commercial law, and applied mathematics.

Missionary education introduced a different type of human capital. Protestant missionaries in particular established institutions ranging from village primary schools to high schools, professional schools, practical-training programs, colleges, and universities. For the adoption of new organizations, upper-secondary, higher-education, and applied-training institutions were especially relevant because they prepared students for more specialized forms of work. By 1935, Protestant missionaries had founded 16 of the 80 colleges operating in China, 20% of the total, and Protestant colleges offered especially broad training in the natural sciences and applied fields (Ma et al., 2022a). Mission high schools, colleges, and training programs taught subjects such as mathematics, science, bookkeeping, economics, and English (Bays, 2011; Bai and Kung, 2015; Bai, 2019). These skills were useful for working in, managing, and expanding modern banks and enterprises. English training was particularly valuable because it provided access to foreign texts and prepared students for employment in foreign firms and banks, including as intermediaries known as compradors.[13] To complement these historical sources, we reviewed 44 oral-

[13]Compradors were Chinese agents who connected foreign firms and banks to Chinese clients and markets through local knowledge and networks. Some later used this experience in Chinese enterprises and financial institutions. See Spence (1990)

history interviews with Christian missionary workers in China held by the Claremont Colleges Special Collections. We coded their archival summaries into broad topics and examined the underlying interviews for accounts of schooling, curricula, practical training, and graduates' careers. The interviews provide examples of English and business training and, in some cases, graduates entering Chinese banks; Appendix Section E.2 reports the systematic review and selected examples.[14] Missionary schools were small relative to China's entire education market, but they were disproportionately important in modern higher education and specialized practical training. They could therefore have high economic value at a time when new financial and commercial institutions were being adopted.

Missionaries also diffused useful knowledge through publications and translations. Missionary presses produced religious texts, school materials, newspapers, scientific works, and bilingual or vernacular publications. A concrete example is the American Presbyterian Mission Press, also known as the Huamei Press. Founded in 1844 and moved to Shanghai in 1860, it trained Chinese workers in modern printing and integrated typefounding, typesetting, printing, binding, sales, and distribution. Skills and personnel from this ecosystem later contributed to Chinese-owned commercial publishing. The founding group of the Commercial Press, established in Shanghai in 1897, came from the missionary-school and mission-press network and drew on the Huamei Press model.[15] These materials made foreign knowledge more accessible to Chinese readers and helped transmit ideas about science, education, commerce, and modern institutions (Dennis et al., eds, 1911; Stauffer, 1922; Liang, 1988).[16]

This publication channel complements the education channel. Schools trained students directly, while translations and printed materials allowed knowledge to circulate beyond the classroom. Together, these channels explain why missionary exposure could affect the local adoption of modern banks. Missionary organizations did not simply transplant foreign institutions. They helped Chinese students, workers, and entrepreneurs access and adapt external knowledge, creating skills and networks to support banks and other modern organizations.

3 Data and Descriptive Statistics

An important contribution of the paper is the construction of a historical-to-modern dataset that links missionary expansion to financial development and related economic outcomes over nearly two centuries. The two subsections below describe the missionary data used to measure historical exposure and the banking data that provide our central outcome across periods. We introduce additional datasets when they enter the analysis and document their sources, digitization, construction, coverage, and limi-

and Appendix Table E.4.

[14]The topic coding is based on the archival summaries, while the selected examples and photographs draw on the underlying interviews. The interviews are qualitative and are not intended to form a representative sample; see also Appendix Figures E.1 and E.2.

[15]Appendix Figure E.3 reproduces an 1895 photograph of the American Presbyterian Mission Press. The Commercial Press's founding group included Xia Ruifang, Bao Xian'en, Bao Xianchang, and Gao Fengchi. The Bao brothers studied at the Presbyterian Qingxin school and worked at the Huamei Press. Gao came from the same school and printing network and remained at the mission press during the Commercial Press's early years. Xia learned English and printing at Qingxin before working as a typesetter in foreign-run presses. The Commercial Press's official history describes the firm as deliberately drawing on the Huamei Press model. We interpret this link as the diffusion of personnel, skills, and organizational practices, not as missionary ownership of the Commercial Press (McIntosh, 1895; Lu, 2017).

[16]This information channel 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 concerns the internal diffusion of skills and knowledge useful for financial modernization (Chen et al., 2025b).

tations in Appendix Section B. All geographic data are harmonized to 1911 prefectural boundaries from CHGIS (2016), a standard historical geography in quantitative work on China (Bai and Jia, 2016; Lin et al., 2021; Dong and Zhang, 2024).

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 (Mayfield et al., 2024). The CHCD is a collaborative project at the Center for Global Christianity and Mission at Boston University that brings together archival and published sources on churches, schools, hospitals, publishing houses, and other Christian institutions.[17]

The baseline CHCD extract contains 20,213 institution-location records, corresponding to 5,885 unique institutions after matching to 1911 prefectures. In collaboration with the CHCD team, we also digitized 971 additional school records from historical school and mission directories. We use these additional records for education descriptives and the analysis of missionary schools.[18]

We use the dated institution records to construct a prefecture-year panel and measure missionary arrival as the first year in which a missionary institution is recorded in a prefecture. Start years are available or can be recovered for 83.6% of the 5,885 prefecture-matched institutions. Appendix Figure A.3 shows the cumulative expansion of missionary institutions over time. As an external check on the geographic coverage of the CHCD, we compare it with the contemporaneous 1920 survey of Protestant missionaries compiled by Stauffer (1922). The Stauffer source records missionary personnel rather than institutions, but the two sources show a similar spatial distribution: across common prefectures, Protestant institution counts in the CHCD have a correlation of 0.74 with Stauffer missionary counts, and the two sources record Protestant presence in 211 and 227 prefectures, respectively (Appendix Table A.2).[19]

Figure 3 shows the timing of missionary expansion across the prefectures in our historical sample. The sample contains 247 prefectures. Areas shown in gray are outside the analysis sample because the historical outcomes or controls required for the analysis are unavailable. These areas are concentrated in geographically large frontier regions, so they occupy a substantial share of the map despite representing relatively few prefectural units.[20] Among sample prefectures, missions were initially concentrated along the coast and the Yangtze River before spreading rapidly inland; by 1936, only 15 of the 247 prefectures had no recorded missionary presence. For the Protestant–Catholic comparisons, we use the denomination recorded for each institution, which provides a more stable classification than individual missionary affiliation. Linked missionary-person records are used separately to construct national missionary flows and finer denominational descriptives; Appendix Tables A.3 and A.4 report these distributions.

[17] The complete documentation of the CHCD source materials is available at the CHCD data documentation. Appendix Figure A.1 describes the database structure.

[18] We use institutions because they capture stable local organizations with a physical footprint, including churches, schools, hospitals, presses, and mission stations. A mission station is a local base where missionaries lived or worked, rather than merely a record of individual movement. Appendix Section A.2 describes the supplementary sources, and Appendix Table A.1 reports the composition of missionary institutions.

[19] The sources measure different objects. CHCD institution records capture stable local organizations, whereas a missionary can be recorded as present in or moving through a prefecture without a corresponding institution record there. This helps explain why CHCD institutions cover fewer prefectures than the Stauffer personnel survey.

[20] China contained roughly 250–300 prefectures during this period, depending on the year and definition. Our coverage is similar to that of other quantitative studies of historical China. Appendix Figure A.4 shows missionary expansion at selected dates.

3.2 Banking in China

Our main historical outcome is the number of modern-bank offices in each prefecture between 1857 and 1936. The data come primarily from the *National Banking Yearbook* (Bank of China Economic Research Office, 1937), based on a nationwide survey conducted during the 1930s. The survey records bank names, locations, establishment dates, ownership, and head offices and branches, including establishments dating back to 1857. Importantly, the source records both banks operating at the time of the survey and some establishments that had already ceased operations.[21] Because the source focuses primarily on Chinese-funded banks, we supplement it with foreign-bank records collected from historical enterprise and commercial directories by Huang (1995). We geocode bank locations and assign them to 1911 prefectures.

The resulting data show a rapid but uneven expansion of modern banking. Only 9 of the 247 sample prefectures had a recorded modern bank by 1897, compared with 57 by 1915, 82 by 1926, and 168 by 1936. Banks were initially concentrated in treaty-port and lower-Yangtze areas before spreading more broadly inland during the Republican period. Figure 2 compares this growth with the decline of *Piaohao*, and Appendix Figure A.5 maps the spatial expansion. Appendix Table A.5 reports summary statistics for banks and other historical outcomes.

We complement the establishment data with two additional types of historical financial records. First, we digitize modern-bank balance sheets from Republican government tables and the *National Banking Yearbook*, which allow us to examine deposits, loans, assets, capital, and other measures of bank scale. Second, we construct separate data on the two main forms of traditional banking described in Section 2: branch histories of *Piaohao* from Huang (2002) and Liu (2018), and *Qianzhuang* records from the *National Banking Yearbook*. These data allow us to study both whether missionary exposure affected the scale of modern banking and how modern banks interacted with preexisting financial institutions. Appendix Section B.1 describes these sources and their coverage in detail.

For the long-run analysis, we use annual county- and district-level counts of licensed financial-institution offices from 1949 to 2022, compiled from the China Financial Supervision and Administration Bureau. The modern registry covers a broader set of regulated financial institutions than the pre-1936 modern-bank data, so we use the two series to trace changes in the geography of financial activity over time without treating their levels as directly comparable.[22] Appendix Table A.7 reports summary statistics for the variables in the main long-run analysis.

The remaining data used to study enterprises, trade, identification, mechanisms, and broader long-run outcomes are introduced when they enter the analysis and documented in Appendix Section B.

4 Historical Analysis

This section studies how missionary expansion affected financial and broader market development between 1857 and 1936. We first describe the staggered difference-in-differences design and examine the

[21] Closure dates are not recorded systematically, so smaller establishments that disappeared before the survey, particularly in earlier periods, may still be underrepresented. We therefore interpret the outcome as the number of recorded modern-bank establishments rather than as a complete opening-and-closure panel.

[22] The modern registry includes commercial and policy banks, credit cooperatives, postal savings institutions, trust and investment companies, financial leasing companies, and other regulated financial institutions.

timing of missionary entry, balance, and pre-trends. We then present the effects on modern banks and traditional financial institutions, other market outcomes, and the mechanisms through which missionary activity may have contributed to financial innovation.

4.1 Empirical Design

Our baseline historical panel includes 247 prefectures between 1857 and 1936, of which 232 receive missionaries during the sample period. We exploit variation in the timing of missionary arrival across prefectures. We exclude prefectures with recorded missionary presence before 1857, since we do not observe their outcomes before arrival. Appendix Figure C.1 shows the distribution of first missionary arrival.

Let G_i denote the first year in which a missionary institution is recorded in prefecture i, and let $R_{it} = t - G_i$ denote years relative to missionary arrival. The event-study specification can be represented as

$$Y_{it} = \alpha_i + \lambda_t + \sum_{r \neq -1} \beta_r \mathbb{1}\{R_{it} = r\} + \varepsilon_{it}, \tag{1}$$

where α_i and λ_t are prefecture and year fixed effects, respectively, and the year before missionary arrival is the omitted period. Y_{it} is the outcome of interest, primarily the number of modern banks or enterprises. The coefficients β_r trace changes in the outcome before and after missionary arrival relative to the omitted year.

Because missionary arrival is staggered and its effects may differ across places reached at different times, conventional two-way fixed-effects estimation of Equation 1 can generate inappropriate comparisons across arrival groups (Sun and Abraham, 2021). We therefore estimate group-time treatment effects using the staggered difference-in-differences framework of Callaway and Sant'Anna (2021), with the doubly robust two-period estimator of Sant'Anna and Zhao (2020), and aggregate them into event-study coefficients. For prefectures first reached by missionaries in a given year, the estimator compares changes in outcomes with prefectures that have not yet been reached and with prefectures that are never reached during the sample period. It then combines these comparisons across arrival years to construct the event-study estimates.[23]

Because missionary presence eventually spread to most of the sample, the comparison group is composed mainly of prefectures reached by missionaries later, which alleviates concerns that the estimates are driven by comparisons with locations missionaries would never have selected. We report event-study estimates for the 15 years before and after missionary arrival and cluster standard errors at the prefecture level.

4.2 Selection and Pre-Trends

The identifying assumption requires that, absent missionary arrival, prefectures reached at different times would have followed similar outcome trajectories. A central concern is that missionaries may have systematically entered places that were already more economically developed. This concern is

[23] Our baseline specification includes no covariates, so identification relies on unconditional parallel trends. See Roth et al. (2023) for a synthesis of the recent difference-in-differences literature.

particularly relevant in the missionary literature, where historical mission locations are often positively selected in the cross-section (Jedwab et al., 2022).

We first document this selection directly. At the prefecture level, we regress the year of first missionary arrival on predetermined economic and geographic characteristics, including modern banks, enterprises, government industrial investment, railways, treaty ports, population, provincial-capital status, river access, coastal location, and rice suitability. All specifications include province fixed effects; the benchmark years used for the time-varying measures are reported in the table notes. Appendix Table A.6 reports summary statistics for missionary exposure and selected predetermined covariates used in the analysis.

Table 2: Predictors of Mission Establishment Year: Prefecture-Level Estimates

	(1)	(2)
Variables	All	Post 1900
Total Modern Banks	9.156	-1.899
	(8.755)	(5.715)
Total Enterprises	0.851	0.096
	(2.399)	(0.522)
Ln (investment gov. factory)	0.016	0.332
	(0.413)	(0.696)
Total railways	-5.237*	-2.163
	(3.004)	(3.654)
Total Treaty Ports	-25.857***	-0.629
	(9.315)	(2.666)
Whether there's main river	-1.008	0.195
	(1.814)	(1.371)
Provincial capital	-9.202***	-4.765**
	(2.391)	(2.241)
Crop suitability: Rice	-0.660	0.861
	(1.225)	(1.002)
Ln population	-2.464**	-1.428
	(1.128)	(0.883)
Coastal	-0.240	0.260
	(3.100)	(3.421)
Province FE	Yes	Yes
Obs.	214	156
Adj. R sq.	0.330	0.105
Mean Dep. Var.	1901	1907
S.D. Dep. Var.	13.75	8.173
P-value F-stat.	1.56e-05	0.452

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 year of first missionary establishment, on the listed covariates. Column 2 uses the same dependent variable but restricts the sample to prefectures first reached after 1900. Controls are from Bai and Jia (2016) and are measured before missionary arrival. Banks, enterprises, and government investment are observed in 1880, treaty ports in 1860, and railways in 1890; all time-varying controls are measured in 1900 in column 2. All specifications include province fixed effects. Standard errors are in parentheses. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively. Appendix Figure C.2 reports the corresponding one-by-one coefficient plots.

Table 2 shows clear selection over the full period. Prefectures with greater railway access, treaty-port status, larger populations, and provincial-capital status tended to receive missionaries earlier. This pattern is consistent with the historical expansion described in Section 2. Missionaries initially entered through a small number of accessible and commercially important locations and subsequently expanded across the interior. Column 2 shows that these relationships are substantially weaker among prefectures first reached after 1900, although this remains a cross-sectional comparison and is not the main diagnostic for the DiD design.

Importantly, selection in levels does not necessarily imply selection in trends around missionary arrival. Persistent time-invariant differences across prefectures are removed by the DiD comparisons. The more relevant concern is that missionaries may have arrived precisely when a prefecture was beginning to experience faster growth in banking, enterprise formation, or other determinants of market development.

The historical process of missionary expansion provides some context for why these two forms of selection may differ. Mission expansion depended on both local suitability and the supply of missionaries. Local factors, such as a new railway connection or demand for schools, could make several prefectures plausible destinations around the same time. Which of these places was reached first could also depend on factors external to the local prefecture, including missionary inflows, denominational budgets, conferences, revivals, wars, and funding cycles.[24] These factors do not imply that missionary arrival was random. They do imply that the exact timing of expansion need not have been determined solely by changes in local economic conditions. In particular, the interaction between push factors affecting missionary inflows into China and pull factors affecting the attractiveness of specific locations could generate plausibly exogenous variation in which prefectures were reached in one year rather than the next. We exploit this source of variation more explicitly in the long-run analysis in Section 5.

As a complementary check, we compare predetermined characteristics across prefectures reached within progressively narrower periods. Appendix Table C.1 compares three broad adjacent arrival groups, while Appendix Table C.2 uses eight narrower comparisons. These exercises remain comparisons in levels and cannot reproduce the exact weighting of the staggered DiD, but they allow us to ask whether prefectures reached closer together in time also look more similar before missionary arrival. The differences generally become smaller as the arrival windows narrow. Prefectures reached around similar times are more balanced on the observed characteristics than prefectures reached many years apart.

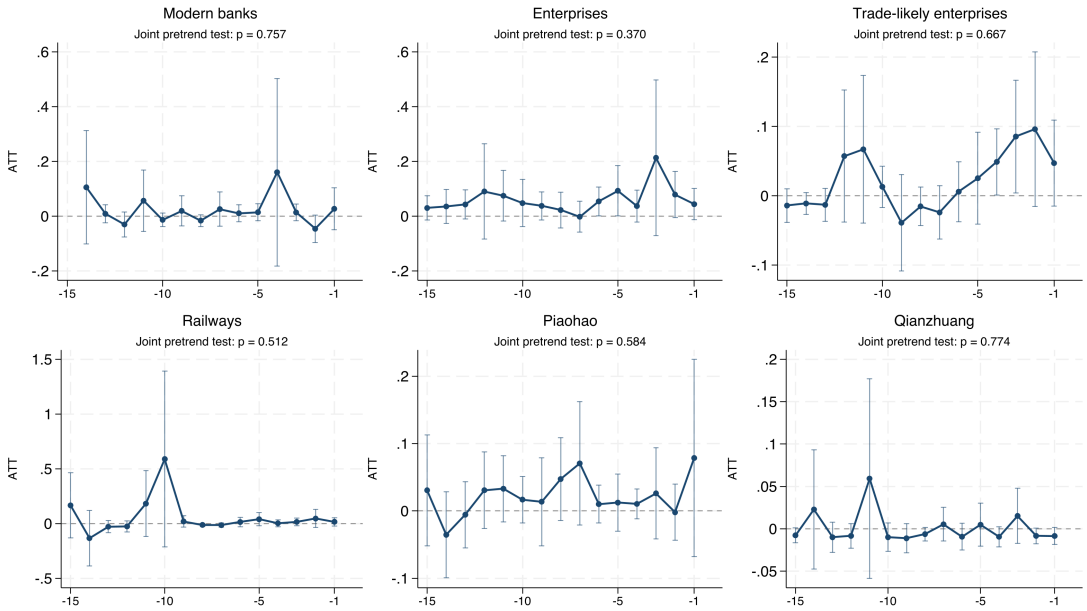
The more important diagnostic is whether outcomes were already evolving differently before missionary arrival. We examine this directly using the event-study estimates. Figure 4 reports annual pre-arrival coefficients for modern banks, enterprises, trade-oriented enterprises, railways, *Piaohao*, and *Qianzhuang* in the 15 years before missionary arrival. Appendix Figure D.14 reports corresponding evidence for government industrial investment and treaty-port status, for which annual data are more limited. Across these outcomes, we find no systematic evidence that prefectures were already following different trajectories before missionaries arrived. The absence of pre-trends in *Piaohao* and railways is particularly informative because both outcomes have substantial variation before the expansion of modern banking.

One concern is that modern banks themselves are rare in the early part of the sample, so their flat pre-trends may partly reflect limited pre-period variation. Appendix Section D.1 complements the pre-trend tests with a design-based minimum detectable effect exercise using the estimated pre-period coefficients and covariance matrix. The exercise shows that the design has power against several smooth pre-trend patterns, with only pre-trends that emerge immediately before missionary arrival being harder to detect.

The absence of pre-trends is not sufficient to establish parallel trends after missionary arrival, but

[24] Francis Price Jones, for example, had studied Arabic expecting to serve in North Africa. When World War I stopped his mission board from sending missionaries there, it offered him immediate placement in China instead. Source: The Claremont Colleges Library.

Figure 4: Annual Pre-Treatment Coefficients Across Historical Outcomes



Notes: The panels report annual Callaway–Sant'Anna event-study coefficients for event years $T-15$ through $T-1$, where estimable, with 95% confidence intervals. The reported p-values are covariance-based joint Wald tests that the $T-15$ through $T-2$ coefficients equal zero. Outcomes remain in their native units. Appendix Section D.3 explains the construction of trade-likely enterprises. *Piaohao* and *Qianzhuang* are the two types of traditional banks examined in the paper.

it is an important diagnostic for the design: systematic differential trends before arrival would directly undermine the identifying assumption. Taken together, the exercises show that missionary arrival was clearly selected in levels over the full historical expansion, that these differences become smaller among prefectures reached closer together in time, and that we find no systematic evidence that the relevant outcomes were already changing differentially before missionary arrival.

4.3 Results

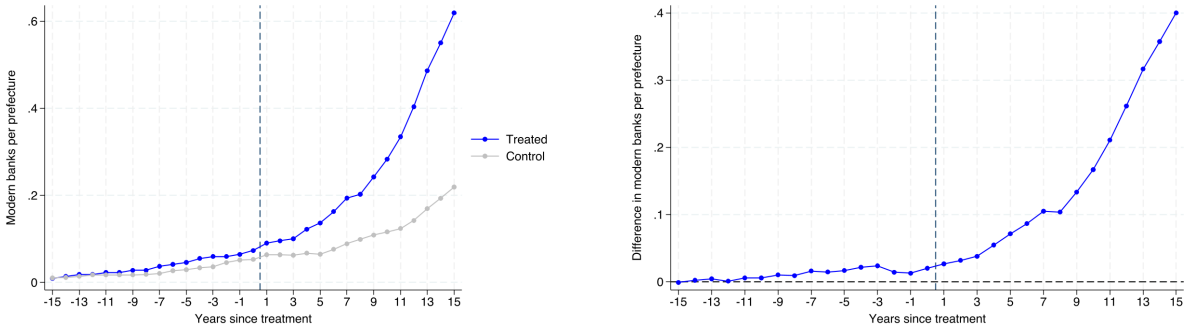
We begin with modern banks, our main historical outcome. Panel A of Figure 5 displays the raw data over a window of [-15, 15] years surrounding the arrival of missionaries, using the 247-prefecture historical panel between 1857 and 1936. The control group consists of the next cohort of treated prefectures and the never-treated group for each year, mimicking 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.

To identify these dynamics causally, Figure 6 plots the event-study estimates from equation 1. 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.

The effect is also not limited to a particular type of bank. Appendix Figure D.6 shows similar patterns for the three components of our aggregate measure of modern banks: private, government, and foreign banks. To examine whether missionary exposure was also associated with the scale of financial intermediation, we use the historical balance-sheet records described in Appendix Section B.1.

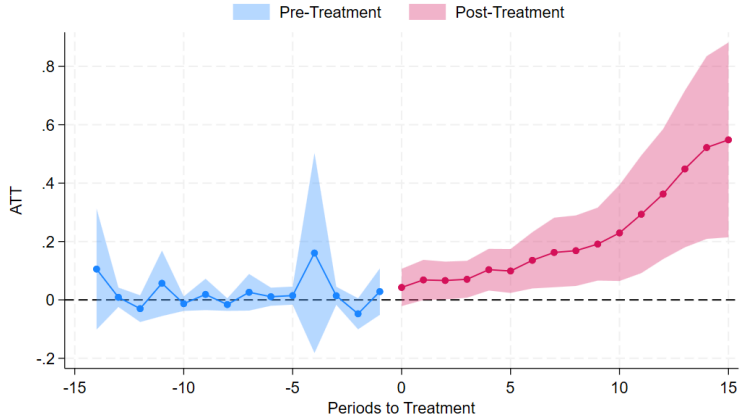
Figure 5: Raw Data: Total Modern Bank Dynamics

(a) Raw data **(b)** Difference



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.

Figure 6: Missionary Presence and Total Modern Banks: 15 Periods



Notes: The figure reports event-study estimates from Equation 1, 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. Appendix Table D.1 reports the pre- and post-treatment averages and alternative bank outcomes.

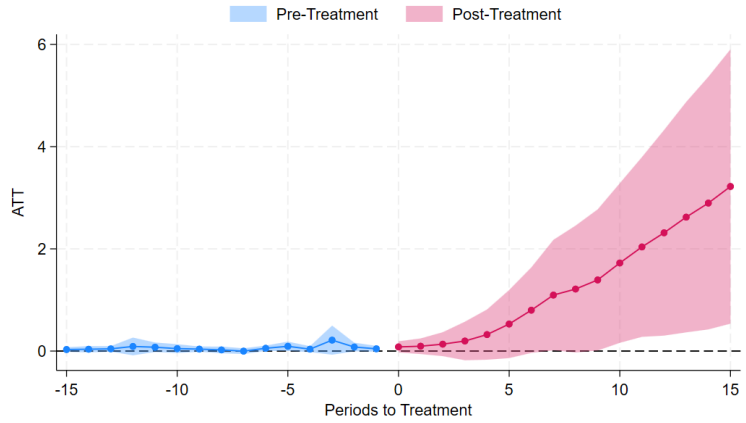
Appendix Tables D.3 and D.5 show increases in deposits, loans, assets, and related measures of bank size. Some increase in aggregate balance-sheet quantities naturally follows from the establishment of more banks, but the results are similar when these measures are expressed per branch. The bank-level estimates also indicate that banks operating in more mission-exposed locations were larger. The effect therefore appears to reflect both the spread of modern banking and an increase in the scale of the institutions that took root.

We next examine how this expansion interacted with the traditional financial institutions described in Section 2. Appendix Figures D.10 and D.11 show different patterns for *Piaohao* and *Qianzhuang*. *Piaohao* initially expand following missionary arrival but subsequently decline as modern banks rise, consistent with modern banks eventually substituting for some of their long-distance remittance functions. The pattern for *Qianzhuang* is different. These locally embedded money shops do not show the same decline and appear more complementary to modern banks, consistent with their role in providing local information, merchant relationships, and networks of trust. The modern-bank response is also

stronger in places where traditional finance was already present. Together, these results suggest that missionary exposure contributed to a transition in the organization of finance: modern banks expanded where financial activity already existed, eventually replacing some functions of *Piaohao* while operating alongside the more locally embedded *Qianzhuang*.

We next ask whether missionary exposure also affected broader market activity. We measure enterprises using geocoded head offices of registered Chinese firms from Du (1991, 2019), supplemented with foreign-enterprise directories from Huang (1995). Figure 7 presents the results for total enterprises over the same 15-year window. As with modern banks, there are no visible pre-trends before missionary arrival. The effect emerges more gradually after arrival and averages 1.29 additional enterprises over the post-arrival window, equivalent to approximately 27% of the outcome mean.

Figure 7: Missionary Presence and Total Enterprises: 15 Periods



Notes: The figure reports event-study estimates from Equation 1, 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. Appendix Figure A.6 reports the evolution of total enterprises over time, and Appendix Table D.1 reports the corresponding pre- and post-treatment averages.

Appendix Figure D.8 and Appendix Table D.8 provide additional evidence on broader market activity. Missionary exposure is associated with stronger growth in trade-oriented enterprises and greater export activity in 1936. Both the enterprise and trade responses emerge with a lag relative to the increase in modern banking. This timing is consistent with financial development supporting subsequent enterprise formation and market exchange. At the same time, it does not rule out more direct effects of missionary activity on these outcomes. In the next section, we examine why missionary presence affected financial innovation and other market activity.

Robustness Appendix Section D.5 reports additional robustness checks. The modern-bank result is similar when we use alternative outcome definitions, including $\log(y+1)$, growth rates, an extensive-margin indicator, and new-bank flows, and when we restrict the sample to prefecture-years in provinces where at least one modern bank is present. The results are also robust to excluding the early part of the sample, excluding treaty ports, using longer and balanced event windows, adding railway controls, and examining effects separately across missionary-arrival groups. Across these specifications, the increase in modern banking following missionary arrival remains similar.

4.4 Mechanisms

Why would exposure to missionary institutions contribute to the development of modern banks? In this section, we examine several potential mechanisms and find evidence consistent mainly with two: practical education and the diffusion of useful knowledge through publications and translations. Modern banks were a new institutional technology in China, and missionary institutions could help provide the skills and knowledge needed to operate and adapt them locally. We interpret the evidence as suggestive, 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 et al., 2020). Jedwab et al. (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 et al., 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 examine education in four ways.

Banker formation. 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]

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. Christian-affiliated bankers account for 27% of matched banker observations. The annual cumulative share was substantially higher in the early period: it exceeded 50% from 1865 through 1893 and peaked at 71% in 1885–1888. 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 about 0.2% of the population.[26]

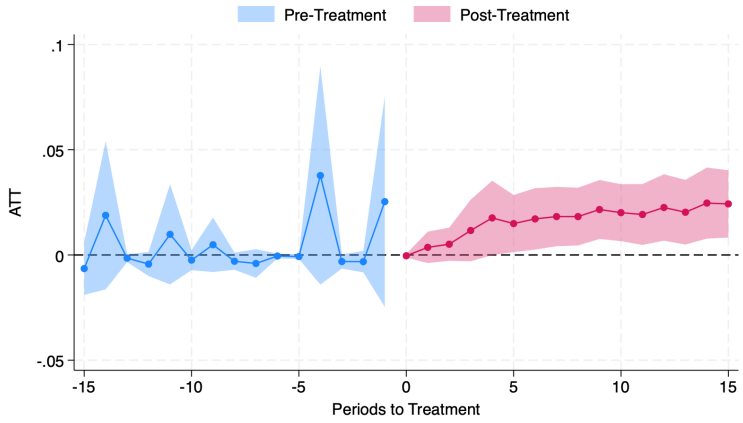
Figure 8 then estimates the effect of missionary presence on the share of Christianity-related bankers. The share increases after missionary arrival, consistent with the idea that missions helped train or connect individuals who later worked in modern banking.

Elite formation and foreign study. Second, we turn to Republican-era elites to ask whether mission-

[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 Hong Kong dollars. See Appendix Section E.3 for additional historical examples.

[26] Appendix Figure E.8 shows the ratio of Christian-affiliated bankers to total bankers over time.

Figure 8: Missionary Presence and the Share of Christianity-Related Bankers



Notes: The figure reports event-study estimates from Equation 1, using the share of Christianity-related bankers as the outcome. The average post-treatment ATT is 0.016. The dependent-variable mean is 0.025 overall, 0.052 in 1920, and 0.113 in 1936.

ary presence contributed to high-skill Chinese human capital and connections to foreign education and networks. We use the Republican China Elite Database, constructed from biographies of prominent political, business, financial, scientific, educational, and cultural figures active during the Republican period. Among the 14,763 biographies matched to our historical prefectures, 1,282, or about 9%, have a coded Christian-school background, our proxy for Christian educational affiliation. Appendix Figure B.2 reports its level and share across school-age cohorts.

Because the biographies do not consistently report when and where schooling occurred, we construct two prefecture-year proxies. For the first, Panel A of Figure 9 assigns elites with a Christian-school background to their native prefecture at age 15. This uses age 15 as a common proxy for school-age exposure and assumes that native prefecture is informative about where the individual was living during those school years. We then ask whether missionary presence in the native prefecture at that age predicts later Christian educational affiliation. For the second, Panel B uses biographies that report foreign study and its timing. We assign elites to their native prefecture in the reported year of departure and ask whether missionary arrival increased subsequent departures for study abroad.[27]

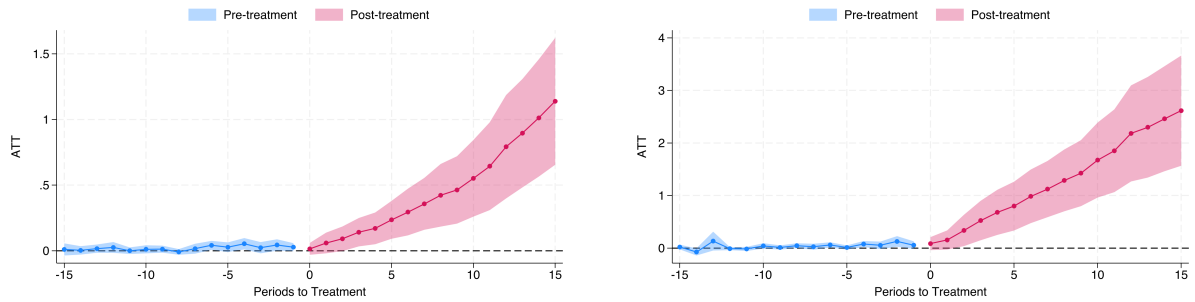
The event studies show limited differential accumulation before missionary arrival and sustained increases afterward in both outcomes. Given the age and location approximation required for the Christian-school measure, Panel A should be interpreted as evidence that missionary exposure during school age predicts later Christian educational affiliation rather than as a direct measure of local mission-school attendance. Together, the two results are consistent with missions helping form highly skilled Chinese intermediaries and strengthening access to foreign education and networks.

Missionary schools. Third, 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

[27] Appendix Section B describes the construction of the Christian-school indicator and foreign-study departure-year proxy.

Figure 9: Missionary Presence and Chinese Elite Formation

(a) Christian-school elites **(b)** Study abroad

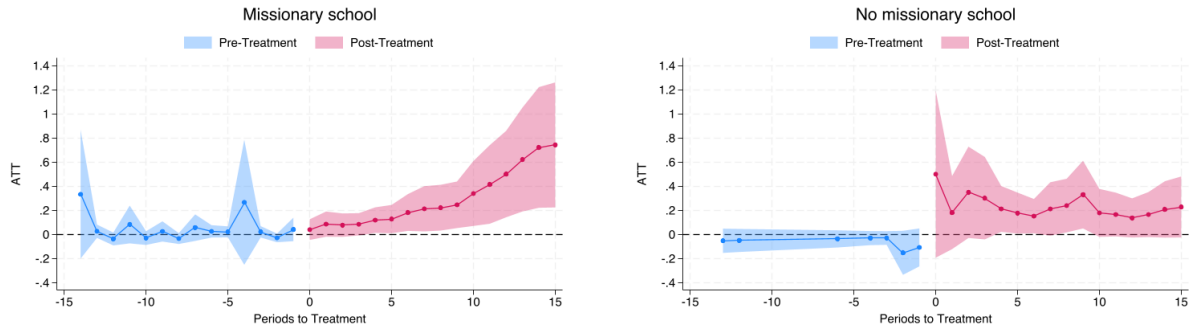


Notes: The treatment is the first year of missionary presence in the elite's native prefecture, harmonized to 1911 boundaries. Both panels report cumulative prefecture-year stocks and are estimated separately using Equation 1. Panel A cumulates biographies with a coded Christian-school background, assigning each to the native prefecture at birth year plus 15. This is a proxy for school-age mission exposure, not a direct observation of local school attendance. Panel B cumulates biographies coded as having studied abroad, assigning each to the first four-digit departure year parsed from the study-abroad year field. Post-window increases are 158% in Panel A and 134% in Panel B.

education to affect the local supply of bankers and managers.[28]

Figure 10: 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: The 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. Split-group sizes: 135 treated prefectures with a missionary school and 97 treated prefectures without a missionary school.

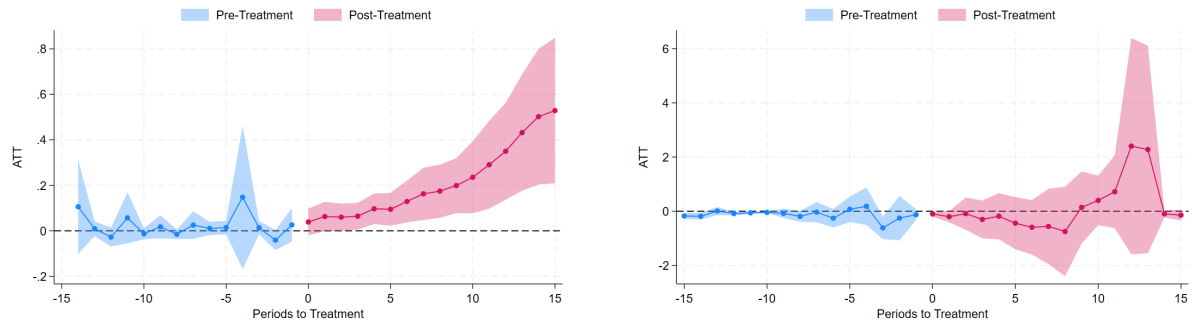
Protestant and Catholic missions. Fourth, the effect on modern banks is concentrated in Protestant missions. Figure 11 shows a positive effect following Protestant missionary arrival, while Catholic missionary arrival is not associated with a similar increase. This pattern is consistent with the greater emphasis Protestant missions placed on schooling and conversion through education (Bai and Kung, 2015; Bai, 2019). It is also potentially consistent with Weber's broader Protestant-ethic hypothesis (Weber, 2001; Becker and Woessmann, 2009).

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 educational mate-

[28] Appendix Table E.3 summarizes these magnitudes, and Appendix Figure E.9 reports coefficient-by-coefficient difference tests for the main school and publication splits.

Figure 11: Missionary Presence and Modern Banks: Protestant and Catholic Missions

(a) Protestant arrival **(b)** Catholic arrival



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.

rials. Many of these publications were written in vernacular or romanized Chinese, making them accessible beyond the elites.[29] This channel complements the education channel: schools trained students directly, while translations and printed materials helped knowledge circulate outside the classroom.

We use 677 located records of missionary publications spanning 74 prefectures, together with evidence on missionary printing presses from McIntosh (1895).[30] Among the underlying publications, 67.0% were religious or missionary in focus, 42.3% were in vernacular or romanized Chinese, 28.4% included a Western language, 15.1% included English, and 16.5% were educational or student-oriented. A smaller share, 5.8%, were scientific or technical.[31]

We then check whether locations with missionary publication or printing-press activity experienced stronger effects on modern banks. Figure 12 splits treated prefectures by whether they have any located CHCD publication record, or a McIntosh mission press. The effect is much stronger in places with publication or press activity and flatter elsewhere. This is consistent with publications and translations helping diffuse the knowledge needed to adopt and operate modern financial institutions.

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.[32]

Additional channels and alternative explanations The evidence points to mechanisms beyond formal education. Missionary schools and publications could transmit not only skills, but also knowledge

[29]This emphasis was especially pronounced among Protestants. Their doctrine placed particular weight on lay believers reading Scripture directly, rather than receiving it primarily through clergy as in Catholicism, which encouraged Bible translation, vernacular printing, and literacy. (Gallego and Woodberry, 2010; Woodberry, 2012).

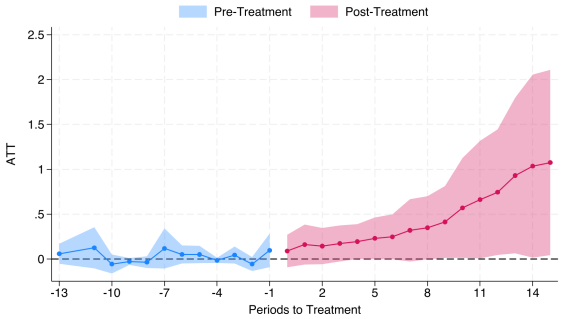
[30]The CHCD records cover religious periodicals (including newspapers, magazines, journals, bulletins, newsletters, and school or society papers) while McIntosh locates mission presses. They are not a universal bibliography and may omit smaller or early titles. We therefore interpret the split as the geography of recorded publication or press activity, not a complete title count; see Appendix Figures E.5 and E.6.

[31]Appendix Table E.2 reports the full descriptive breakdown, and Appendix Figure E.4 plots the growth of missionary publications over time.

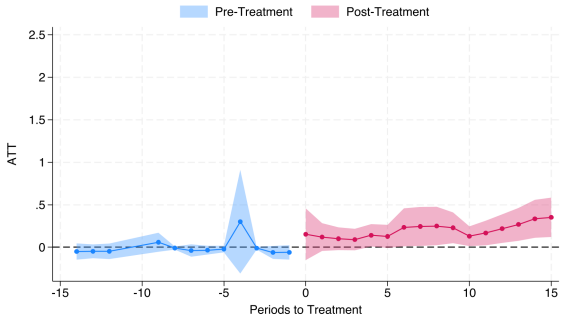
[32]Appendix Figure E.7 presents the complementarity split, and Appendix Table E.3 gives average post-treatment differences.

Figure 12: Missionary Publication or Printing-Press Activity and Modern Banks

(a) Publication or mission press



(b) No publication or mission press



Notes: The outcome is the total number of modern banks. The left panel reports treated prefectures with any located CHCD publication record, regardless of whether its start year is known, or a McIntosh mission press; the right panel reports the other treated prefectures. Split-group sizes are 62 and 170 treated prefectures, respectively. Adding mission-press locations changes the publication-only split by one treated prefecture.

about how modern organizations operated in practice. Other channels may also have mattered, including networks linking Chinese actors to foreign firms and financial institutions. We examine these additional mechanisms below.

We examine three additional channels. The first is a possible network channel through compradors. Compradors were Chinese intermediaries who worked with foreign firms and banks and could transmit foreign financial practices into Chinese institutions. Working as a comprador also required knowledge of English, which at the time was taught predominantly in missionary schools. Our banker biography data provide descriptive evidence consistent with this channel. Appendix Table E.4 shows that comprador-background bankers are a small group, but disproportionately connected to Christianity and to Chinese finance: 28% are Christianity-related, 63% later founded at least one Chinese bank, *Qianzhuang*, *Yinhao*, or *Piaohao*, and 72% worked at both foreign and Chinese banks.[33] We interpret this as suggestive evidence that missionary exposure may also have operated through networks of intermediaries connecting foreign and Chinese finance, allowing them to learn through direct exposure and helping them establish firms, banks, and other market-oriented institutions.

The second is a competing explanation based on clans. Recent work argues that Confucian clan institutions and financial markets can act as substitutes (Chen et al., 2022b), and missionary activity may weaken kin-based institutions (Schulz et al., 2019; Henrich, 2020). This raises the possibility that our results reflect missionaries weakening clans, rather than directly facilitating modern banks. Appendix Figure E.10 shows that the effect on modern banks is similar across high- and low-clan prefectures. Appendix Table E.5 then reports a horse-race exercise between missionary exposure and clan intensity. The missionary effect remains positive, while the clan effect becomes small and statistically insignificant.

Third, missions may themselves have demanded banking services to finance schools and hospitals. While these capital needs could have generated some initial demand for financial services, reconstructing their approximate magnitude suggests that they were too small to explain the full banking effect. The estimated effect of 0.22 banks, or 31% of the outcome mean, corresponds to roughly 490,000–877,000 yuan in loans or assets using the average 1932–1936 branch balance sheet. By comparison, the foreign-

[33] In our banker biography data, 1,041 bankers are recorded, of whom 43 are flagged as comprador-related.

funded half of the Hwa Mei Hospital construction cost was about 110,000 yuan (13–22% of that scale), annual foreign support for Fenyang Hospital was about 12,000 yuan (1–2.5%), and the annual operating gap of a missionary middle school was 2,500–5,100 gold dollars (less than 1.1%).[34] Mission capital needs could therefore have contributed to early bank demand, but the available benchmarks suggest that they cannot account for the full effect.

Summary. Overall, the mechanism evidence points to several related channels. Education supplied practical human capital relevant for banking and broader enterprise formation, while publications and translations diffused useful knowledge about modern economic and financial practices. The comprador evidence suggests that some of this knowledge may also have traveled through intermediaries connecting foreign and Chinese finance. By contrast, we find less support for explanations based on missionaries weakening clan institutions, and the scale of missionaries' own capital needs appears too small to account for the full banking effect. Taken together, the evidence is consistent with missionaries transmitting institution-specific knowledge through a combination of skills, practices, networks, and organizational models that helped modern banks take root. The next section asks whether the local differences created during this period persisted through the Mao era and became economically relevant again after China's market reforms.

5 Long-Run Analysis

Did the skills, knowledge, and connections formed under missionary exposure before 1936 continue to matter when China returned to market-oriented development? To test this hypothesis, we examine the relationship between historical missionary exposure and bank development over this later period. Specifically, we aim to estimate the following 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 ever built or established between 1850 and 1936. This approach ensures consistency with the period used in the DiD analysis and allows us to examine outcomes in the 1930s.[35] 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 et al. (2020), we exploit the interaction between national missionary migration flows and railway connection timing to instrument for missionary expo-

[34] These are order-of-magnitude comparisons because the historical sources use imperfectly comparable currencies and mix construction costs, annual operating flows, and bank balance-sheet stocks. Bank scale comes from the 1932–1936 *National Banking Yearbook* balance sheets (Bank of China Economic Research Office, 1937); the project benchmarks come from the Ethel Lacey Hylbert interview on Hwa Mei Hospital, a historical account of Fenyang Hospital, and Ralph E. Diffendorfer's *Missionary Education in China*.

[35] The results remain unchanged when using the broader timeframe of 1850-1950 instead.

sure. In this section, we show the estimating equations, explain the logic behind the instrument both graphically and descriptively, provide examples, and show the results.

5.1 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 there and the subsequent accumulation of missions.[36] 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 13. 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.

Figure 13: Annual Flow of Missionaries in China, 1880–1936

Notes: Flow of Missionaries at time t is defined as the total number of missionaries present in China in $t+1$ minus the total present in t. Source: China Historical Christian Database (CHCD).

To illustrate the source of variation in the instrument, we begin with the following auxiliary "zero-stage" equation:

$$\begin{aligned} \text{MissInst Stock}_{i,t} = \alpha_t + \alpha_i + \delta \text{RRstock}_{i,t-1} \\ + \beta \text{ Missionary Flow}_{t-1} \times \text{RRstock}_{i,t-1} + \varepsilon_{i,t} \end{aligned} \tag{2}$$

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

[36] This does not conflict with the identification used in the staggered DiD. The two designs exploit different margins of missionary expansion. The DiD uses the timing of first missionary entry and requires that prefectures treated around similar periods were not already on different trajectories; the balance and pre-trend tests support this assumption. The IV instead exploits variation in the intensity of subsequent missionary exposure. Railway access need not strongly determine the exact year of first entry for its interaction with national missionary inflows to generate meaningful differences in the number of missionaries and missions accumulated over time.

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. 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 β to be positive.

The two variables that comprise the interaction term are also included in equation (2), capturing the effect of being connected to a positive number of railway lines when no missionaries are entering China, and 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 (2), 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 (2). We then sum this prefecture year-specific predicted missionary stock over the whole time period (1850-1936):[37]

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

Where T is the total number of periods. Finally, our 2SLS equations are equation (3), the first stage, and equation (4), the second stage:

$$\begin{aligned} \text{TotMiss Inst}_{i,p} = \zeta_p + \mu \widehat{\text{TotMiss Inst}}_{i,p} \\ + \omega \text{RR Duration}_{i,p} + \text{RR Density}_{i,p} + \varepsilon_{i,p} \end{aligned} \tag{3}$$

$$\begin{aligned} Y_{i,p} = \xi_p + \psi \text{TotMiss Inst}_{i,p} \\ + \pi\, \text{RR Duration}_{\,i,p} + \text{RR Density}_{i,p} + \nu_{i,p} \end{aligned} \tag{4}$$

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.

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 pres-

[37] Because $\widehat{\beta}$ is common to all prefectures, it only rescales the instrument. Omitting it would leave the Kleibergen–Paap first-stage F-statistic, fitted values, and 2SLS estimates unchanged. Estimating this common scalar therefore does not require a generated-regressor correction (Sequeira et al., 2020).

ence 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 $_{i,t-1}$ $\times$ 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, once we condition on overall railway exposure, internal movements of people and resources induced by the railway do not pose the same concern, because the identifying variation comes from the exact timing of railway connections rather than differences in overall railway exposure. 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 argue that this is unlikely.

5.2 Sources of Variation for Identification

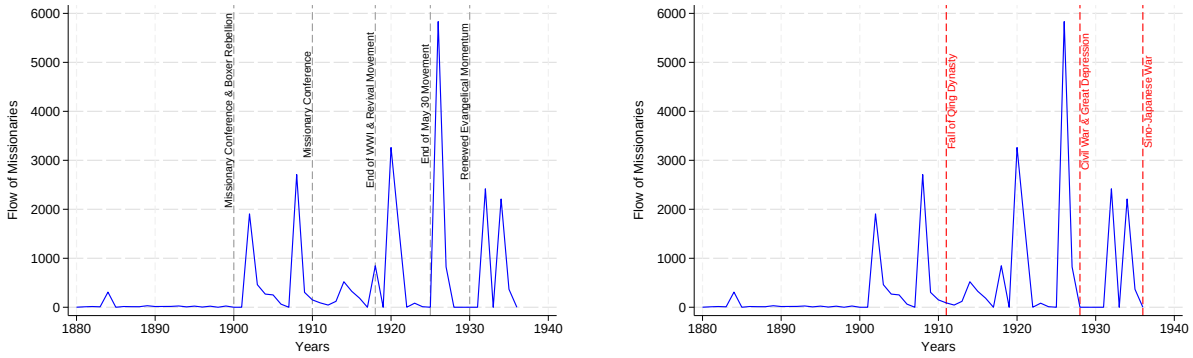
The first source of variation used for identification is the yearly missionary migration flows. While multiple factors influence these flows, we can identify some key push and pull factors that may contribute to the spikes and lulls observed in Figure 13. Figure 14 illustrates events that may correlate 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.

Figure 14: Missionary Booms and Lulls: Annual Missionary Flow, 1880–1936

(a) Booms **(b)** Lulls



Notes: The conference markers are the 1900 Ecumenical Conference on Foreign Missions in New York and the 1910 World Missionary Conference in Edinburgh. The May Thirtieth Movement was a 1925 anti-imperialist protest wave in China; renewed evangelical momentum refers to early-1930s revival campaigns. The plotted missionary-flow shifter sets negative annual changes to zero. Source: China Historical Christian Database (CHCD).

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.

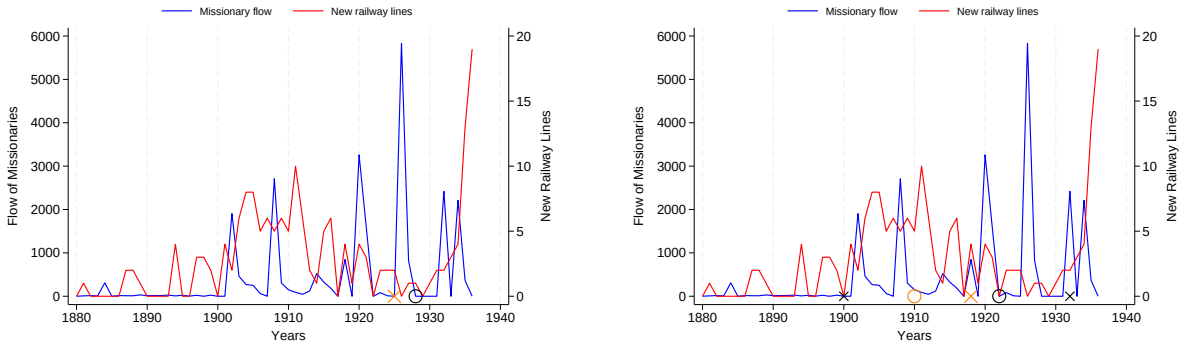
Nevertheless, it is important to note that other factors may have influenced these flows. For example, another pattern that emerges is the presence of spikes following the end of conflicts against Christians, such as the Boxer Rebellion or the May 30th Movement. Additionally, panel b shows that some of the lowest missionary migration periods coincide with the onset of political and social instability in China. However, these factors may threaten identification only if 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 locally in China. Figure 15 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 2,210 new missionaries. In our data, Jiangning Prefecture in Jiangsu Province, connected just before the boom, received 57 new missionaries (2.58% of the total) and established 5 new missions (a 12% increase from a base of 42 missions). In contrast, Haizhou Prefecture in the same province, connected just after the boom, received 1 new missionary (0.05% of the total) and established 0 new missions (a 0% increase from a base of 2 missions).

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

Figure 15: New Railway Lines and Missionary Flow, 1880–1936

(a) Across-prefecture timing **(b)** Within-prefecture timing



Notes: The legend identifies the blue national missionary-flow series and the red number of new railway lines. A new railway line is either an added stop on an existing line or a newly constructed line. Black markers represent one prefecture and orange markers another prefecture in the same province; X's denote boom-year connections and circles denote lull-year connections. The missionary-flow series is the regression-consistent shifter used in the zero stage. Sources: China Historical Christian Database (CHCD) and Ma et al. (1983).

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.

5.3 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, Jiangning Prefecture has been connected to the railway network for 92 years with 7 railway lines, whereas Haizhou Prefecture has been connected for 95 years with 6 railway lines. The difference between these two prefectures, 3 years of connection and 1 railway line, 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 Jiangning Prefecture, 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 within a given decade, and lull Prefectures as those connected in a below-median flow year or one year afterward. Table 3 presents pairwise differences between boom and lull prefectures using OLS, with standard errors clustered at the prefecture level because the same prefecture may appear multiple times. We compare the two groups on pre-existing modern banks, enterprises, government industrial investment, railways, treaty-port status, population,

provincial-capital status, river access, coastal location, and rice suitability. All variables are measured at the beginning of the period, in 1880, except for time-invariant geographic characteristics. We find little systematic imbalance between boom and lull prefectures. The only statistically significant difference is treaty-port status, which is 4.4 percentage points higher among boom prefectures and is significant at the 10% level; none of the other characteristics differs significantly across the two groups

Table 3: 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	129	0.132	109	0.183	238	-0.052
	54	(0.072)	47	(0.104)	60	
Total Enterprises	129	0.419	109	0.606	238	-0.187
	54	(0.199)	47	(0.330)	60	
Ln (investment gov. factory)	129	2.292	109	2.377	238	-0.084
	54	(0.802)	47	(0.928)	60	
Total railways	129	0.000	109	0.000	238	0.000
	54	(0.000)	47	(0.000)	60	
Total Treaty Ports	129	0.140	109	0.183	238	-0.044*
	54	(0.064)	47	(0.076)	60	
Whether there's main river	129	0.682	109	0.651	238	0.031
	54	(0.074)	47	(0.081)	60	
Provincial capital	129	0.442	108	0.435	237	0.007
	54	(0.089)	46	(0.091)	59	
Crop suitability: Rice	129	2.097	109	2.088	238	0.009
	54	(0.188)	47	(0.185)	60	
Ln population	129	14.517	109	14.518	238	-0.001
	54	(0.133)	47	(0.134)	60	
Coastal	129	0.310	109	0.349	238	-0.039
	54	(0.088)	47	(0.092)	60	

Notes: Boom prefectures are prefectures connected to a railway line one or two years before national missionary flows are above the median within a given decade. Lull prefectures are prefectures connected in a below-median flow year within a given decade or one year afterward. 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 a prefecture 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 control for latitude and longitude as a robustness check in the first stage.

5.4 Results

We begin by presenting the zero-stage estimating equation (2) and the first-stage equation (3) in Table 4.

Table 4: Auxiliary Zero-Stage and First-Stage Estimates

Variables	Zero-stage (1) MissInst Stock	First stage (2) Tot Miss Inst
RRstock (t-1)	1.5672***	
	(0.3465)	
Miss Flow x RRstock / 1,000	0.03738**	
	(0.01456)	
Predicted Tot Miss Inst		3.3997***
		(0.8816)
RR Duration		0.0690**
		(0.0279)
RR Density		-685.2861***
		(128.9182)
Prefecture FE	Yes	No
Time FE	Yes	No
Province FE	No	Yes
Obs.	21,242	247
Adj. R sq.	0.722	0.240
Mean Dep. Var.	3.10	10.28
S.D. Dep. Var.	6.06	9.06
K–P first-stage F	–	14.87

Notes: MissInst Stock$_{i,t}$ is the total number of 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 the total railway stock in year $t-1$. Their interaction is divided by 1,000 for readability. Column (1) uses the prefecture-year panel; its predicted interaction component is summed over time to construct the prefecture-level predicted missionary exposure used in the cross-section in column (2). RR Duration$_{i,p}$ is the number of years connected to the railway network as of 2000, and Density$_{i,p}$ is $\left(\sum_{t=1}^{T} \text{RRstock}_{i,t}\right) / (\text{area in km}^2)$. Fixed effects are reported in the table. Robust standard errors are in parentheses. K–P F is the Kleibergen–Paap first-stage F-statistic; the zero-stage interaction statistic is not a weak-instrument diagnostic. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

The interaction between national missionary flows and lagged railway stock is positive and statistically significant in the zero stage. Thus, a given national missionary inflow led to more local missionary institutions in prefectures with greater railway access. For scale, the 1926 flow value of 5,832 implies an incremental interaction contribution of 0.22 predicted missionary institutions in a prefecture with one lagged railway line and 0.44 in a prefecture with two. These values capture only the interaction component of the fitted missionary stock. Column (2) reports the first stage: predicted cumulative missionary exposure predicts actual missionary institutions. A one-standard-deviation increase in predicted exposure (1.138 units) is associated with approximately 3.9 additional missionary institutions, about 38% of the sample mean of 10.28. The Kleibergen–Paap F-statistic is 14.87.

We next estimate the second-stage regressions using the final six years of the historical modern-bank dataset and annual data on total banks from 1949 to 2022. Because the level of banking activity changes substantially across this period (see Appendix Figure F.1), we standardize the bank outcome within each year to facilitate comparisons of the coefficient path.[38] Figure 16 reports the resulting year-specific

[38] Results using the total number of banks, rather than the standardized outcome, are reported in Appendix Figures F.3 and F.4.

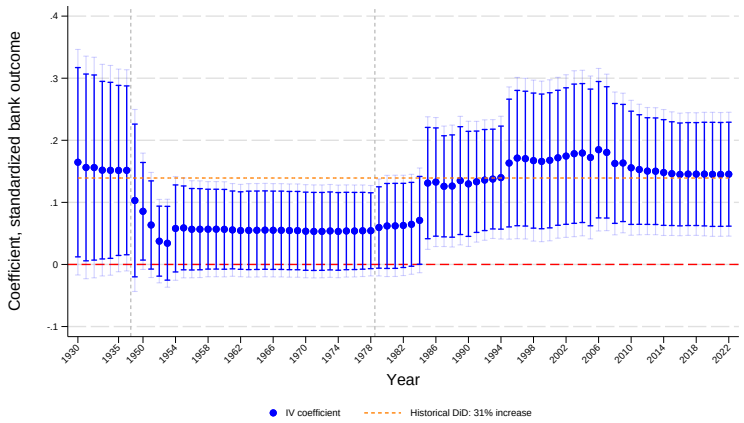
estimates, and Appendix Table F.2 reports selected years in regression-table form.

The historical estimates from 1930 to 1936 are positive and statistically significant at the 10% level. In raw-bank units, they imply increases of approximately 51% in 1930 and 34% in 1936. The 1936 magnitude is close to the 31% estimate from the historical difference-in-differences design. The IV therefore reproduces the main historical relationship despite relying on a different source of variation.

The missionary-exposure gradient re-emerges after the market-oriented reforms. The coefficient becomes positive during the 1980s and remains positive through the end of the sample. The 1990 estimate is significant at the 5% level and the 2022 estimate at the 1% level; expressed relative to the corresponding sample means, they imply increases in the number of bank offices of approximately 14.2% and 14.7%, respectively. The result is also robust to adding alternative population measures as controls and to expressing bank outcomes per capita (Appendix Table F.3 and Appendix Figure F.5).[39]

By contrast, the missionary-exposure gradient is muted between 1949 and 1978. This does not mean that banking offices disappeared. Private and foreign banks were closed, merged, or brought under state control, while the state expanded a nationwide network of local banking offices. These offices, however, operated as part of the planned economy rather than as market-oriented financial intermediaries.[40] An

Figure 16: 2SLS Estimates: Standardized Modern and Total Banks, 1930–1936 and 1949–2022



Notes: The figure reports coefficients from Equation 4 estimated separately by year, using the historical modern-bank data used in the DiD design and recent county- and district-level bank counts assigned to 1911 prefectures by each modern unit's centroid. Blue points are IV estimates; dark and light intervals show 90% and 95% confidence intervals. The red dashed horizontal line marks zero, the orange dashed horizontal line maps the historical DiD estimate of a 31% proportional increase into 1936 standardized-outcome units (0.139 standard deviations), and the vertical dashed lines mark the establishment of the People's Republic in 1949 and the beginning of market reforms in 1978. Historical modern-bank means are 2.4 in 1930 and 5.8 in 1936, so the raw-unit IV estimates imply increases of approximately 51% and 34%, respectively. Recent total-bank means are 145 in 1990 and 707 in 2022, so the corresponding increases are approximately 14.2% and 14.7%. Appendix Table F.2 reports the 1936 and 2020 estimates in regression-table form. Source: China Financial Supervision and Administration Bureau.

[39] We do not use these population-adjusted specifications as our baseline because missionary exposure may itself affect population growth, migration, and urban concentration, making later population a potential outcome of treatment. Moreover, no single population measure is an obviously preferable denominator for the per-capita outcomes, and reliable prefecture-level population estimates are particularly scarce for the Mao period.

[40] After 1949, most banking functions were consolidated under the People's Bank of China, which combined central-bank, commercial-bank, treasury, and government-accounting functions. Its local offices, together with state-guided rural

increase in recorded branches during this period therefore does not represent the same type of financial development as the growth of modern banks before 1949 or after reform.

The disappearance of the mission effect under Mao does not appear to arise simply because the state built fewer banks in historically mission-exposed areas. Rather, bank expansion was proportionally faster in the least mission-exposed prefectures, suggesting that state-directed expansion into previously underbanked areas may have compressed the inherited spatial distribution of banking. In the same 247-prefecture sample used for the baseline IV, raw recorded banks rose from 1,610 in 1936 to 4,164 in 1960. They increased by 213.2% in prefectures at or below the empirical 25th percentile of missionary exposure, compared with 153.0% in the remaining prefectures. The network also became much less concentrated in the pre-Mao banking centers: prefectures in the highest quartile of the 1930s bank distribution accounted for 86.2% of recorded banks in 1936 but only 30.3% in 1960. The IV estimates likewise show no evidence that mission-exposed prefectures received fewer banks in absolute terms, but suggest slower proportional growth in those places. Appendix Figure F.2 and Appendix Table F.1 report these results.

This distinction also suggests that physical banking infrastructure was not sufficient to generate market-oriented financial development. Mao-era offices provided payments and administrative capacity, and their expansion may have had value for the planned economy. But the earlier financial geography did not reappear merely because banking offices existed. It returned only after banks again operated in an environment that permitted market exchange, commercial lending, private enterprise, and international connection. Appendix Section F.13 examines whether the gradient changes around major reforms. The clearest and most stable breaks occur around the 1984 completion of decollectivization and reconstruction of the two-tier banking system and around China's WTO accession in 2001; estimates around other dates are smaller or more sensitive to the chosen window.

The long-run relationship also appears in aggregate economic activity. Using 1-km gridded real GDP for 1992–2019 from Chen et al. (2022a), aggregated directly to 1911 prefectures, Figure 17 reports the year-specific estimates. The annual coefficients are positive and statistically significant throughout the sample period. Although the estimates rise in levels as average output expands, their magnitude relative to mean prefecture GDP remains stable: the average estimate is approximately 16.1% of the annual mean, and the 2019 estimate is 16.5%.[41]

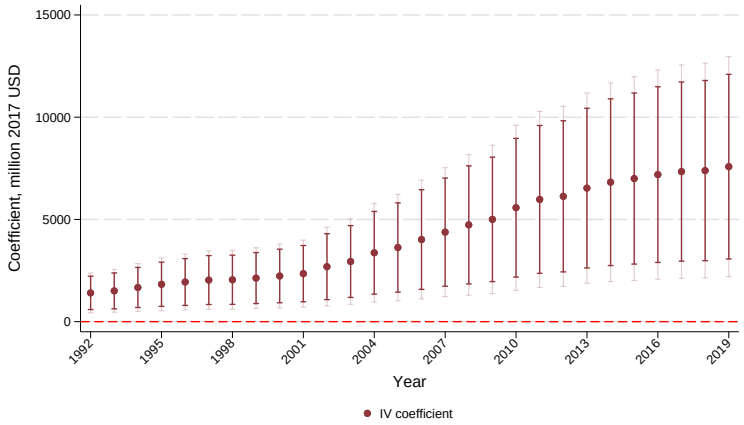
We next check whether mission exposure has an effect on enterprises, and find evidence in the same positive direction as for banks and GDP. We use the National Bureau of Statistics' Annual Survey of Industrial Production for 2007–2013 to examine post-reform industrial enterprises. Historical missionary exposure predicts more industrial enterprises after reform, with similar standardized estimates for private and all enterprises. The increase in private enterprises is larger for those with high external-finance dependence. Appendix Figures F.7 and F.8 report these results, and Appendix Section F.3 explains the enterprise mapping and external-finance-dependence classification.

Finally, we use county-level data from Shaanxi to examine whether the long-run pattern extends be-

credit cooperatives, handled deposits, cash distribution, payments, state-enterprise and commune accounts, and credit allocated according to government plans.

[41] Appendix Table F.4 reports corresponding 2019 IV estimates with two alternative population controls and with two standardized per-capita GDP outcomes. Appendix Figure F.6 reports the annual per-capita path using the fixed 2015 Census denominator.

Figure 17: 2SLS Estimates: Real GDP, 1992–2019 (Millions of 2017 USD)



Notes: The figure reports coefficients from Equation 4 estimated separately by year. GDP is constructed by summing 1-km grid cells directly within accepted 1911 prefecture polygons. Maroon points and dark/light intervals show the IV estimates and 90%/95% confidence intervals. All 28 annual estimates are positive and statistically significant at the 1% level. The average estimate is approximately 16.1% of annual mean prefecture GDP, and the 2019 estimate is 16.5% of that year's mean. Appendix Table F.2 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.

yond banking. Nationally, bank offices are the only outcome that we observe consistently across the pre-1949, Mao, and reform periods. Shaanxi is unusual in providing county-level economic records spanning much of the Mao period and the early reforms, allowing us to trace a similar longer-run arc for broader economic activity. We transcribed these data from the Shaanxi Provincial Bureau of Statistics' 1949–1990 historical compilation (Shaanxi Provincial Bureau of Statistics, 1991) and harmonized changing county, district, and county-level-city names to 1911 county boundaries. The resulting data also allow us to reproduce the long-run bank exercise at a finer geographic level, absorb historical-prefecture fixed effects, and reconstruct the railway-based instrument within a single province. Additional details on the data and construction are provided in Appendix Section B.4.

Because the exercise covers only one province, we treat it as complementary to the national analysis. The bank results follow the same broad pattern: the OLS missionary-exposure gradient attenuates during the Mao period and recovers after reform. Early post-1949 financial-institution coverage is too sparse to estimate the Mao-period IV after including historical-prefecture fixed effects and railway controls, but after 1978 the relationship between historical missionary exposure and standardized financial institutions is positive in both OLS and IV, with a strong county-level first stage. More importantly, the GNP data allow us to examine the same long-run pattern for an outcome other than banking. The missionary-exposure gradient in log GNP is relatively flat in the available Mao-era benchmark years and rises sharply after the opening begins in 1978.[42] Appendix Figures F.9 and F.10 report the coefficient paths, and Appendix Table F.5 summarizes the pooled estimates.

Robustness Checks We perform several robustness checks on our main result. First, we use a re-centering exercise following Borusyak and Hull (2023). We hold each prefecture's railway path fixed

[42]GNP is reported in the Shaanxi Provincial Bureau of Statistics' 1949–1990 historical compilation (Shaanxi Provincial Bureau of Statistics, 1991).

and repeatedly reshuffle the timing of the observed national missionary-flow series, preserving the same distribution of booms and lulls.[43] This gives the expected missionary exposure associated with each prefecture's railway history under alternative flow timings. We subtract this expected component from the original instrument, leaving the variation generated by the realized alignment between railway connections and missionary-flow spikes. Appendix Section F.12 shows that the estimates change little after recentering. For standardized banks in 2020, the coefficient falls from 0.145 to 0.127; for GDP in 2019, from 7,581 to 6,548–6,616. The first stage also remains strong. This suggests that the baseline IV is not driven by generic differences in railway exposure.

Second, we vary how we control for railway exposure in the cross-sectional first stage. Our baseline uses railway duration and cumulative railway density, which summarize the railway path entering the zero stage. The results remain qualitatively similar when we use non-linear railway controls, railway mileage per km^2, cubic polynomials of latitude and longitude, the number of railways in 1936, or railway-density bins (Appendix Figures F.24–F.29). This suggests that the results do not depend on a particular way of controlling for railway exposure.

Third, we address the influence of extreme observations and alter the variation introduced in the zero stage. Our main specification winsorizes all variables at the 1st and 99th percentiles. The coefficient pattern is similar under alternative winsorization (Appendix Figure F.33); without winsorization, coefficients remain positive but the first stage is weaker (Appendix Figure F.34). We also exclude treaty ports (Appendix Figure F.30), drop the top three railway outliers (Appendix Figure F.31), and extend the zero-stage window to 1850–1950 (Appendix Figure F.32). Finally, placebo regressions using fixed and early historical characteristics show that the instrument does not systematically predict these outcomes (Appendix Figure F.16).

6 Long-Run Mechanisms: Seeds and Reactivation

The previous sections showed how missionary exposure, particularly through schooling and translations, contributed to financial innovation and market development before 1949, and how these effects disappeared under Mao and reemerged after reform. We argued that missionaries planted seeds that survived the Mao era, and that the policy environment determined whether these market-related inputs could be put to use. But what exactly were these seeds, and what mechanisms could explain their persistence and reactivation? This is inherently difficult to establish. In this section, we provide suggestive evidence on two potential channels and briefly assess several alternative explanations.

High-skilled people and networks Mission exposure helped form practical human capital before 1949. Chinese people carried this human capital within and outside mainland China, and some of it was internationally oriented. Under Mao, the returns to much of this expertise fell sharply. The disruption of higher education during the Cultural Revolution further limited the supply of newly trained human capital: regular university admissions were suspended, higher education operated only in restricted form for much of the period, and the national entrance examination was restored only in 1977. When reform increased demand for financial, managerial, technical, and internationally oriented skills,

[43] The national flow distribution is fixed; only the timing of booms and lulls changes.

older surviving experts and Chinese who had trained or worked abroad therefore represented potentially valuable sources of knowledge and experience. We examine three ways in which this human capital could have survived the Mao period: through a high-skilled diaspora outside mainland China, through foreign-exposed elites who later reconnected with mainland institutions, and through individuals who remained in China.

The first channel is a high-skilled diaspora. Using the Chinese Engineers Relational Database (Pelzer et al., 2025), which records the education, careers, and locations of engineers in Republican China and postwar Taiwan, we identify engineers observed in Taiwan in 1974 and trace their places of origin in mainland China. Mission-exposed places are disproportionately represented in this diaspora: the linked sources identify 4,640 mainland-origin individuals observed in Taiwan in or after 1974. Appendix Table F.6 shows that origin in a prefecture with a mission by 1880 is associated with a 2.45 percentage-point increase in near-reform Taiwan presence, relative to a mean of 3.0 percent; origin in a prefecture with a mission school by 1900 predicts a 5.36 percentage-point increase. Mission-exposed places thus produced a disproportionately large high-skilled diaspora.[44]

Second, some of this internationally oriented human capital could reconnect with mainland China after reopening. Using the same data on Republican-era elites showing that mission exposure predicted a greater likelihood of studying abroad, we examine whether these internationally exposed elites subsequently reappeared in mainland institutions. While foreign-exposed elites were generally less likely to hold mainland institutional roles, conditional on foreign exposure, those from mission-exposed places were more likely to do so: the interaction rises from 14.77 percentage points during the Mao period to 54.64 points after reform (Appendix Table F.7).[45] This pattern is consistent with international connections fostered in mission-exposed places becoming more relevant once China reopened.[46]

Shiing-Shen Chern provides one illustration of this path. From 1920 to 1922, he attended the upper-primary division of Xiuzhou School in Jiaxing, then a Christian mission school. He later left mainland China in 1948 and built his career in the United States. After China reopened, he used trans-Pacific academic connections to help establish Nankai University's mathematics institute and returned permanently in 2000.[47]

But survival did not necessarily require leaving China. Some of the people carrying pre-1949 expertise remained in the country through the Mao period and became economically important again after reform. Rong Yiren is a prominent example. Educated at St. John's University, a missionary-founded institution, Rong managed his family's textile enterprises before 1949. He remained in China through the Mao period, when the scope for his pre-1949 commercial and financial expertise was sharply restricted, and in 1979 became the founding chairman of the China International Trust and Investment Corporation (CITIC), a state investment company. He became known as the "Red Capitalist" and served as a key

[44]This pattern may partly reflect the general targeting of elites for repression and links between Christianity, missionary education, and the Nationalist government. The Nationalist elite included prominent Christians: Chiang Kai-shek converted to Christianity, and his wife, Soong Mei-ling, came from a prominent Christian family. See the Office of the Historian, U.S. Department of State.

[45]The biographies follow the same Republican-era individuals, not their descendants, and each period is restricted to elites known to be alive. Because reform-period survivors were necessarily old, the estimate captures late-life institutional roles rather than transmission to later generations.

[46]Related evidence from Chen et al. (2026) shows that, after local opening, diaspora firms disproportionately entered prefectures tied to their representatives' likely ancestral origins.

[47]On Chern's work at Nankai and permanent return, see Nankai University.

intermediary between the reform government and foreign capital.[48]

Our banker biographies provide more systematic evidence of this type of survival. We find that 13.8% of historical bankers were still active during the Mao period (29% of whom were Christian-affiliated) and 6.1% were still active after 1978.[49] These are conservative measures because they capture only the original bankers, not the knowledge or networks transmitted to later generations. Still, they show directly that some people carrying pre-1949 financial expertise survived into the periods in which the historical effects disappeared and reemerged.

Foreign-facing commercial connections The evidence on Chinese human capital captures only one part of the mechanism. Mission-exposed prefectures also developed more trade-oriented activity before 1949. Closing the economy meant that many of these links between China and the rest of the world could no longer be put to use. Reopening could make them valuable again.[50] More broadly, this can be interpreted as a form of market memory. Places that had developed trade routes, commercial connections, and financial systems before 1949 may have retained some advantage when the policy environment again allowed markets to operate in similar ways. One implication is that foreign capital should flow disproportionately toward historically exposed locations once international exchange resumes. This interpretation is related to work by Huang et al. (2024), who show that anti-missionary conflict reduced investment in modern firms and banks and left a persistent penalty in contemporary FDI. Their estimates identify the negative effect of anti-missionary conflict, rather than a positive effect of missionary presence on FDI.

The FDI evidence is consistent with this prediction. Historical missionary exposure predicts higher foreign direct investment in 2017 in both OLS and IV specifications (Appendix Table F.8). The IV estimates imply approximately 14 percent more total FDI and 6 percent more FDI per capita for each additional historical mission. Thus, the reactivation visible in banking is accompanied by renewed foreign capital flows toward historically mission-exposed places.

Alternative explanations We find less support for three alternative explanations. First, the results do not appear to reflect the direct persistence of missionary organizations, which could no longer operate after 1949 in their historical form. Their human-capital output, however, may have persisted or been rebuilt. In the 2015 Census, OLS estimates are positive and precise across the education ladder, while the standardized IV estimate is near zero for middle school and positive but imprecise from senior high through postgraduate education (Appendix Figure F.13). Within Shaanxi, the mission-exposure gradient rises after reform for secondary but not overall enrollment (Appendix Figures F.14 and F.15). These patterns provide little support for broad schooling persistence, but are consistent with persistence or rebuilding of upper-tail human capital.

Second, we find limited evidence for broad religious or cultural persistence, although these channels

[48] See McNeill's (2005) obituary in *The Independent*.

[49] These percentages are proxies based on keywords in the biographies, with an LLM used to identify activity in each period and random batches manually validated.

[50] A 1989 account of Shanghai's aroma industry offers one illustration. It describes pre-1949 links with Western fragrance houses, the cultivation of aromatic inputs including geranium, vetiver, patchouli, and pine-needle oils, and renewed sales and technical ties with international firms after 1978. The author characterized Shanghai as inheriting an earlier foreign-trade tradition in the industry (Wu, 1989).

are harder to study. Historical missionary exposure predicts somewhat higher Protestant and Christian affiliation, generalized trust, and greater ownership of savings and financial assets, but measures of religious participation, prayer, donations, and overall religiosity do not move consistently (Appendix Tables F.9–F.12). The generalized-trust result is consistent with related work on missionary exposure and the scope of morality (Bergeron, 2019), and with evidence of higher trust and trustworthiness in places with greater historical Protestant activity in China (Deng et al., 2025).

Third, the results do not point to greater Mao-era state capacity or public investment in historically exposed places. In the Shaanxi county data, IV estimates for fiscal expenditure, fiscal revenue, fixed-asset investment, electricity, machinery, and health infrastructure are generally null or negative, while positive estimates are concentrated in industrial enterprises, retail sales, and township enterprise activity (Appendix Table F.13). This pattern is more consistent with a market-facing advantage than with greater state infrastructure.

7 Conclusion

This paper studies the historical and institutional roots of China's market-based capitalism through the lens of financial development. We ask whether China's response to market-oriented reform depended partly on economic conditions formed before the Communist period. We study one historical source of these conditions: Christian missionary activity before 1949. Using newly compiled data that follow missionary institutions, modern and traditional banks, enterprises, people, and economic activity across nearly two centuries, we show that missionary exposure contributed to the adoption of modern banking and broader market activity before 1949, that these differences weakened under Mao, and that they re-emerged after China returned to markets and reopened to the rest of the world.

Our historical analysis points mainly to the transmission of practical skills and useful knowledge. Missionary schools taught subjects such as mathematics, bookkeeping, economics, science, and English, while publications and translations made foreign knowledge more accessible to Chinese readers. Banker and elite biographies show that missionary exposure was also associated with Chinese actors who acquired these skills and international connections. The resulting financial transition interacted with existing Chinese institutions. Modern banks expanded especially where financial activity was already present, eventually substituting for some functions of *Piaohao* while remaining more complementary to the locally embedded *Qianzhuang*.

The longer-run evidence shows that these historical differences did not need to remain continuously visible to matter later. Under Mao, markets and international connections were sharply restricted, and the state expanded banking across China in ways that compressed the inherited financial geography. After reform, the historical gradient re-emerged in banking and broader economic activity. Suggestive evidence points to surviving human capital, renewed connections with foreign-exposed Chinese elites, and the return of foreign capital as possible channels. The same historically formed skills, knowledge, and connections could therefore have very different economic effects depending on the policy environment in which they could be used.

This has implications for how we think about both historical persistence and economic reform. Historical conditions may matter not because their effects persist unchanged, but because they can become

more or less valuable as the policy environment changes. Likewise, common national reforms can generate different responses across places because places enter those reforms with different stocks of relevant skills, knowledge, and connections. In China, the return to markets did not begin from a blank slate: some of the conditions that helped places respond to reform had been formed much earlier.

The results also speak to policies aimed at encouraging market development and the diffusion of new technologies and organizations. Expanding access to banks, firms, or other institutions may have limited effects if people lack the skills and practical knowledge needed to operate and adapt them, or if the broader policy environment limits the returns to doing so. Conversely, the same intervention may have larger effects where relevant local knowledge and skills are already present and where policy allows them to be put to use. This suggests that policies aimed at expanding market institutions should consider not only access to the institution itself, but also the local conditions and broader policy environment that determine whether it can function effectively.

More broadly, an important question is how general this pattern is. Which historically formed skills, knowledge, and connections survive periods in which they cannot be used, and under what conditions do they become economically relevant again? Similar questions arise in settings where markets, migration, trade, or private enterprise are restricted and later restored. Studying these episodes can help us understand both how new economic institutions diffuse and why similar reforms can produce very different outcomes across places.

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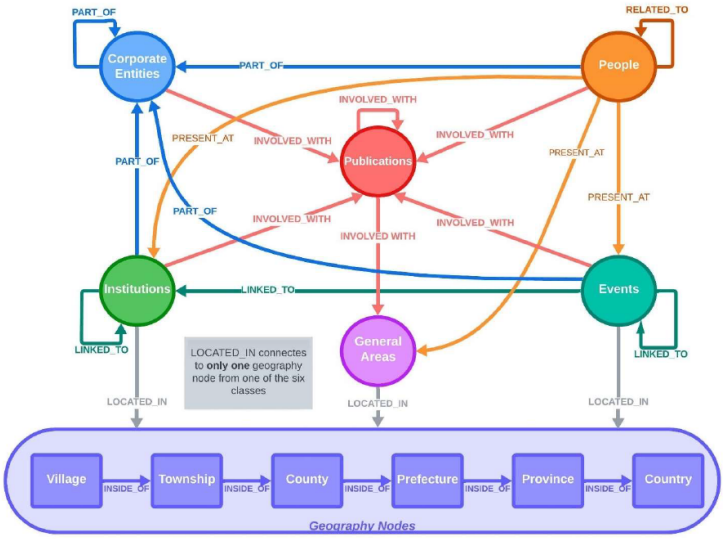
Appendix Contents

A Diffusion of Missionary Institutions, Banks, and Enterprises

A.1 Missionary Data Structure and Institution Types

Figure A.1: Data Structure of CHCD



Notes: 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 A.1: 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: The table counts each baseline CHCD v3.0.0 institution once after matching to 1911 prefectures and adds 971 new directory-based CHCD records used in the supplementary descriptive measures, for 6,856 institutions in total. Press coverage combines 16 CHCD press institutions with 677 located CHCD publication records and 16 unique print entities in the reviewed McIntosh data, including 7 mission presses across 10 prefectures. These source counts are complementary and are not deduplicated one-for-one.

Table A.2: CMS/Stauffer and CHCD Missionary Coverage, 1920

	Count in 1920	Prefectures with presence	Correlation with CMS/Stauffer count
CMS/Stauffer: Protestant missionaries (1920)	10,715	227	–
CHCD institutions: Protestant	1,860	211	0.737

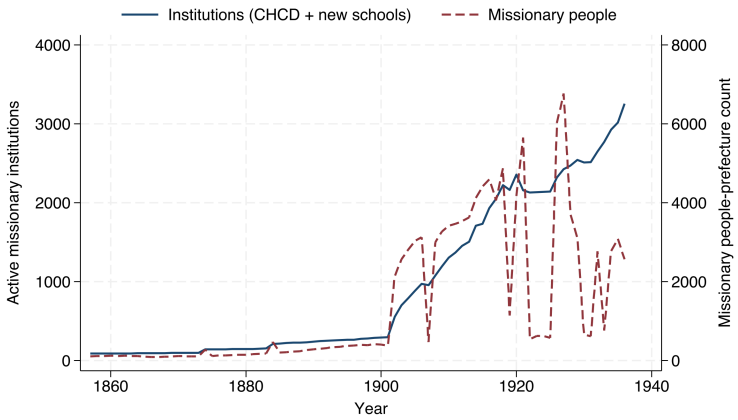
Notes: The comparison is at the 1911 prefecture level and uses the 245 prefectures present in both sources. CMS/Stauffer reports Protestant missionary personnel in 1920, whereas CHCD reports Protestant institutions active in 1920. Institution records capture stable local organizations with a physical footprint; personnel may be recorded as present in or moving through a prefecture without a corresponding institution record there. This difference helps explain why CHCD records institutional presence in 211 prefectures, compared with personnel presence in 227 prefectures in CMS/Stauffer. The correlation column reports the Pearson correlation between the two prefecture-level counts.

A.2 Supplementary Missionary School Sources

The 971 additional prefecture-matched school records were digitized with CHCD collaborators from the *Educational Directory of China* for 1914, 1916, 1917, 1918, and 1920, together with mission and school handbooks from 1936. We use this directory-based extension for education descriptives and the analysis of missionary schools.

A.3 Missionary People and Denominations

Figure A.2: Missionary People and Institutions Over Time



Notes: The 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 duplicated in the baseline v3.0.0 panel. The figure is descriptive; the main treatment is based on institutional arrival.

Table A.3: 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: The table counts unique CHCD v3.0.0 mission institutions with prefecture matches, using the institution tradition field and the cleaned start-year measure used to construct treatment timing. Percentages are within columns. The "Undated" column reports institutions with known tradition and location but no usable cleaned start year. Orthodox, non-religious, unknown, and missing traditions are excluded from the two-way Protestant–Catholic split. Source: CHCD v3.0.0.

Table A.4: 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: The 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.

A.4 Summary Statistics and Historical Diffusion

Table A.5: Summary Statistics: Historical DiD Outcomes

Variable	Obs.	Mean	SD	P5	Median	P95
Panel A. Headline outcomes						
Modern banks (stock)	19,760	0.76	6.16	0.00	0.00	3.00
New modern banks	19,760	0.08	0.67	0.00	0.00	0.00
Industrial enterprises (stock)	15,314	4.78	40.10	0.00	0.00	17.00
Panel B. Ownership-specific outcomes						
Private modern banks (stock)	19,760	0.33	4.14	0.00	0.00	0.00
Government modern banks (stock)	19,760	0.29	1.35	0.00	0.00	2.00
Foreign modern banks (stock)	19,760	0.10	1.16	0.00	0.00	0.00
Foreign enterprises (stock)	15,314	0.05	0.48	0.00	0.00	0.00
Government enterprises (stock)	15,314	0.33	1.40	0.00	0.00	2.00
Panel C. Other historical outcomes and infrastructure						
Trade-oriented enterprises (stock)	15,314	0.87	8.33	0.00	0.00	3.00
Domestic-oriented enterprises (stock)	15,314	0.48	5.11	0.00	0.00	1.00
Piaohao branches (stock)	18,320	0.91	3.22	0.00	0.00	7.00
Railway lines (stock)	19,760	0.27	1.34	0.00	0.00	2.00
Government industrial investment (thousands)	18,880	21.65	249.77	0.00	0.00	0.07

Notes: The unit is a 1911-boundary prefecture-year. Statistics use the exact historical panel behind the headline DiD results. The modern-bank sample covers 1857–1936 (247 prefectures and 19,760 prefecture-years). Enterprise variables are observed from 1875–1936, so their maximum sample is 15,314 prefecture-years. Stocks are cumulative within prefecture. Government industrial investment is shown in thousands of nominal historical currency units. Observation counts vary only when the underlying source does not cover the full analysis window.

Table A.6: Summary Statistics: Missionary Treatment, Mechanisms, and Controls

Variable	Obs.	Mean	SD	P5	Median	P95
Panel A. Prefecture-year treatment and mechanism measures						
Missionary institutions (stock)	19,760	3.58	8.34	0.00	0.00	17.00
Mission presence	19,760	0.46	0.50	0.00	0.00	1.00
Missionary people	18,800	5.98	24.12	0.00	0.00	25.00
Mission education institutions (stock)	19,760	0.28	1.47	0.00	0.00	2.00
Mission schools (stock)	19,760	0.23	1.26	0.00	0.00	1.00
Mission higher-education institutions (stock)	19,760	0.03	0.22	0.00	0.00	0.00
Mission publication activity	19,760	0.04	0.20	0.00	0.00	0.00
Protestant mission institutions (stock)	19,760	3.21	7.88	0.00	0.00	15.00
Catholic mission institutions (stock)	19,553	0.37	2.23	0.00	0.00	1.00
Christianity-related bankers / all bankers	19,760	0.030	0.100	0.000	0.000	0.237
Church-school-educated bankers (stock)	19,760	4.30	19.26	0.00	0.00	25.00
Panel B. Prefecture-level treatment and heterogeneity measures						
Ever received a mission by 1936	247	0.94	0.24	0.00	1.00	1.00
Year of first mission (treated prefectures)	232	1,898	17	1,857	1,902	1,926
Ever had mission education	247	0.54	0.50	0.00	1.00	1.00
Ever had mission publication activity	247	0.22	0.42	0.00	0.00	1.00
Panel C. Predetermined controls used in balance tests						
Population, 1880 (thousands)	247	1,408.31	1,273.26	143.90	1,018.48	4,008.94
Provincial capital, 1880	231	0.16	0.36	0.00	0.00	1.00
Main river	247	0.63	0.48	0.00	1.00	1.00

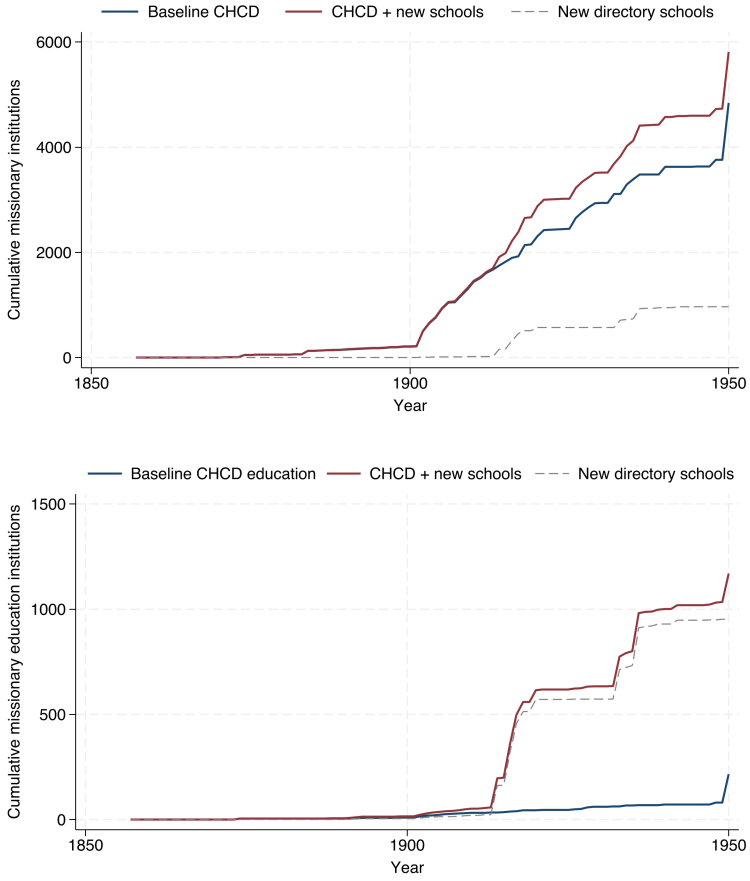
Notes: Panel A uses the exact 1857–1936 prefecture-year panel behind the headline modern-bank DiD. CHCD institution stocks define treatment timing; education adds unmatched directory schools, publication activity defines the school-by-publication split, and the banker share is set to zero when no banker is recorded, matching the corresponding figures. Panels B and C report one observation per 1911-boundary prefecture. First-treatment year is reported only for treated prefectures. Population is in thousands; provincial-capital status is measured in 1880 and available for 231 prefectures; main-river access is time invariant.

Table A.7: Summary Statistics: Main Bank IV Samples

Variable	Obs.	Mean	SD	P5	Median	P95
Panel A. Historical-bank IV cross-section (1936)						
Missionary institutions, 1850–1936	247	10.28	9.06	0.00	8.00	32.00
Predicted missionary exposure	247	0.473	1.138	0.000	0.000	3.351
Railway connection duration (years)	247	24.11	39.59	0.00	0.00	97.00
Cumulative railway density	247	0.0018	0.0051	0.0000	0.0000	0.0117
Modern banks, 1936	247	5.77	13.02	0.00	1.00	26.00
Standardized modern banks, 1936	247	0.000	1.000	-0.443	-0.366	1.553
Panel B. Long-run bank IV cross-section (2020)						
Missionary institutions, 1850–1936	247	10.28	9.06	0.00	8.00	32.00
Predicted missionary exposure	247	0.473	1.138	0.000	0.000	3.351
Railway connection duration (years)	247	24.11	39.59	0.00	0.00	97.00
Cumulative railway density	247	0.0018	0.0051	0.0000	0.0000	0.0117
Total financial-institution offices, 2020	247	713.30	724.25	0.00	473.00	1,895.00
Standardized financial-institution offices, 2020	247	0.000	1.000	-0.985	-0.332	1.632

Notes: The unit is a 1911-boundary prefecture. Both panels report the 247-prefecture complete-case sample used by the headline bank IV regressions, including province fixed effects, missionary exposure, predicted missionary exposure, railway duration, and railway density. Cumulative railway density is cumulative railway stock divided by prefecture area.

Figure A.3: Evolution of Missionary Institutions Over Time



Notes: The first panel plots cumulative missionary institutions. The second panel plots cumulative missionary education institutions. Baseline counts use the CHCD v3.0.0 institution panel; the added series includes new directory-based school records not duplicated in the baseline panel.

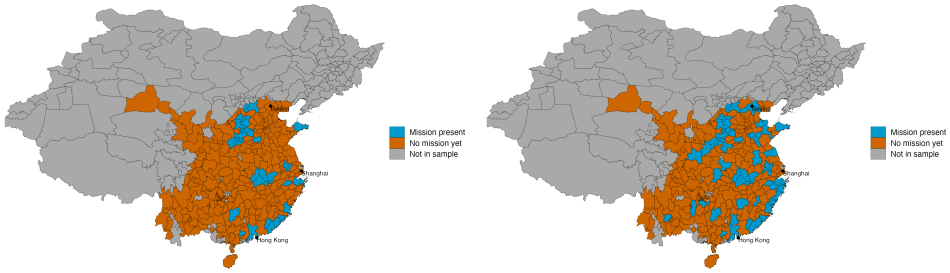
Table A.8: Three Types of Financial Institutions

Feature	Piaohao	Qianzhuang	Modern banks
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 loans

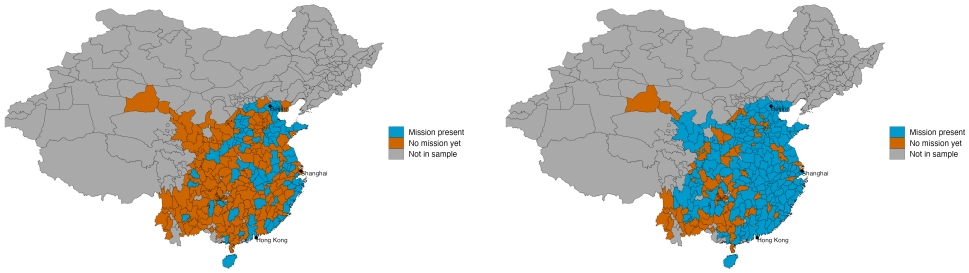
Notes: The table compares the main functions, clients, branch networks, and lending focus of the three principal financial-institution types in China between 1840 and 1936. Modern banks uniquely combined deposit and lending services with limited-liability organization.

Figure A.4: Expansion of Missionaries

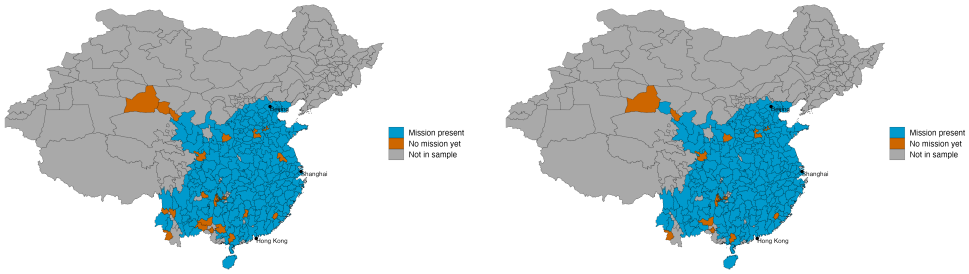
(a) 1875 **(b)** 1885



(c) 1900 **(d)** 1905



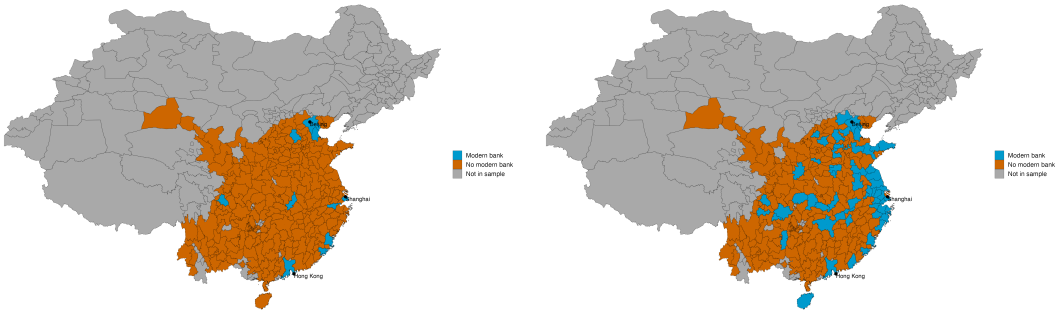
(e) 1926 **(f)** 1950



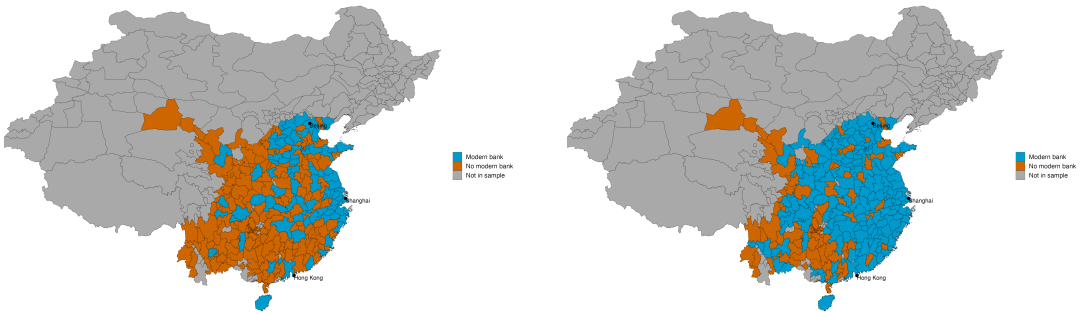
Notes: These maps show the expansion of missionaries over time for selected periods. Prefectures with missionary presence are shown in blue, those without missionaries in orange, and prefectures not included in the main analysis are in gray. Panel A shows prefectures with missionaries by 1875, Panel B by 1885, Panel C by 1900, Panel D by 1905, and subsequent panels continue chronologically. Data on missions are from the CHCD, and prefecture boundaries are from CHGIS 1911.

Figure A.5: Expansion of Modern Banks

(a) By 1905 **(b)** By 1915

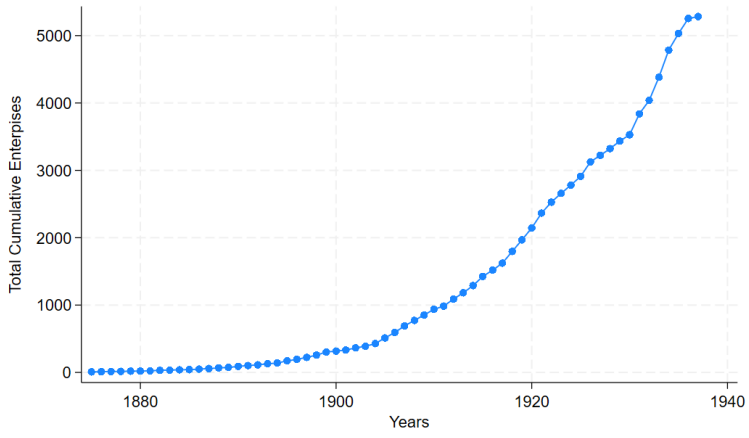


(c) By 1926 **(d)** By 1936



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 A.6: Evolution of Enterprises Over Time



Notes: The figure plots enterprises recorded in Du (1991, 2019). These sources cover domestic-capital and old Chinese government enterprises between 1840 and 1937.

B Data Appendix

This appendix provides additional information on the data sources used outside the main missionary and banking measures described in Section 3. We focus on the construction, geographic matching, coverage, and limitations of each source. Analysis-specific variable construction is described alongside the corresponding empirical exercise elsewhere in the appendix.

B.1 Historical Financial and Market Data

Modern-bank balance sheets. We digitized two complementary sources of historical bank balance sheets. Republican Ministry of Agriculture and Commerce tables cover the 1910s and list head offices and branches separately (Ministry of Agriculture and Commerce, 1912–1924). We transcribed the reported accounts, geocoded each office, assigned it to a 1911 prefecture, and aggregated branch-level deposits, capital, paid-in capital, banknote issuance, and surplus reserves. Coverage is incomplete across years and accounting items, so these records are used as supporting evidence rather than as a balanced panel.

The *National Banking Yearbook* provides richer bank-level balance sheets for 1932–1936 (Bank of China Economic Research Office, 1937). We digitized deposits, loans, assets, income, net income, cash, securities, paid-in capital, surplus reserves, and related accounting measures. Reporting varies across banks and items. Specifications using these accounts therefore report the available outcome-specific samples rather than assuming that unreported items are observed zeros.

***Piaohao* and *Qianzhuang*.** The *Piaohao* data combine the branch histories assembled by Huang (2002) and Liu (2018). The underlying materials draw on museum holdings, archival chamber-of-commerce files, recovered historical records, founders' descendants, private collections, and original Shanxi merchant documents.[51] We retain the institution name, founder-origin affiliation, location, head-office or branch status, and opening, suspension, and closure year-month. Because branches have their own dated entry and exit histories, these data permit the stock, openings, and closures of *Piaohao* to be reconstructed with substantially less survivor bias than a single directory snapshot.

We separately transcribed and geocoded *Qianzhuang* records from the *National Banking Yearbook*. The source records establishment dates, addresses, and the names and positions of core personnel. This data lacks the complete branch-level closure histories available for *Piaohao*.

Enterprises. Historical enterprise data come primarily from Du (1991, 2019). We geocode recorded head offices and assign them to 1911 prefectures. The source covers registered and relatively capitalized Chinese enterprises and therefore underrepresents smaller firms.[52] We complement these records with foreign-enterprise directories assembled by Huang (1995).[53] In the combined historical file, approxi-

[51] The sources described by Huang (2002) include materials from the Chinese Piaohao Museum in Pingyao, files of the Fengtian Chamber of Commerce in the Liaoning Provincial Archives, historical materials recovered from Japan, and collections held by founders' descendants and private collectors. Liu (2018) collates original Shanxi merchant documents from multiple collections.

[52] The source includes shipping, industrial, and mining enterprises capitalized above 10,000 silver dollars and financial enterprises capitalized above 50,000 silver dollars.

[53] 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.

mately 70% of recorded establishments are private Chinese enterprises, 5% are government enterprises, and 24% are foreign enterprises.

Trade. Historical trade outcomes come from the 1934–1936 postal census compiled in Ministry of Communications (1937). The Republican government commissioned local postal offices to collect information at the county and township levels on products, production, prices, and sales destinations. We digitize domestic and international export activity, including export values and commodity composition, and aggregate the underlying records to 1911 prefectures. These data capture recorded trade activity rather than informal exchange. Appendix Section D.3 describes how their product composition is used to construct trade-oriented enterprise measures.

Railways and other historical controls. We reconstruct railway access using station locations and opening dates from Ma et al. (1983). Stations are geocoded and assigned to 1911 prefectures, producing time-varying measures of railway access as well as the railway-duration and cumulative-exposure measures used in the long-run analysis.

The main geographic and historical controls come from Bai and Jia (2016) and include historical population, coastal and major-river access, rice suitability, provincial-capital status, and treaty-port status. Selected mechanism exercises also use genealogy-book counts from Dong and Zhang (2024) as a measure of clan intensity. These variables are treated as predetermined controls; potentially endogenous historical market outcomes are introduced only in explicitly labeled mechanism or robustness exercises.

B.2 Biographical Data

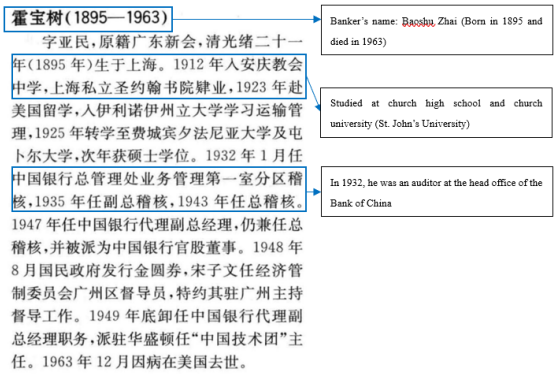
Banker biographies. We created a person-level dataset from *Jindai Zhongguo Yinhangye Jigou Renming Dacidian* (Jiang, 2014), a biographical dictionary of people in modern Chinese banking. The source contains 1,041 bankers who held positions such as director, founder, sponsor, or manager at Chinese-funded banks. We transcribed the narrative biographies and coded names, life dates, native place, education, Christian-school and other Christian connections, comprador experience, banking positions, and employment across Chinese and foreign financial institutions.

The dictionary is a selected biographical source rather than a census of bank employees. It is most informative about people in senior or otherwise documented positions, and missing information in a biography is not interpreted as evidence that an attribute was absent. We therefore use these data for descriptive and mechanism analysis rather than as a representative sample of Chinese bankers.

For the historical mechanism analysis, we classify a banker as Christianity-related when the biography records a Christian family background, conversion, attendance at a Christian school, or work in a Christian institution. We also code comprador experience and careers spanning foreign and Chinese financial institutions. The empirical exercises match bankers to the historical bank records using the institutions in which they worked; Section 4.4 describes how these measures enter the analysis.

For the long-run exercises, life dates identify historical bankers who survived beyond 1949 and into the reform era, while later economic or institutional activity is coded separately from the biographical records.

Figure B.1: Illustration of Banker-Biography Digitization



Notes: Example of the narrative-to-field workflow used to code banker names, education, and banking positions.

Republican-era elites. The Republican China Elite Database was assembled by Wang et al. (2026) from the revised edition of Xu Youchun's *Minguo Renwu Dacidian* (Xu, 2007). The source volume covers prominent individuals active between the founding of the Chinese Revolutionary Alliance in August 1905 and September 30, 1949, although individual biographies can extend beyond those dates. Its inclusion criteria span senior political and military figures; prominent businesspeople, bankers, and economists; scientists, engineers, and medical professionals; leading educators, writers, artists, journalists, and lawyers; and prominent religious figures. The resulting individual-level file contains 16,445 biographies and should therefore be interpreted as a selected record of prominent people, not a representative sample of the Chinese population.

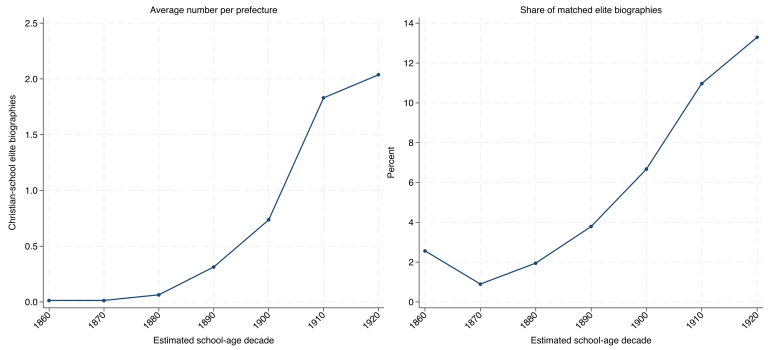
The source PDF was converted to machine-readable text using optical character recognition, manually cleaned and structured, and then parsed with DeepSeek-R1 into person-level fields. The extracted information includes native and childhood place, birth and death years, education and discipline, foreign study and destination, career history and primary position, regime affiliation, publications, and other biographical markers. We harmonize native-place strings to Qing-era province names and 1911 prefecture boundaries. Of the 16,445 biographies, 14,763 match to one of 236 prefectures in the historical mission panel; 14,113 of those also report a birth year.

For the education proxy, we search the raw education narrative for a dictionary of major Christian institutions and church-related terms. The dictionary includes, among others, St. John's, Ginling, Yenching, Aurora, Fu Jen, West China Union, Lingnan, Cheeloo, Soochow, Hangchow, and the University of Shanghai, as well as generic references to church or Christian schooling. This procedure identifies 1,282 Christian-school-background biographies among the 14,763 geographically matched elites. It measures an education-background connection to Christian institutions, not the individual's religious belief. Because the biographies usually omit the exact date and place of attendance, the event-study proxy assigns each flagged person to the native prefecture at birth year plus 15. This construction assumes that native place is informative about school-age location and uses age 15 as a common marker for possible secondary-school exposure; mobility or attendance at a school elsewhere introduces measurement error.

The foreign-study indicator comes from the person-level biographical coding. The associated year field is free text and sometimes contains ranges or multiple dates, so we extract the first four-digit year between 1800 and 1999 as the departure-year proxy. The event-study outcome then cumulates these

departures within the native prefecture. For the long-run analysis, we additionally use birth and death years, foreign exposure, and recorded ties to mainland institutions.

Figure B.2: Christian-School Background Among Republican-Era Elites by School-Age Cohort



Notes: The sample contains biographies matched to 1911 prefectures with a non-missing birth year. School-age year is defined as birth year plus 15. Panel A reports, for each full decade from 1860 through 1920, the number of biographies coded with a Christian-school background divided by all 236 matched prefectures, including prefectures with zero such biographies. Panel B reports these biographies as a percentage of all matched elite biographies in the same school-age decade. The Christian-school flag is based on the education-field dictionary described in the text. The figure is descriptive: changes can reflect cohort composition and source coverage as well as changes in education, and the selected biographies are not representative of the population.

Engineers. The Chinese Engineers Relational Database records education, employment, and location histories for engineers in Republican China and postwar Taiwan (Pelzer et al., 2025). We use individuals' mainland places of origin and later observations in Taiwan to study the geographic origins of the technical diaspora. The database is a source-defined collection of documented engineers rather than a census of technically trained workers, so the exercises are interpreted as evidence on the composition and continuity of high-skilled human capital.

B.3 Long-Run National Outcomes

Financial institutions. The post-1949 financial series comes from the China Financial Supervision and Administration Bureau's registry of licensed financial-institution offices described in Section 3. We standardize administrative names and assign each modern county or district to the 1911 prefecture containing its centroid. We then aggregate institution records to historical-prefecture years. This procedure keeps the geographic unit fixed despite changes in modern administrative boundaries.

The regulatory definition is broader than the definition of a modern bank in the Republican-era data. The post-1949 series includes commercial and policy banks, credit cooperatives, postal savings institutions, trust and investment companies, financial leasing companies, and other regulated financial institutions. We therefore use the series to trace the geographic distribution of financial offices over time rather than interpreting its level as directly comparable with the historical modern-bank count.

GDP and population. We use 1-km gridded real GDP estimates for 1992–2019 from Chen et al. (2022a). We intersect the grid directly with CHGIS 1911 prefecture polygons and sum GDP within each historical prefecture, avoiding an intermediate crosswalk through modern prefectures.

Population controls and denominators use historical population together with county-level measures constructed from the National Bureau of Statistics' 2000 Population Census and 2015 one-percent population sample. Modern counties and districts are assigned to 1911 prefectures using the same geographic procedure employed for the financial-institution data. Because population may itself respond to historical missionary exposure through migration, urbanization, or population growth, later population controls and per-capita outcomes are treated as robustness exercises rather than baseline specifications.

Industrial enterprises and foreign investment. Post-reform industrial-enterprise outcomes come from the National Bureau of Statistics' Annual Survey of Industrial Production for 2007–2013. The survey covers industrial enterprises above the applicable reporting threshold rather than the universe of registered firms. We use counts of observed enterprises and distinguish private firms using the paid-in-capital ownership classification.

Geocoded firm locations are assigned directly to accepted 1911 prefecture polygons; records without a usable direct match use a modern county or district centroid, followed by an area-weighted city crosswalk as a final fallback. The private-enterprise series omits 2009 because the ownership field mechanically assigns all observations to the same category in that year; the all-enterprise count remains usable. Appendix Section F.3 describes the construction of the industry-level external-finance-dependence measure used in the corresponding analysis. Foreign direct investment in 2017 comes from the *China City Statistical Yearbook* and is mapped to the same historical prefecture geography.

Contemporary education, religion, values, and financial behavior. Contemporary educational attainment comes from population Census and intercensal microdata from 1990 to 2015. Religious affiliation, values, and household financial behavior come from the China Family Panel Studies (Xie and Hu, 2014) and the 2007 Spiritual Life Study of Chinese Residents. Survey observations are linked to the corresponding 1911 geography at the finest location disclosed in each source. These datasets are used only for the long-run mechanism and alternative-explanation exercises, and the relevant appendix tables report the analysis-specific samples and specifications.

B.4 Shaanxi Provincial Data

The county panel is transcribed from the Shaanxi Provincial Bureau of Statistics' *Historical Statistical Data Compilation for the Prefectures, Cities, and Counties of Shaanxi Province, 1949–1990* (Shaanxi Provincial Bureau of Statistics, 1991). It reports benchmark years before reform (1949, 1952, 1957, 1962, 1965, 1970, 1975, and 1978) and annual observations from 1978 through 1990. We use its county-level measures of population, students, fiscal revenue and expenditure, fixed-asset investment, electricity, health infrastructure, industrial and township enterprises, retail sales, savings, and production.

We exclude provincial, prefectural, and broad city aggregates, harmonize the remaining county, district, and county-level-city names to CHGIS 1911 counties using reviewed Chinese-name aliases, and aggregate multiple successor units assigned to the same historical county-year. The resulting panel covers 88 historical counties in the pre-1978 benchmark years and 89 from 1978 onward. Per-capita outcomes use population reported in the same source. Mission exposure is defined by whether a CHCD institution was recorded in the historical county before 1950; the railway and predicted-exposure mea-

sures are assigned to the same 1911 county geography. For this exercise, we also conducted a focused recovery of Shaanxi CHCD geography: unresolved province- or prefecture-level place records were reviewed using institution names, historical place-name variants, directory and gazetteer evidence, and the full CHGIS 1911 county reference, allowing additional institutions to be assigned to counties when the evidence was sufficiently specific. A national county-level design is not currently feasible without substantially greater record-by-record recovery, because many CHCD locations elsewhere are identified only at the prefecture or broader level; restricting the national analysis to county-resolved records would discard considerable information and produce a selected sample. Because the source is confined to one province, these estimates are complementary to the national prefecture analysis.

For the religion series, we separately digitize dated references to Christian institutions, activity, closures, persecution, and Cultural Revolution disruption from Shaanxi county and city gazetteers. We aggregate these source references into county-period mention shares through 1998. They measure the content recorded in local histories, not a complete annual census of religious activity.

C Balance & Identification

Table C.1: Predictors of Mission Establishment by Broad Treatment Cohort: Prefecture-Level Estimates

Variables	(1) 1860–1900	(2) 1900–1904	(3) 1904–1920
Total Modern Banks	-0.196	-0.069	0.106
	(0.244)	(0.364)	(0.251)
Total Enterprises	-0.051	0.024	-0.020
	(0.038)	(0.034)	(0.023)
Ln (investment gov. factory)	0.026	-0.086*	0.063
	(0.018)	(0.045)	(0.056)
Total railways	0.837***	-0.056	0.025
	(0.230)	(0.174)	(0.099)
Total Treaty Ports	0.695***	0.152	0.319
	(0.158)	(0.171)	(0.275)
Whether there's main river	0.058	0.073	-0.072
	(0.059)	(0.088)	(0.107)
Provincial capital	0.190**	0.195	0.257
	(0.078)	(0.146)	(0.217)
Crop suitability: Rice	-0.014	-0.051	0.068
	(0.040)	(0.064)	(0.081)
Ln population	0.039	0.116**	0.034
	(0.037)	(0.057)	(0.068)
Coastal	-0.054	0.072	0.062
	(0.101)	(0.213)	(0.475)
Province FE	Yes	Yes	Yes
Obs.	215	157	77
Adj. R sq.	0.342	0.0752	0.208
Mean Dep. Var.	0.250	0.448	0.635
S.D. Dep. Var.	0.433	0.498	0.482
P-value F-stat.	3.59e-08	0.180	0.494

Notes: Regressions are at the prefecture level. In each column, the dependent variable equals one if a mission was established in the indicated period, and the sample includes prefectures reached in that period or in the subsequent cohort. Controls are from Bai and Jia (2016) and are measured before the relevant cohort comparison. All specifications include province fixed effects. Standard errors are in parentheses. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively. Appendix Figure C.3 reports complementary one-by-one regressions and includes additional covariates.

Figure C.1: Distribution of Treatment Variable G_i

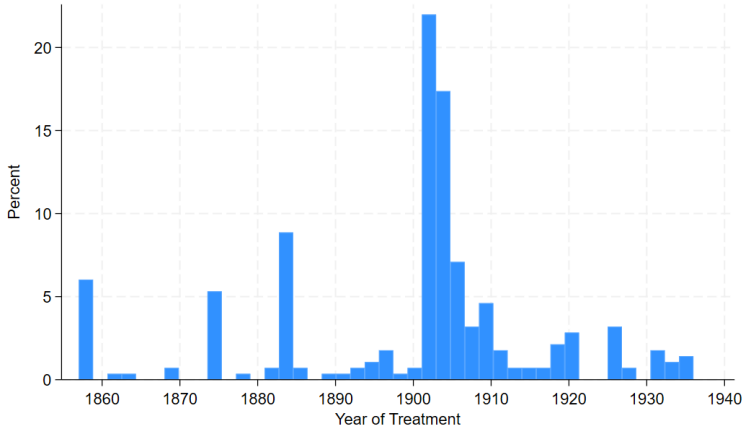
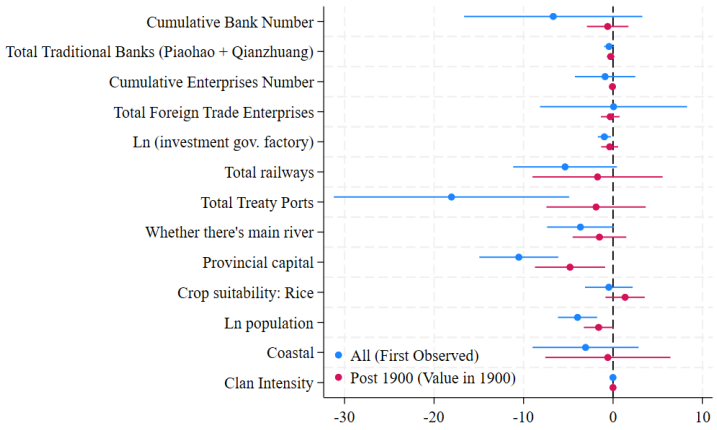
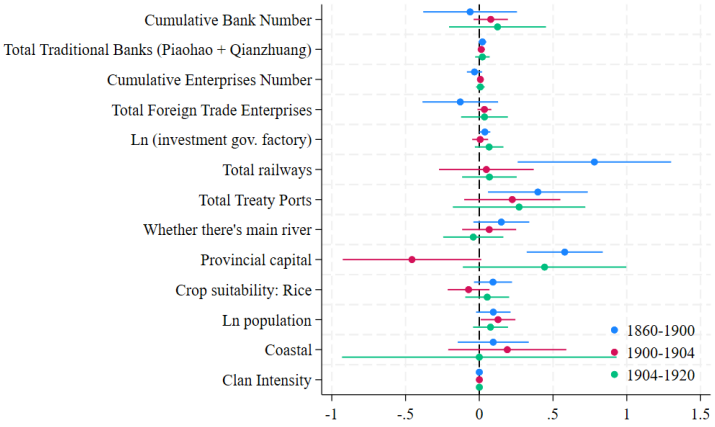


Figure C.2: Predictors of Mission Establishment Year: One-by-One Regressions



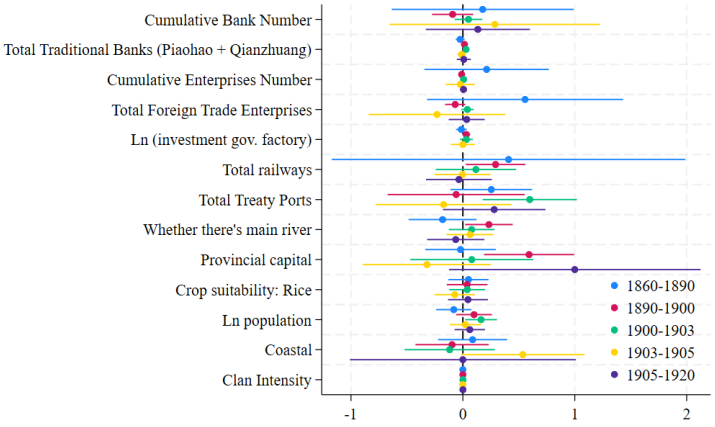
Notes: Predetermined covariates are separately regressed on missionary establishment year. The figure plots the coefficients corresponding to columns 1 and 2 of Table 2. All regressions include province fixed effects. Covariates are in raw units.

Figure C.3: Predictors of Mission Establishment by Broad Treatment Cohort: One-by-One Regressions



Notes: Univariate regressions of the treated-cohort dummy on each covariate. The three comparisons are 1860–1900, 1900–1904, and 1904–1920, each relative to the subsequent cohort. The figure complements the multivariate estimates in Appendix Table C.1 and includes additional covariates. All regressions include province fixed effects. Covariates are in raw units.

Figure C.4: Predictors of Mission Establishment by Intermediate Treatment Cohort: One-by-One Regressions



Notes: Univariate regressions of the treated-cohort dummy on each covariate using five adjacent comparisons: 1860–1890, 1890–1900, 1900–1903, 1903–1905, and 1905–1920, each relative to the subsequent cohort. This intermediate partition provides an additional sensitivity check between the three broad comparisons in Appendix Table C.1 and the eight narrower comparisons in Appendix Table C.2. All regressions include province fixed effects. Covariates are in raw units.

Table C.2: Predictors of Mission Establishment by Narrow Treatment Cohort: Prefecture-Level Estimates

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 at the prefecture level. In each column, the dependent variable equals one if a mission was established in the indicated period, and the sample includes prefectures reached in that period or in the subsequent cohort. The eight adjacent comparisons are 1860–1880, 1880–1890, 1890–1900, 1900–1903, 1903–1904, 1904–1905, 1905–1910, and 1910–1920. Controls are from Bai and Jia (2016) and are measured before the relevant cohort comparison. For example, banks are measured in 1860 in column 1, which compares prefectures reached in 1860–1880 with those reached in 1880–1890. Standard errors are in parentheses. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

D Historical DiD Results and Robustness

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

Table D.1: Pre- and Post-Treatment Estimates for Main Historical Outcomes

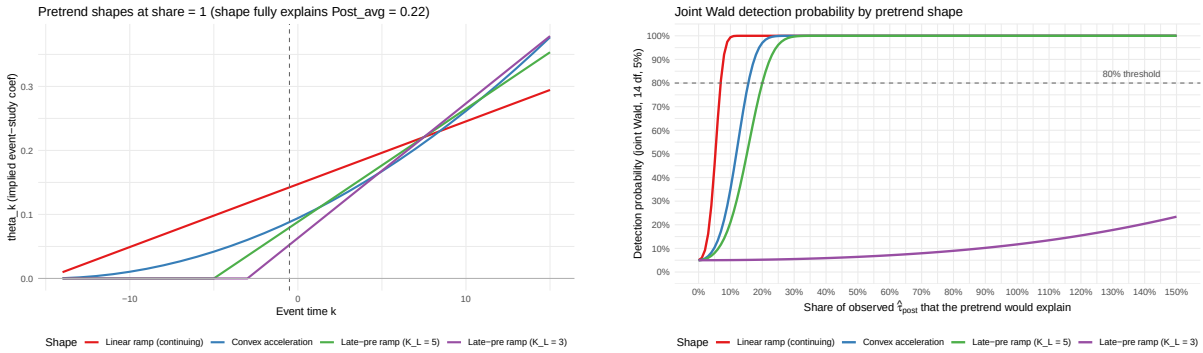
VARIABLES	(1) Modern banks	(2) Enterprises	(3) Log banks	(4) Bank growth	(5) New banks
Pre-treatment ATT	0.024	0.060*	0.013	0.007	0.011
	(0.016)	(0.036)	(0.009)	(0.004)	(0.007)
Post-treatment ATT	0.221***	1.292**	0.075***	0.019***	0.059**
	(0.071)	(0.610)	(0.021)	(0.005)	(0.024)
Prefecture FE	Yes	Yes	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 6; column 2 corresponds to Figure 7. Columns 3–5 report alternative modern-bank outcomes: $\log(\text{total modern banks}+1)$, 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 6 and 7. 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.

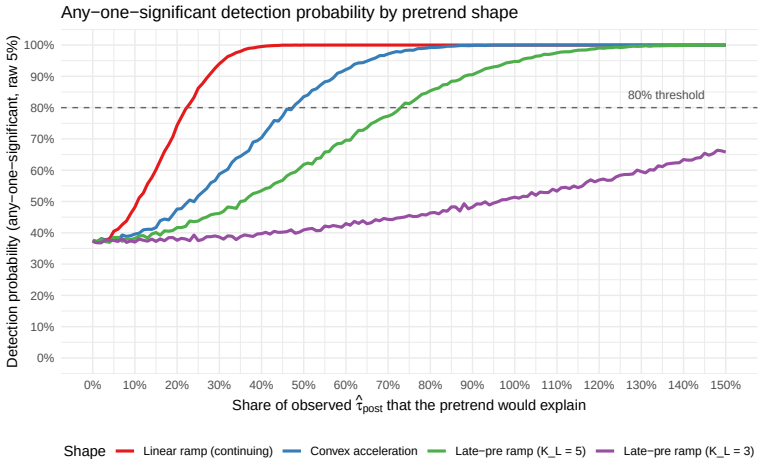
Alternative transformations. We also re-estimate the historical DiD using alternative transformations of the modern-bank outcome. These specifications address the concern that the baseline level outcome may be affected by zeros or limited early variation. Table D.2 reports the post-treatment ATT for each specification, and Figures D.3–D.5 plot the corresponding event studies.

Figure D.1: 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 D.2: 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.

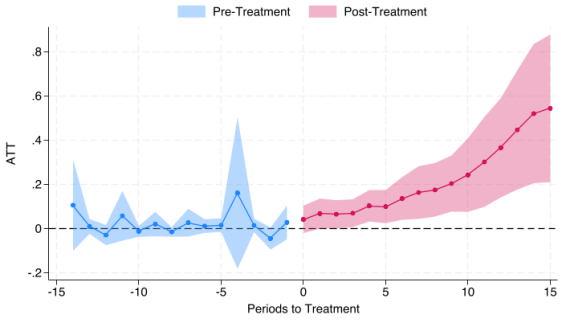
Table D.2: Post-Treatment ATT Under Alternative Modern-Bank Outcomes

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

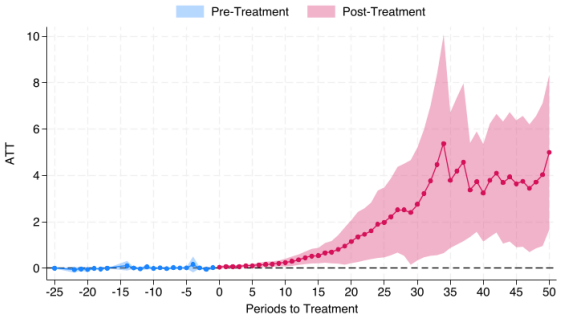
Notes: The table reports post-treatment ATT estimates averaged over event times 0 through 15. The baseline reproduces the main effect reported in Figure 6. The remaining rows use alternative transformations or definitions of the modern-bank outcome.

Figure D.3: Alternative Outcome Transformations: Baseline, Logs, and Growth

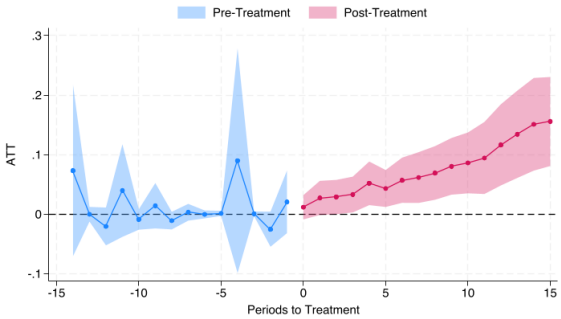
(a) Baseline, 15 periods



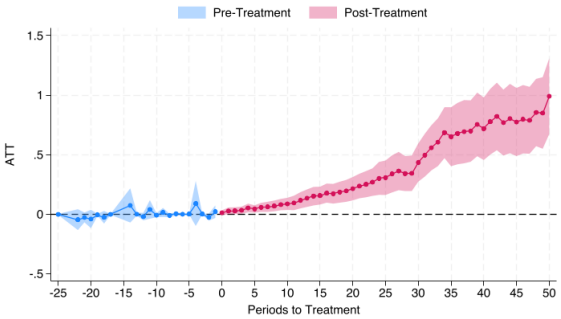
(b) Baseline, 50 periods



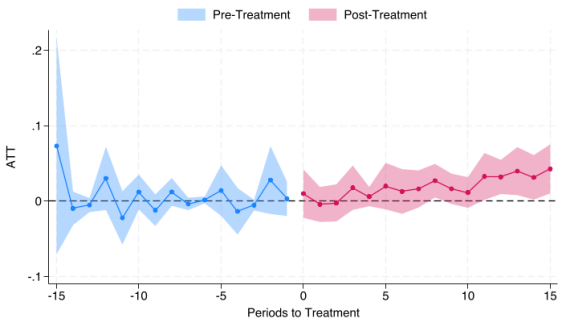
(c) $\log(y+1)$, 15 periods



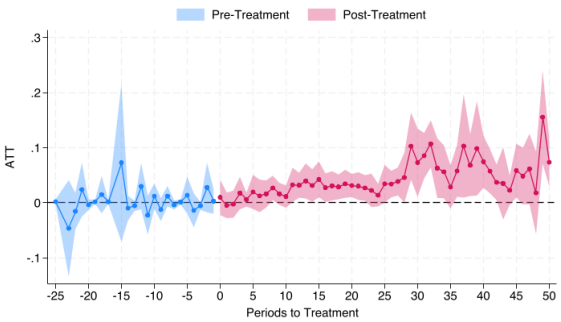
(d) $\log(y+1)$, 50 periods



(e) Growth rate, 15 periods



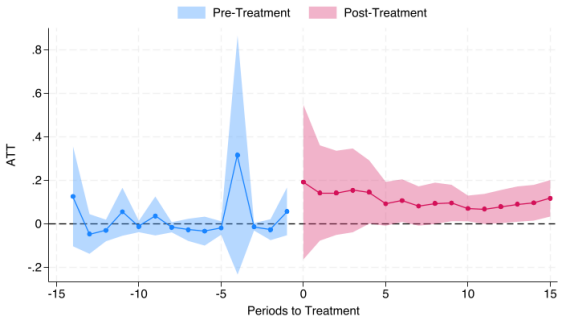
(f) Growth rate, 50 periods



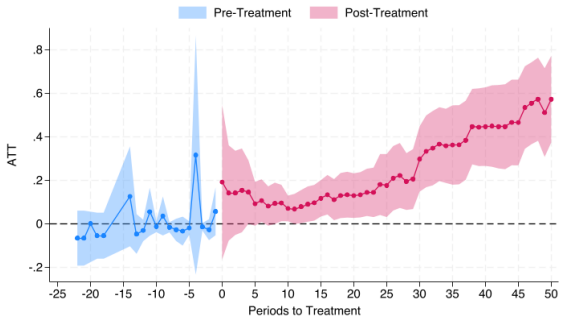
Notes: The figure reports event studies for alternative transformations of the modern-bank outcome. Panels use the same treatment definition as the baseline specification.

Figure D.4: Alternative Outcome Transformations: Extensive Margin and New Banks

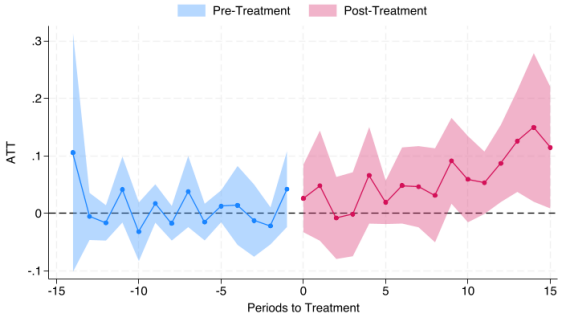
(a) Extensive margin, 15 periods



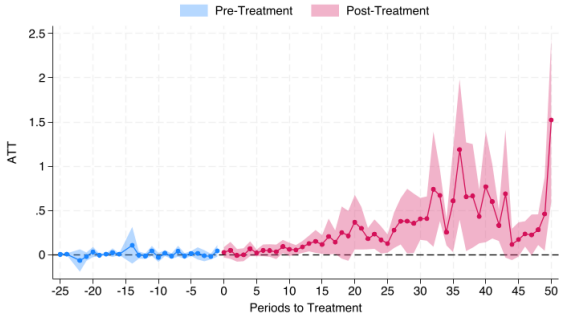
(b) Extensive margin, 50 periods



(c) New banks, 15 periods



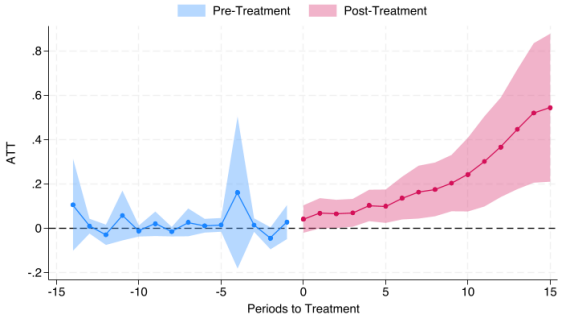
(d) New banks, 50 periods



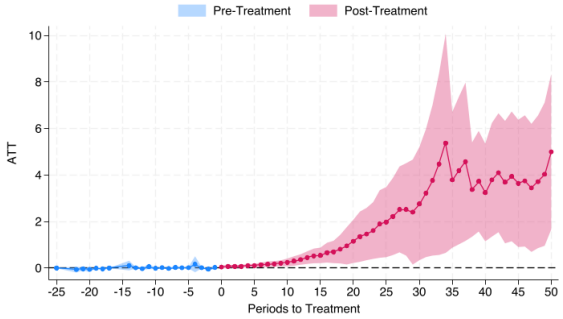
Notes: The figure reports additional outcome transformations. The post-treatment averages corresponding to these figures are reported in Table D.2.

Figure D.5: Alternative Outcome Transformations: Province-Conditioned and Restricted Samples

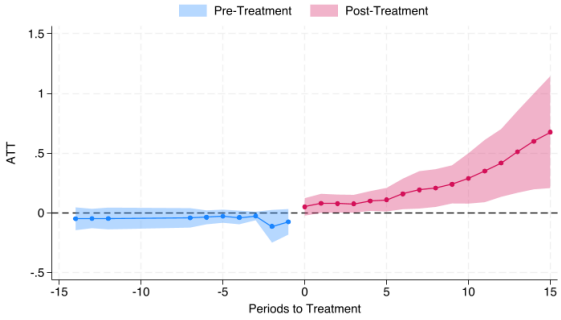
(a) Province-conditioned, 15 periods



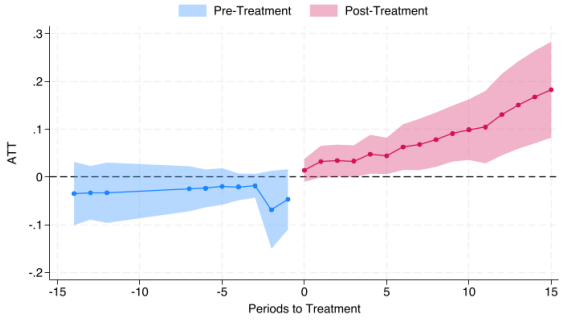
(b) Province-conditioned, 50 periods



(c) Drop pre-1900, levels



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



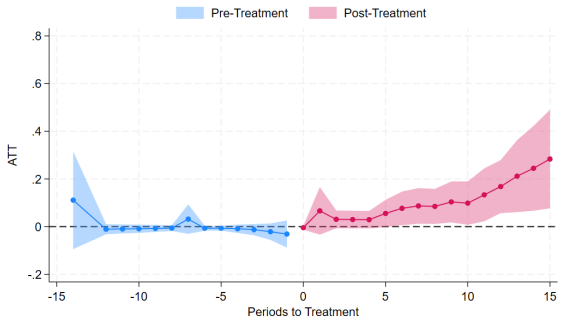
Notes: The figure reports province-conditioned specifications and sample restrictions. The post-treatment averages corresponding to these figures are reported in Table D.2.

D.2 Propagation Across the Banking Sector

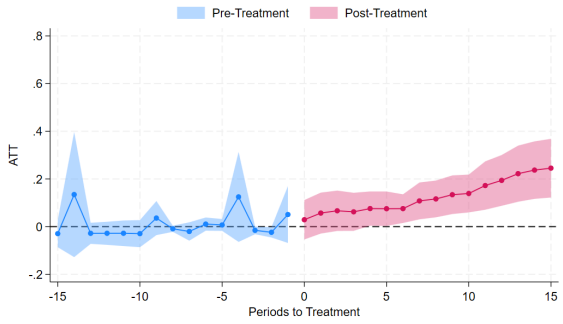
The baseline outcome counts all modern banks. We next show that the result is not driven by a single bank type or by a purely extensive-margin count. Figure D.6 reports event studies separately for private, government, and foreign banks. All three outcomes move in the same direction after missionary arrival, suggesting that missionary exposure affected the broader modern-banking sector rather than only one ownership category.

Figure D.6: Missionary Presence and Modern Banks by Ownership Type

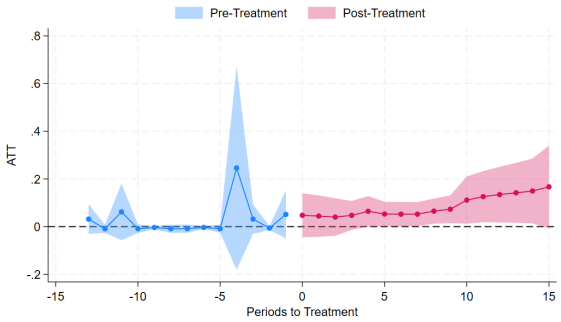
(a) Private banks



(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 5. 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 D.3: 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 5. Table D.4 reports the corresponding specification with log 1880 population included as an additional control. Standard errors are in parentheses. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

Table D.4: Missionary Exposure and Bank Balance Sheets: Prefecture Level with 1880 Population Control

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	0.474**	0.542**	0.461**	0.430*	0.407*	1.888
	(0.227)	(0.243)	(0.209)	(0.221)	(0.236)	(1.292)
Railway Duration	-0.0261	-0.0384	-0.0293	-0.0247	-0.0234	-0.172
	(0.0262)	(0.0284)	(0.0238)	(0.0255)	(0.0269)	(0.133)
Railway Density	317.3***	249.1**	250.0**	246.7**	259.6**	1,376**
	(107.5)	(125.4)	(121.2)	(109.6)	(111.1)	(620.4)
Ln Population (1880)	-0.577	-0.970	-1.434	-1.126	-0.856	-5.615
	(1.127)	(1.223)	(1.035)	(1.080)	(1.144)	(6.151)
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 copies the prefecture-level specification in Table D.3 and adds log 1880 population as a control. Missionary institutions are instrumented by the railway-flow prediction described in Section 5. Every column also includes railway duration, railway density, and province fixed effects. The 1880 measure is the project historical population series assigned to 1911 prefectures. Consistent with the original table, unreported monetary balance-sheet items are coded as zero before applying $\ln(1+x)$. Standard errors are in parentheses. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

Table D.5: 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. The baseline population-exposure variable sums 1820 log population density over active bank–prefecture–year records. Table D.6 replaces that legacy proxy with log 1880 population in each bank's pre-outcome geographic branch footprint. Standard errors are in parentheses. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

Table D.6: Missionary Exposure and Bank Balance Sheets: Bank Level with 1880 Population Control

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)	0.651***	0.585***	0.584***	0.392***	0.848***	0.791***	1.910	0.325***
	(0.124)	(0.111)	(0.124)	(0.106)	(0.162)	(0.130)	(1.151)	(0.110)
Ln 1880 Network Population	0.859***	0.770***	0.819***	0.761***	0.921***	0.712***	7.131***	0.650***
	(0.140)	(0.147)	(0.153)	(0.142)	(0.173)	(0.128)	(1.762)	(0.172)
Obs.	97	97	97	97	91	94	98	97

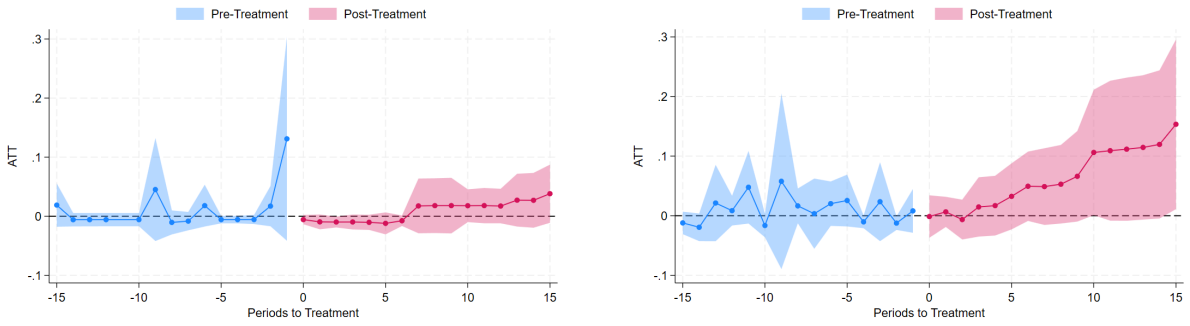
Notes: The table copies the bank-level specification in Table D.5, replacing its legacy population-exposure proxy with log 1880 network population. For each bank, the population measure sums the project 1880 population across the distinct 1911 prefectures in which the bank had established a branch by the end of 1931. A prefecture is counted once even when a bank had multiple branches there. Banks are retained only when every prefecture in their branch network has a valid positive 1880 population, so the denominator never represents a partial network. Of the 160 banks in the collapsed 1932–1936 balance-sheet cross-section, 108 link to the historical branch network and 98 have complete 1880 population coverage; outcome reporting produces the column-specific samples shown. Mission exposure is standardized over the original 160-bank cross-section. Estimates are robust OLS with an intercept and are not instrumented. Monetary outcomes are $\ln(1+x)$ and total branches is in levels. Standard errors are in parentheses. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

D.3 Other Market Outcomes

The main text reports the effect of missionary presence on total enterprises. This appendix provides additional evidence on other dimensions of 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 D.7: 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 evidence on another market outcome rather than as a mechanism test. A downstream response through modern banks is one possible interpretation; direct effects from practical education and the diffusion of commercially useful knowledge are also plausible. 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 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 measures of market activity: trade-likely enterprises and domestic-likely enterprises.

Table D.7 reports the resulting classification, and Figure D.8 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 D.8 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. This is consistent with modern banks supporting broader market integration, although this may also reflect practical education and knowledge diffusion.

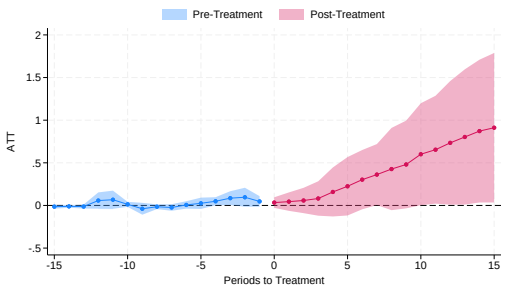
Table D.7: Trade-Likely and Domestic-Likely Enterprise Categories

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

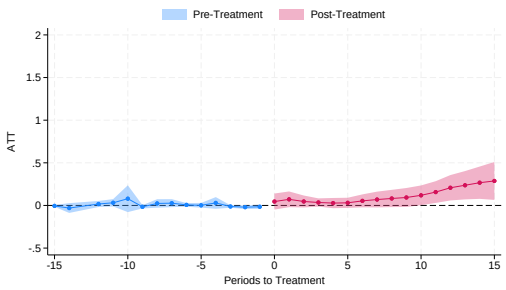
Notes: Product groups are classified using differences in export composition between treaty ports and non-treaty ports in the 1930s trade data. We then map these products to enterprise industries.

Figure D.8: Missionary Presence and Trade-Likely Enterprises

(a) Trade-likely enterprises



(b) Domestic-likely enterprises



Notes: Panel A uses trade-likely enterprises as the outcome; Panel B uses domestic-likely enterprises. The categories are defined in Table D.7.

Table D.8: 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 export transactions in 1936. The IV instruments missionary institutions with the railway-flow instrument from Section 5. Standard errors are in parentheses; ***, **, and * indicate significance at the 1%, 5%, and 10% levels.

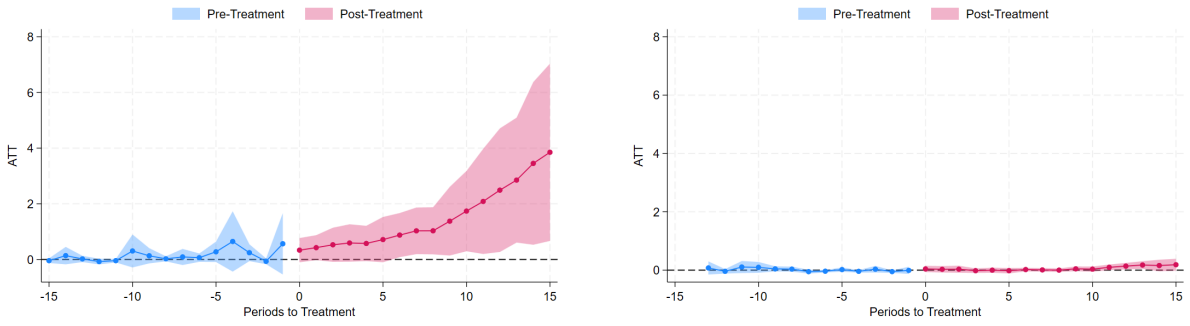
D.4 Traditional Finance and Financial Interaction

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 D.9: Modern Banks in Places With and Without Preexisting *Piaohao*

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



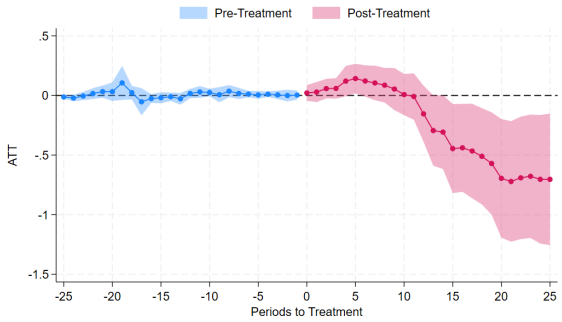
Notes: The outcome is the number of modern banks. Panel A includes prefectures with *Piaohao* before missionary arrival and never-treated prefectures. Panel B includes prefectures without *Piaohao* before missionary arrival and never-treated prefectures. Split-group sizes: 37 treated prefectures with preexisting *Piaohao* and 195 treated prefectures without preexisting *Piaohao*.

***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

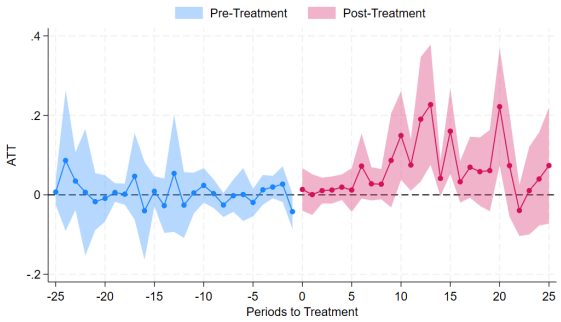
institutions. The lack of a clear *Piaohao* pre-trend is also useful because these institutions were already active before the modern-bank wave. Unlike the modern-bank outcome, the pre-period has meaningful variation, so the flat pre-period is less likely to be only a mechanical consequence of early zeros.

Figure D.10: Missionary Presence and *Piaohao*

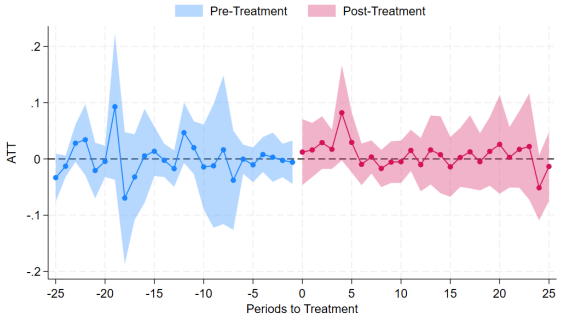
(a) Total *Piaohao*



(b) New closings



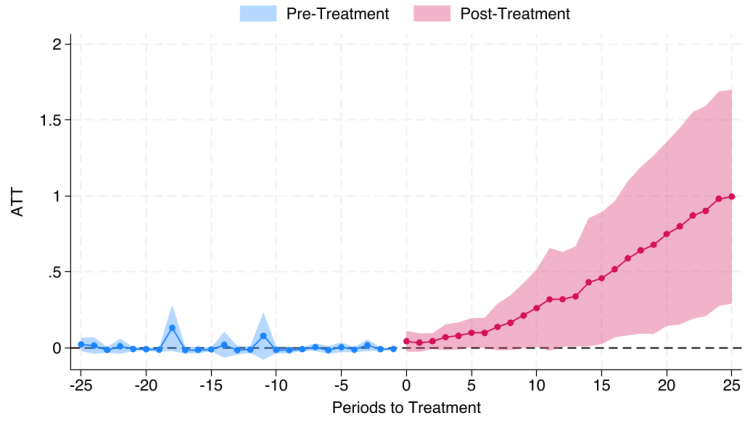
(c) New openings



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.

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 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 erase all older institutions; the substitution pattern is clearest for *Piaohao*, while *Qianzhuang* appear more complementary.

Figure D.11: Missionary Presence and *Qianzhuang*



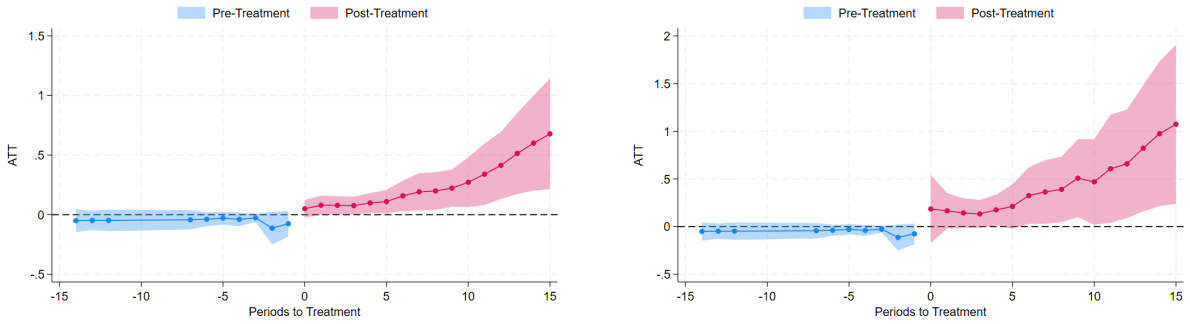
Notes: The figure reports the event study using total *Qianzhuang* as the outcome.

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.

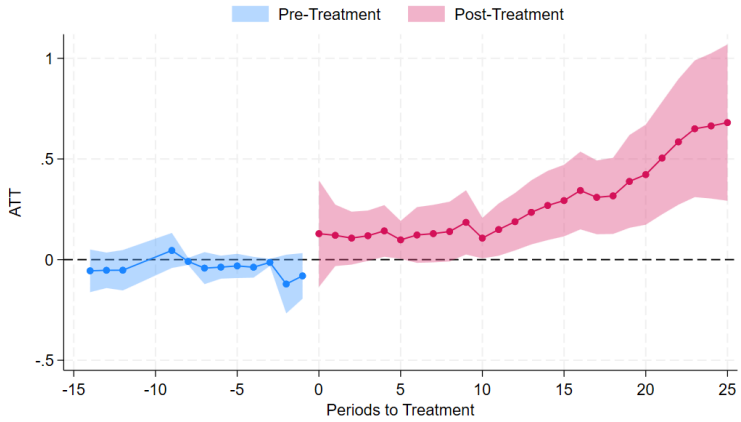
Figure D.12: Missionary Presence and Modern Banks: Post-1900 and Post-1905 Samples

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



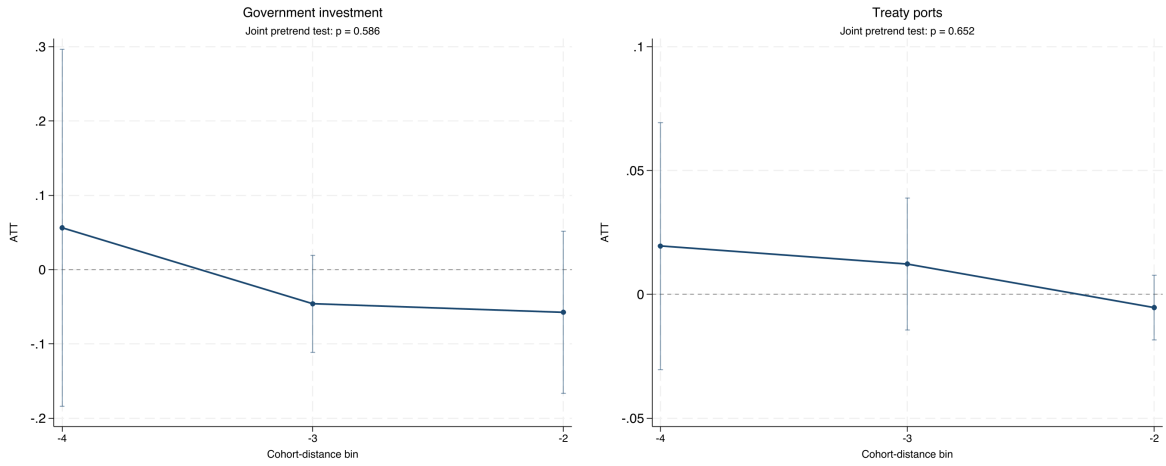
Notes: The figure reports the baseline event study after restricting the estimation sample to later periods. The dependent variable is the total number of modern banks. The positive post-treatment pattern remains when the early years with sparse modern-bank activity are excluded.

Figure D.13: Missionary Presence and Modern Banks: Excluding Treaty Ports



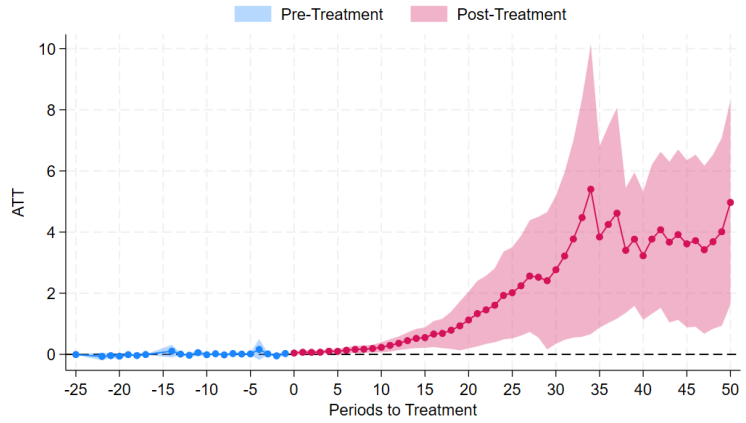
Notes: The figure reports the baseline event study after excluding treaty-port prefectures. The dependent variable is the total number of modern banks. The persistence of the effect outside treaty ports suggests that the result is not only a treaty-port foreign-presence effect.

Figure D.14: Pre-Treatment Institutional Conditions in Aggregated Cohorts



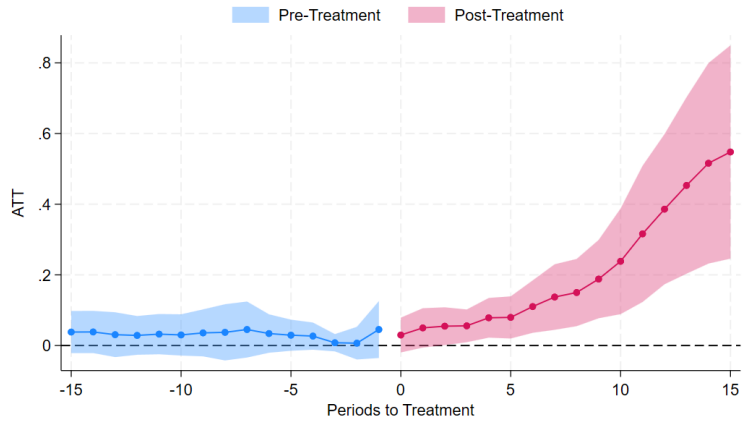
Notes: Annual data are not consistently available for government investment and treaty ports over the historical period, so the estimates pool years into cohort-distance bins. The underlying treatment cohorts are the same as those used in the balance exercise in Table C.2. Points report pooled pre-treatment coefficients with 95% confidence intervals; the reported p-values are covariance-based joint Wald tests that all displayed coefficients equal zero.

Figure D.15: Missionary Presence and Modern Banks: Longer Event Window



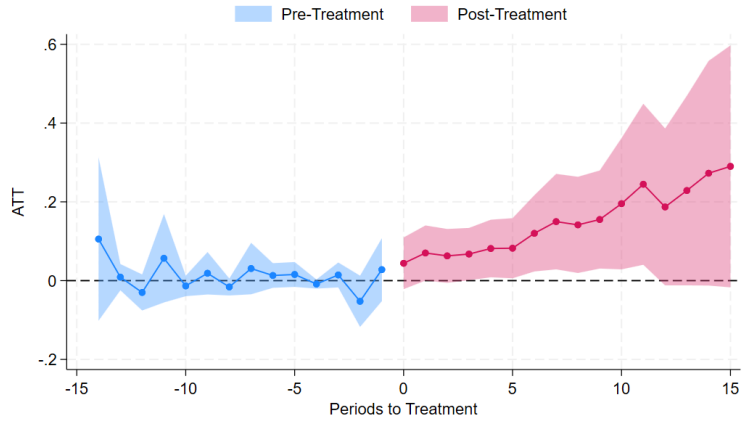
Notes: The figure reports the event study using the longer event window. The dependent variable is the total number of modern banks. The longer window shows a similar post-treatment increase.

Figure D.16: Missionary Presence and Modern Banks: Long Gaps in the Pre-Period



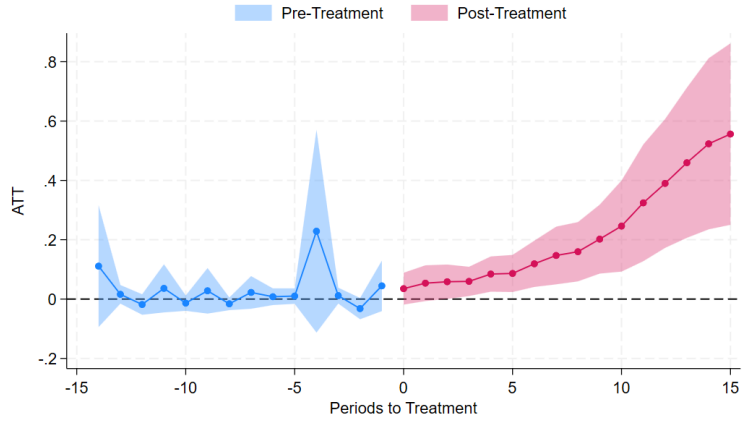
Notes: The figure reports the event study allowing for longer gaps in the pre-period. The exercise checks that the result is not an artifact of how long pre-treatment gaps are handled.

Figure D.17: 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.

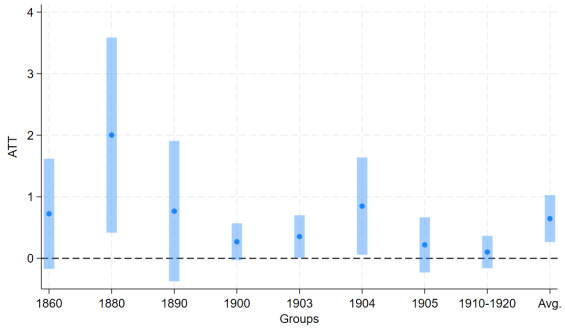
Figure D.18: Missionary Presence and Modern Banks: Balanced Pre/Post Window



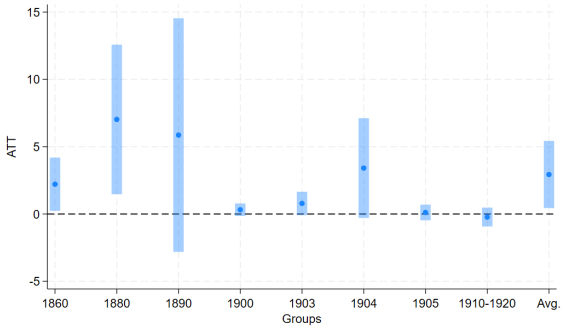
Notes: The figure reports the event study using a balanced number of pre- and post-treatment periods. The pattern remains similar after imposing the balanced event window.

Figure D.19: 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.

E Mechanisms

E.1 Historical Narratives of the Mechanism

Local embeddedness and knowledge translation. This appendix provides brief historical background for the claim in Section 2.1 that mission organizations were locally embedded and could help translate foreign knowledge to the Chinese context. The point is not that missionaries alone possessed local knowledge, nor that foreign knowledge automatically generated institutional change. The argument is narrower. Mission organizations often combined access to foreign ideas and networks with the local linguistic and social knowledge needed to translate those ideas into forms that Chinese actors could adapt and use.

This adaptive logic was consistent with the late-Qing *ti-yong* idea, associated with Zhang Zhidong: Chinese learning would provide the moral and philosophical foundation, while Western learning could be used for practical development. Missionaries did not create this formulation, but mission-educated Yung Wing and collaborations between Chinese scholars and missionary translators provide examples of this selective adaptation (Spence, 1990).

Language and contextual learning. Language acquisition was often systematic rather than incidental. Mission societies commonly required newly arrived personnel to devote substantial time to Chinese language study before taking on independent responsibilities. In some cases, missionaries were examined in the vernacular before being allowed to lead local work. Training could also include geography, government, religion, etiquette, and other aspects of local society. In Hakka-speaking areas, for example, mission work involved extended language study with Chinese teachers, regular examinations, and the production of dictionaries, translations, and other vernacular materials. These practices made linguistic and contextual knowledge more reproducible across successive cohorts of workers.

Chinese personnel. Mission organizations also relied heavily on Chinese personnel. Chinese pastors, teachers, translators, evangelists, printers, doctors, nurses, and other workers helped link mission institutions to local communities. A Protestant count for 1921 reported 6,636 foreign missionaries and 24,732 paid Chinese workers. The Chinese workforce therefore substantially exceeded the foreign missionary presence.

Women and social reach. Mission organizations were also unusually female. In our linked person data, 54 percent of named missionary personnel are women. Historical counts show a similar pattern among foreign Protestant missionaries, and they also record a large number of Chinese Bible women. This composition allowed mission organizations to reach a broader audience that would otherwise have been less accessible.

E.2 Missionary Interview Evidence

As additional qualitative evidence, we reviewed 44 interviews with Christian missionary workers in China held in the Claremont Colleges Special Collections. To summarize the material systematically, we also coded the short archival summary associated with each interview into broad topics. The counts

below are based on those summaries, while the selected passages and photographs draw on the underlying interview materials. This exercise is descriptive and does not enter the causal analysis, but it helps discipline the historical interpretation of the education mechanism.

Table E.1: Topics in Missionary Interviews

Topic	% of archival 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 topic coding of short archival summaries associated with 44 interviews. The underlying interviews are from the Claremont Colleges Special Collections.

Selected interviews. Three interviews illustrate how mission education could build skills valued in modern organizations:

- **Glenn Fuller** arrived in China in 1921 under Methodist sponsorship to establish business-administration training. In 1922, he opened a high-school-level program at Hwei Wen Middle School in Tientsin. He reported that most graduates entered Western firms and several joined the Bank of China or Central Bank of China, a direct link between mission training and modern banking.
- **Francis Price Jones** served in China from 1915 to 1950 as a Methodist educational missionary. A middle-school principal, Nanking professor, and editor of more than forty books in Chinese, he described an early gap in public education and argued that mission schools' "superior instruction in English" helped them compete with government schools.
- **Katherine Ward** arrived in 1925 and taught English at a mission-supported girls' high school in Nanking from 1928 to 1937. She recalled that government and military leaders, including anti-Christian officials, sent daughters to mission high schools because they saw them as academically stronger. Her account shows demand for girls' schooling beyond Christian families.

Source: China Missionaries Oral History Project, Claremont Colleges Special Collections. Quotations are shortened from the interview transcripts.

Figure E.1: Mission Education: Classroom and College Study

(a) Classroom lecture scene

(b) Lingnan college library, 1920s

Notes: Panel A is a classroom photograph from the China Missionaries Oral History Project materials at The Claremont Colleges Library. Panel B shows the Lingnan University college library in the 1920s. Source for Panel B: Lingnan University Digital Commons, "Library Reading Room in Grand Hall."

Figure E.2: Mission Education: Adult Workers and Practical Training

(a) West China pastors and women workers, 1937

(b) Outdoor practical-demonstration scene

Notes: Panel A shows West China pastors and women workers in 1937. Panel B is an outdoor demonstration photograph illustrating the practical training described in the mission manuscripts. Sources: F. Olin Stockwell and Louise Hathaway Stanley manuscripts, China Missionaries Oral History Project, The Claremont Colleges Library.

Figure E.3: American Presbyterian Mission Press in Shanghai

Notes: The photograph shows the front building and staff of the American Presbyterian Mission Press, reproduced from McIntosh (1895). The press began in Macao in 1844, moved to Ningbo, and relocated to Shanghai in 1860. It combined Chinese typefounding, typesetting, editing, mechanical printing, binding, sales, and distribution under one organization and trained Chinese printers in these activities. Its personnel and skill network later helped seed the Chinese-owned Commercial Press. The Commercial Press's four founders (Xia Ruifang, Bao Xian'en, Bao Xianchang, and Gao Fengchi) came out of the Presbyterian Qingxin school and Huamei Press printing ecosystem, and the firm's official history describes its early operation as deliberately modeled on Huamei Press (Lu, 2017). This is evidence of skill and organizational diffusion rather than missionary ownership of the Commercial Press.

E.3 Additional Historical Examples

- 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.

E.4 Empirical Evidence on the Mechanism

Publication descriptives, coverage, and school complementarity.

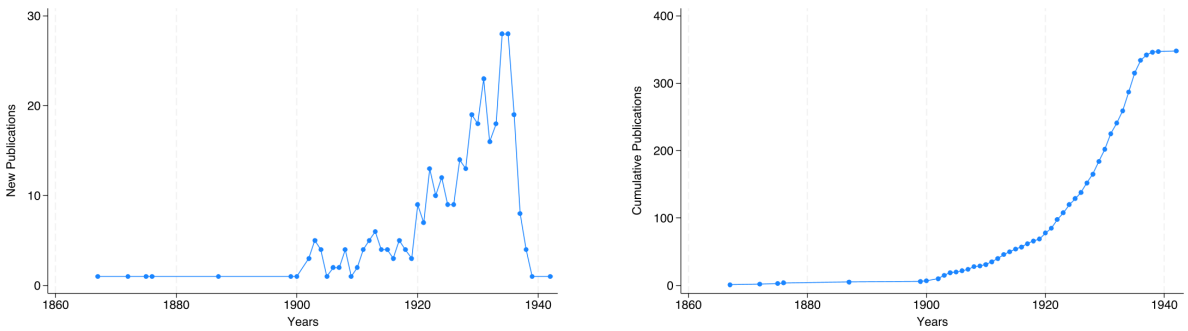
Table E.2: Features of Missionary Publications

Publication feature	Freq.	Percent
Religious / missionary focus	276	67.0%
Vernacular / romanized Chinese	182	42.3%
High circulation (>900)	147	34.2%
Western language present	122	28.4%
English present	65	15.1%
Educational / student-oriented	68	16.5%
High frequency (24+ issues per year)	60	14.0%
Bilingual (Chinese + Western)	33	7.7%
Scientific / technical	24	5.8%

Notes: The table reports descriptive features of missionary publications. Percentages use publications for which the relevant feature is classified; categories are not mutually exclusive.

Figure E.4: Missionary Publications Over Time

(a) New publications **(b)** Cumulative publications



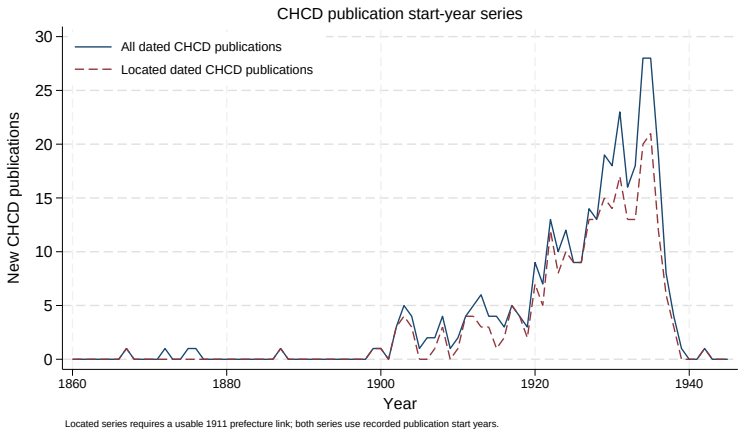
Notes: Panel A plots the number of new missionary publications by start year. Panel B plots the cumulative number of missionary publications over time.

The located CHCD file contains 677 publication records, with usable links spanning 74 historical prefectures. These data are not intended to be a universal bibliography of missionary publishing in China. Most of the underlying publications come from Lowenthal's Catholic and Protestant religious-periodical tables. The records therefore cover newspapers, magazines, journals, bulletins, newsletters, and related religious or educational periodicals, but may miss smaller titles, some early publications, and other print output. McIntosh provides a complementary source on mission-press infrastructure rather than another title list. This limitation matters more for counting the complete flow of titles than for the mechanism exercise, which uses the geography of any recorded publication or press activity.

Among the 348 CHCD publications with a recorded start year, 268 also have a usable 1911-prefecture link. Figure E.5 shows that the located series is lower, especially in the 1920s and 1930s, but follows the same broad time pattern. Because the heterogeneity split does not require publication timing, our preferred geographic measure retains all located publication records even when start year is missing. This classifies 61 treated prefectures as publication locations; adding McIntosh mission-press locations

raises the total to 62. Figure E.6 shows that the publication-only result is nearly identical to the combined measure in Figure 12.

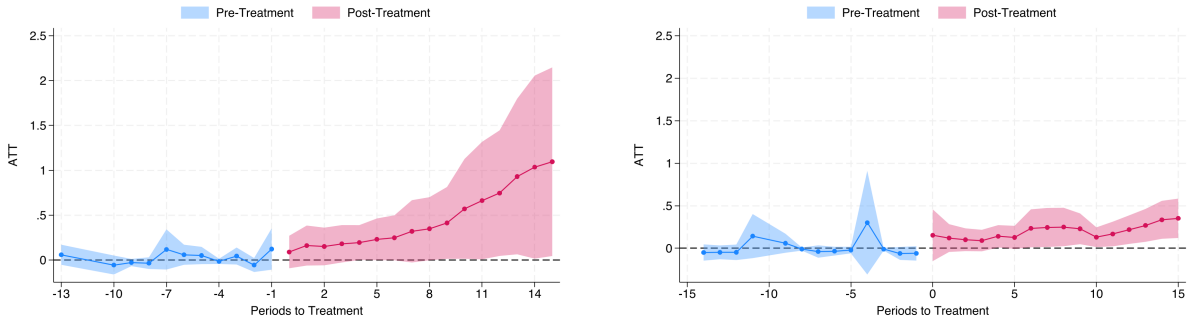
Figure E.5: Coverage of Dated CHCD Publications



Notes: The solid series uses all 348 CHCD publications with a recorded start year. The dashed series uses the 268 publications that also have a usable 1911-prefecture link. The comparison describes coverage within the CHCD source; it does not establish that CHCD is a complete bibliography of missionary publications.

Figure E.6: Publication-Geography Robustness Without a Start-Year Requirement

(a) Publication location **(b)** No publication location



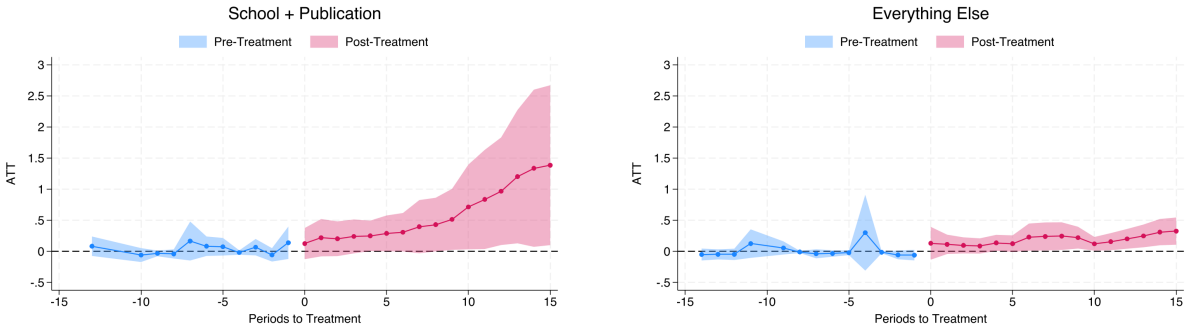
Notes: The outcome is the total number of modern banks. The left panel reports treated prefectures with any located CHCD publication record, regardless of whether its start year is known; the right panel reports the other treated prefectures. Split-group sizes are 61 and 171 treated prefectures, respectively. Figure 12 adds McIntosh mission-press locations, which reclassifies only one treated prefecture.

Heterogeneity magnitudes and difference tests. This appendix summarizes the magnitude comparisons behind the heterogeneity discussion in the main text. The table reports average 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 that compare magnitudes across groups.

Compradors and foreign-bank intermediaries. This section reports descriptive evidence on a possible intermediary-network channel. Compradors 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.

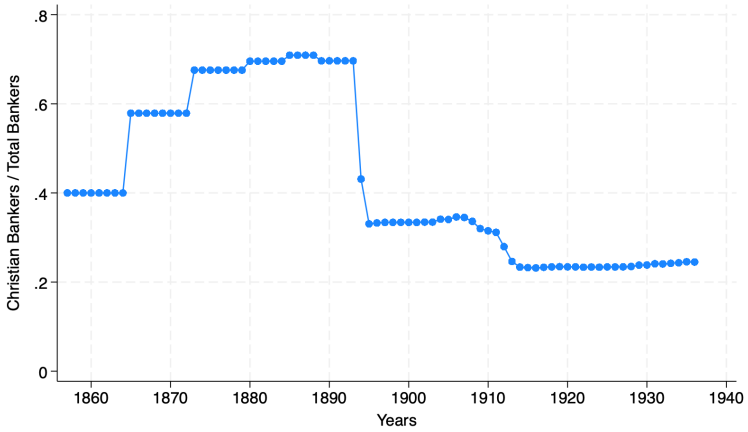
Figure E.7: School and Publication Complementarity

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



Notes: Split-group sizes: 49 treated prefectures with both a missionary school and missionary publication activity and 183 other treated prefectures.

Figure E.8: Evolution of the Ratio of Total Christian Bankers to Total Bankers



Notes: The figure plots the ratio of Christianity-related bankers to all bankers over time. Changes in the ratio partly reflect increases in the number of non-Christian bankers around the establishment of the first government banks and after the founding of the Republic in 1911.

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

Several patterns are consistent with the idea that compradors could act as intermediaries between foreign and Chinese finance. First, 10.9% of foreign firms in the data had a recorded comprador. Second, Christianity-related bankers constitute a sizable share of comprador-background bankers (28%). Third, most comprador-background bankers worked at both foreign and Chinese banks. Fourth, a large share later founded or invested in Chinese financial institutions. This suggests that compradors may have transmitted institution-specific knowledge from foreign firms and banks into Chinese banking, complementing the main-text education and publication channels.

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

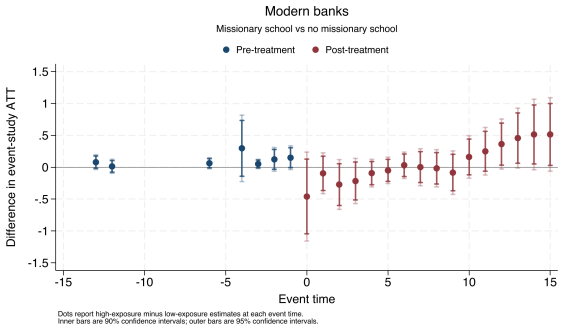
Table E.3: Average Heterogeneity Differences

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

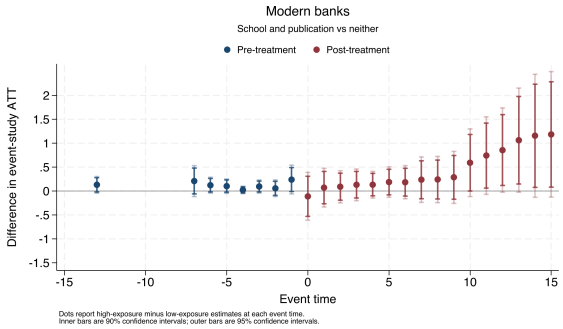
Notes: The table reports high-exposure minus low-exposure differences in average post-treatment event-study estimates. Standard errors for the differences are computed as the square root of the sum of the two group-specific variances; this is conservative because the groups share the never-treated comparison 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 E.9. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

Figure E.9: Coefficient-by-Coefficient Heterogeneity Differences

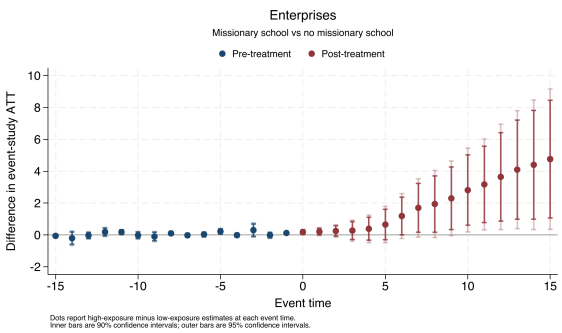
(a) Modern banks: school vs no school



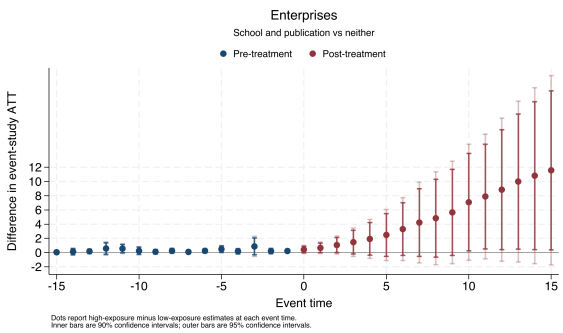
(b) Modern banks: school and publication vs neither



(c) Enterprises: school vs no school



(d) Enterprises: school and publication vs neither



Notes: Split-group sizes: 135 treated prefectures with a missionary school and 97 without a missionary school; 49 treated prefectures with both a missionary school and publication activity and 90 with neither.

Table E.4: Comprador Data and Descriptive Patterns

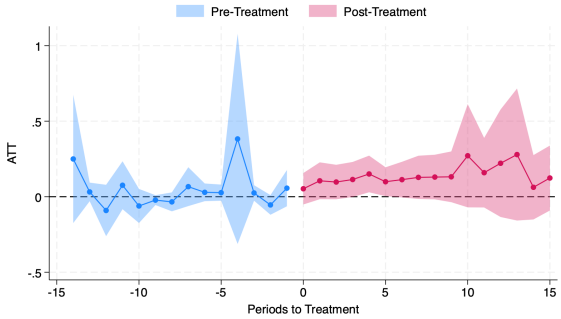
Measure	Value
Share of foreign firms with a recorded comprador	10.9%
Bankers flagged as comprador-related	4.1%
Share Christianity-related among comprador-flagged bankers	28%
Comprador-flagged bankers who founded a Chinese bank, *Qianzhuang*, *Yinhao*, or *Piaohao*	63%
Comprador-flagged bankers who worked 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 share of firms with a recorded comprador. The banker data contains 1,041 bankers; 43 are flagged as comprador-related.

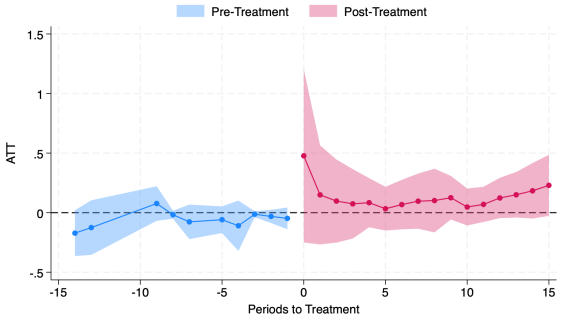
Confucian clan institutions and financial markets may operate as substitutes (Chen et al., 2022b). Missionary activity may also weaken kin-based institutions more generally (Schulz et al., 2019; Henrich, 2020). The exercises below suggest that the bank effect is not simply due to clan substitution.

Figure E.10: Missionary Presence and Modern Banks by Clan Intensity

(a) Above median among positive clan records



(b) Below median among positive clan records



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. Split-group sizes: 105 prefectures above the median and 101 prefectures below the median.

Table E.5: Missionary Exposure and Clan Intensity: Horse Races

Panel A. Clan records per 100 genealogy books

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***	0.245***	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

Panel B. Clan records per 10,000 people

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

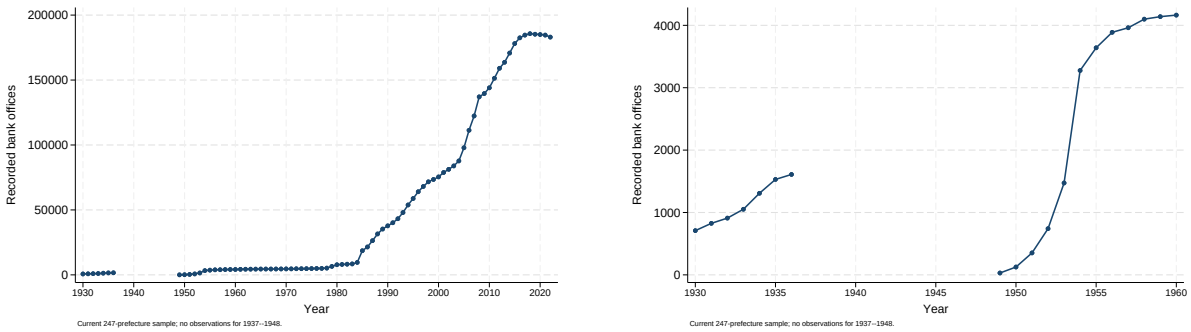
Notes: Cross-sectional regressions for modern banks in 1936. Missionary exposure is the total number of missionary institutions. Panel A scales clan records by genealogy books; Panel B scales them by population. The IV columns use the railway-based missionary-exposure instrument from Section 5. Standard errors are in parentheses; ***, **, and * indicate significance at the 1%, 5%, and 10% levels.

F Long-Term Analysis

F.1 Bank Dynamics and Headline Estimates

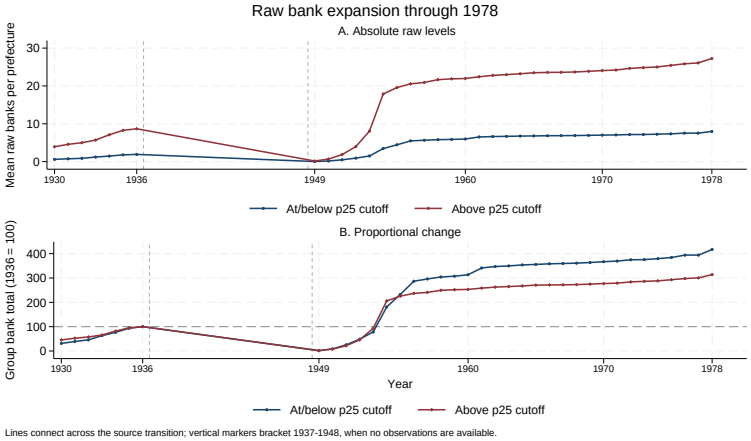
Figure F.1: Raw Bank-Office Dynamics, 1930–1936 and 1949–2022

(a) All Years **(b)** 1930–1960



Notes: The figure sums raw recorded bank-office counts over the same 247 prefectures used by the baseline IV. Recorded bank offices rise from 1,610 in 1936 to 4,164 in 1960, an increase of 159%. The series contains no observations from 1937 to 1948.

Figure F.2: Raw Bank Expansion Through 1978 in Absolute and Proportional Terms



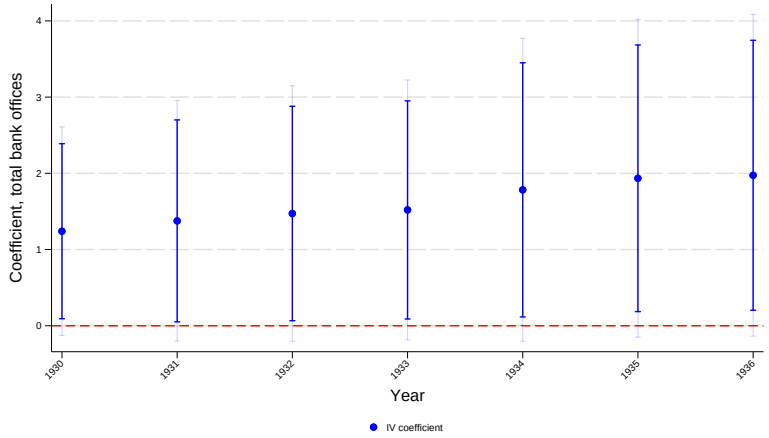
Notes: Panel A reports mean raw banks per prefecture. Panel B indexes each group's raw bank total to 100 in 1936. The lower-exposure group contains prefectures at or below the empirical 25th percentile of missionary exposure; because ties at four missions are retained, it includes 79 of 247 prefectures. The comparison group contains the remaining 168 prefectures. Lines connect the 1936 and 1949 observations, while vertical markers bracket 1937–1948, when no observations are available.

Table F.1: IV Estimates of Mao-Period Bank Changes

Outcome	Start point	Endpoint	IV coefficient	Robust SE	p	Implied change
Raw bank change	1936	1960	1.836	2.957	0.535	
Log bank change	1936	1960	-0.077*	0.045	0.086	-7.4%
Raw bank change	1936	1978	2.216	3.190	0.488	
Log bank change	1936	1978	-0.066*	0.039	0.089	-6.4%

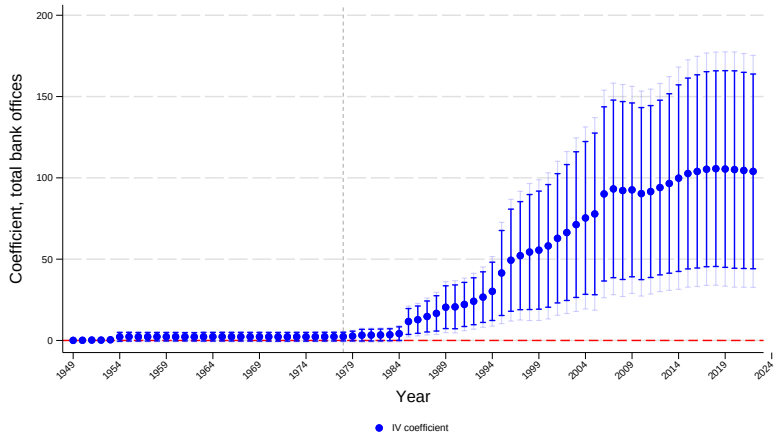
Notes: The table reports 2SLS estimates in the 247-prefecture baseline-IV sample. Missionary exposure is instrumented with predicted missionary exposure from the railway-flow instrument. The raw outcome is the endpoint count minus the 1936 count. The log outcome is the difference in $\ln(1+\text{banks})$. All regressions include the baseline railway controls and province fixed effects and use robust standard errors. The Kleibergen–Paap first-stage F-statistic is 14.87 in every row. The implied percentage change is $100[\exp(\widehat{\beta})-1]$. * indicates significance at the 10% level.

Figure F.3: 2SLS Estimates: Total Modern Banks, 1930–1936



Notes: The figure reports coefficients from separate year-specific regressions based on Equation 4, using the historical modern-bank data from the difference-in-differences design. The outcome and all IV-side variables use the 1st–99th percentile convention. The average post-treatment ATT in the historical design is 0.22. The dependent-variable means are 2.4 in 1930 and 5.8 in 1936. The IV estimates correspond to increases of approximately 51% and 34%, respectively. Dark and light intervals show 90% and 95% confidence intervals.

Figure F.4: 2SLS Estimates: Total Banks, 1949–2022



Notes: The figure reports coefficients from separate year-specific regressions based on Equation 4. Modern county- and district-level bank counts are assigned to 1911 prefectures by each modern unit's centroid, and the annual outcome and all IV-side variables use the 1st–99th percentile convention. Mean total-bank counts are 145 in 1990 and 707 in 2022. The 1990 and 2022 estimates correspond to increases of approximately 14.2% and 14.7%, respectively. Dark and light intervals show 90% and 95% confidence intervals. Source: China Financial Supervision and Administration Bureau.

Table F.2: Headline IV Estimates

	(1) Std. modern banks 1936	(2) Std. total banks 2020	(3) GDP 2019
Missionary institutions	0.152*	0.145***	7,581***
	(0.083)	(0.051)	(2,745)
RR Duration	-0.0125	-0.0046	-304.1
	(0.0095)	(0.0065)	(330.5)
RR Density	105.5**	47.50	1,972,945
	(48.0)	(32.14)	(1,574,214)
Province FE	Yes	Yes	Yes
Observations	247	247	242
K–P F-stat	14.87	14.87	15.01
Mean dep. var.	0.000	0.000	46,051
SD dep. var.	1.000	1.000	52,206

Notes: The table reports 2SLS estimates from Equation 4. 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 2020 bank counts constructed by assigning modern counties and districts to 1911 prefectures by their centroids. Column (3) uses 2019 GDP in millions of 2017 US dollars, constructed by summing 1-km grid cells directly within accepted 1911 prefecture polygons. The mission stock, instrument, railway controls, and outcomes use the 1st–99th percentile convention. 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.

F.2 Population Controls and Per-Capita Outcomes

Population adjustment produces a similar long-run bank result. Table F.3 adds two alternative population measures to both stages of the IV specification or uses population to construct banks-per-capita outcomes. The estimated effect remains positive across all four specifications. Our preferred population-control and per-capita checks use the same county-centroid Census 2015 scale, and Figure F.5 shows the corresponding year-by-year per-capita estimates. The post-reform coefficients remain positive and are statistically distinguishable from zero in recent years.

These checks are not the baseline specifications because population need not be predetermined with respect to missionary exposure. Missions and the institutions that followed them may have affected subsequent population growth, migration, or urban concentration. Controlling for later population can therefore condition on a potential outcome of treatment, while dividing by it changes the estimand. We report both approaches as robustness checks rather than treating population adjustment as conceptually neutral.

Table F.3: Long-Run Bank Results with Population Controls and Per-Capita Outcomes

	Population controls		Per-capita outcomes	
	1880 population	Census 2015 county-centroid scale	1880 denominator	Census 2015 denominator
Missionary institutions	0.146**	0.143*	0.042	0.052**
	(0.069)	(0.085)	(0.027)	(0.024)
Outcome	Standardized 2020 bank presence		Standardized banks per million	
Province fixed effects	Yes	Yes	Yes	Yes
Railway controls	Yes	Yes	Yes	Yes
Observations	247	231	247	231
First-stage F-statistic	8.59	4.18	14.87	15.67

Notes: The table reports IV estimates from Equation 4. The 2020 bank outcome assigns modern county- and district-level bank counts to historical prefectures according to the modern unit's centroid. The mission stock, instrument, railway controls, and bank outcomes use the 1st–99th percentile convention. The first two specifications add the indicated log population measure or scale to both stages. The last two use bank counts per million denominator units and standardize the resulting outcome. The 1880 measure is the historical baseline population. The Census 2015 measure is constructed by summing normalized person weights within modern counties and districts and assigning each modern unit to its historical prefecture by its centroid; it is therefore a weighted relative population scale rather than a literal full-population count. All specifications include province fixed effects and the railway controls used in the baseline IV design. Robust standard errors are in parentheses. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

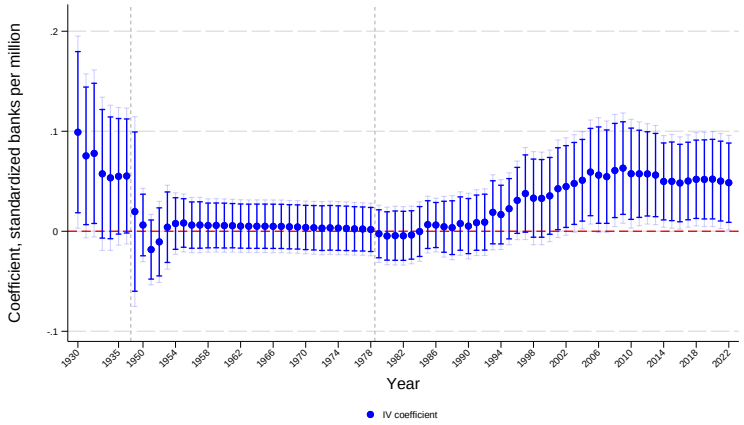
Table F.4 applies the same four-specification structure to the direct-grid GDP outcome in 2019. The estimated effect is positive under every population adjustment. It is significant at the 5% level when 1880 population is added as a control and when GDP per capita uses either denominator, and at the 1% level when GDP per capita uses the Census 2015 denominator.

Table F.4: Long-Run GDP Results with Population Controls and Per-Capita Outcomes

	Population controls		Per-capita outcomes	
	1880 population	Census 2015 county-centroid scale	1880 denominator	Census 2015 denominator
Missionary institutions	8,358**	8,190	0.055**	0.070***
	(3,922)	(5,049)	(0.025)	(0.024)
Outcome	GDP, 2019 (millions of 2017 USD)		Standardized GDP per million	
Province fixed effects	Yes	Yes	Yes	Yes
Railway controls	Yes	Yes	Yes	Yes
Observations	242	231	242	231
First-stage F-statistic	8.64	4.18	15.01	15.67

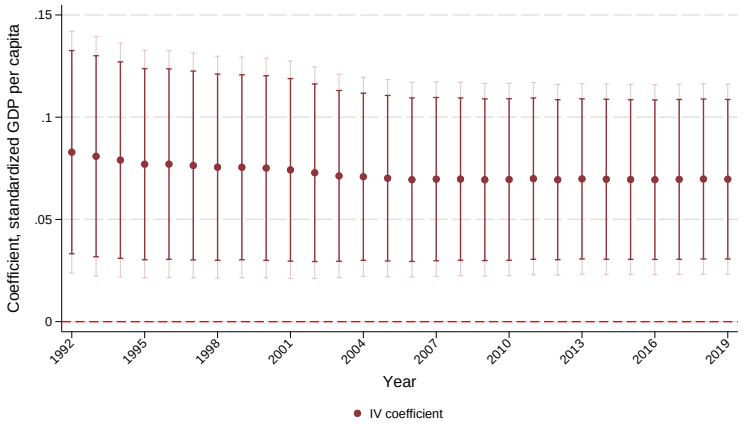
Notes: The table reports IV estimates from Equation 4. The 2019 GDP outcome sums 1-km grid-cell GDP directly within accepted 1911 prefecture polygons. The mission stock, instrument, railway controls, and GDP outcome use the 1st–99th percentile convention. The first two specifications add the indicated log population measure or scale to both stages. The last two express GDP per million denominator units and standardize the resulting outcome. The 1880 measure is the historical baseline population. The Census 2015 measure is constructed by summing normalized person weights within modern counties and districts and assigning each modern unit to its historical prefecture by its centroid; it is therefore a weighted relative population scale rather than a literal full-population count. All specifications include province fixed effects and the railway controls used in the baseline IV design. Robust standard errors are in parentheses. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

Figure F.5: 2SLS Estimates: Banks Per Capita, 1930–1936 and 1949–2022



Notes: The figure reports year-specific estimates from Equation 4. Modern county- and district-level bank counts are assigned to 1911 prefectures by each modern unit's centroid. The outcome is bank counts per million county-centroid Census 2015 scale units, winsorized at the 1st and 99th percentiles and standardized within year; the same Census 2015 denominator is used in every year. Blue points are IV estimates, and dark and light intervals show 90% and 95% confidence intervals. The red dashed horizontal line marks zero, and gray vertical dashed lines mark 1949 and 1978. The coefficient is 0.052 in 2020 ($p = 0.032$) and 0.049 in 2022 ($p = 0.045$); both estimates use 231 historical prefectures.

Figure F.6: 2SLS Estimates: GDP Per Capita, 1992–2019



F.3 Industrial Enterprises and External Finance Dependence

We complement the bank and GDP results with industrial-enterprise outcomes from the Annual Survey of Industrial Production (ASIP). The outcome is the number of industrial enterprises observed in the survey, not sales, employment, output, borrowing, or the universe of registered firms. We report all ASIP enterprises and private ASIP enterprises, where private enterprises are identified using the survey's paid-in-capital ownership classification. The yearly outcomes are expressed per million residents and standardized within year before estimating Equation 4.

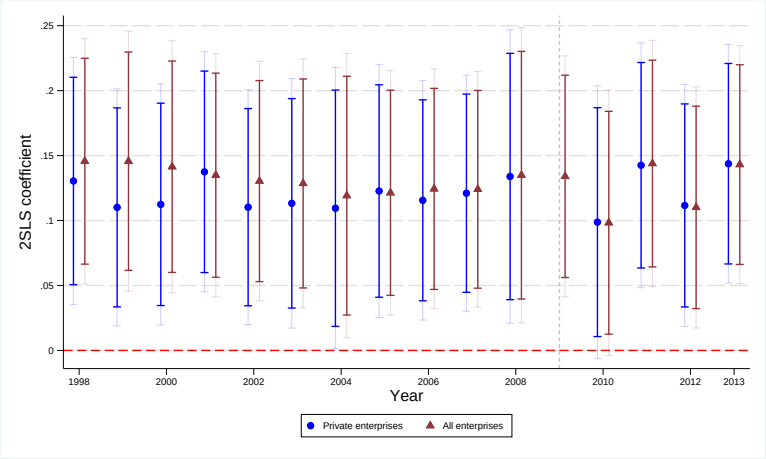
To study whether the enterprise response is related to financial intermediation, we construct an industry-level measure of external finance dependence following the logic of Rajan and Zingales (1998). For firm i in three-digit industry j, we first calculate

$$\mathrm{EFD}_{it} = \frac{\mathrm{Investment}_{it} - \mathrm{Operating\ Cash\ Flow}_{it}}{\mathrm{Investment}_{it}}$$

over 2004–2006, requiring positive investment. Investment is the ASIP real-investment field. Operating cash flow is the direct operating-cash-flow field when available and operating cash inflows minus outflows otherwise. We then take the median of this ratio across firm-year observations within each three-digit industry. "High finance dependence" denotes industries at or above the median of these industry values; "low finance dependence" denotes industries below the median. This classification is therefore a predetermined industry characteristic measuring the need for outside finance, not a firm-level measure of realized borrowing.

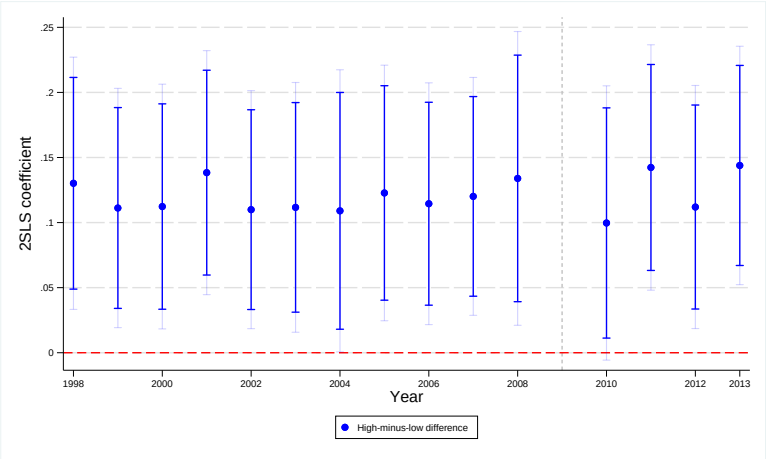
We assign geocoded ASIP firm locations directly to accepted 1911 prefecture polygons. For records without a usable direct match, we use the modern county or district centroid and then an area-weighted modern-city crosswalk as a final fallback. Firm counts are aggregated to historical prefecture-year cells before the per-capita transformation, 1st–99th percentile winsorization, and within-year standardization.

Figure F.7: Historical Missionary Exposure and Industrial Enterprises



Notes: The figure reports year-specific 2SLS estimates from Equation 4. Geocoded ASIP firms are assigned directly to accepted 1911 prefectures, with county-centroid and area-weighted city fallbacks when a direct match is unavailable. Outcomes are private and all ASIP industrial enterprises per million residents, winsorized at the 1st and 99th percentiles and standardized within year. Dark and light intervals show 90% and 95% confidence intervals. In the 2007–2013 period-average specification, the coefficient is 0.128 standard deviations for private enterprises and 0.129 for all enterprises. The corresponding raw private-enterprise estimate is approximately 40 firms per million residents, or 15.8% of the sample mean. The private-enterprise outcome is omitted in 2009 because the ASIP ownership field mechanically assigns every observation to the same category in that year; the all-enterprise outcome remains defined.

Figure F.8: Historical Missionary Exposure and the Difference in Private Enterprises between High- and Low-External-Finance-Dependence Industries



Notes: The figure reports year-specific 2SLS estimates from Equation 4. The outcome is the number of private ASIP industrial enterprises per million residents in high-external-finance-dependence industries minus the corresponding number in low-external-finance-dependence industries. Positive coefficients therefore indicate that historical missionary exposure predicts a larger increase in private-enterprise counts in high-dependence industries. Geocoded ASIP firms are assigned directly to accepted 1911 prefectures, with county-centroid and area-weighted city fallbacks when a direct match is unavailable. The high-minus-low outcome is winsorized at the 1st and 99th percentiles and standardized within year before estimation. Dark and light intervals show 90% and 95% confidence intervals. In the 2007–2013 period-average specification, the estimate is 0.128 standard deviations; on the corresponding unstandardized, winsorized per-capita scale, the estimate is approximately 37 private enterprises per million residents, or 15.8% of the sample mean of the difference outcome. The private-enterprise outcome is omitted in 2009 because of the ASIP ownership-coding anomaly described in Figure F.7.

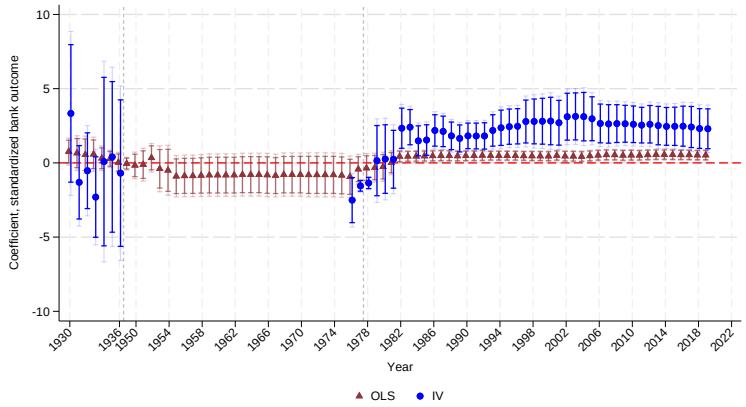
Together, the enterprise results indicate that the long-run effect is not limited to the number of banks. Missionary-exposed prefectures have more later industrial activity, including private industrial enterprises. The high-minus-low finance-dependence outcome is also positive, although the independently standardized high- and low-dependence coefficients are similar in magnitude. We interpret this as complementary evidence consistent with a finance channel, while recognizing that ASIP covers surveyed industrial enterprises above the applicable size threshold.

F.4 Long-Run Mechanism Evidence

This section reports the detailed evidence summarized in Section 6. The exercises use several units of observation and therefore cannot be reduced to one identical regression. Wherever the unit is a prefecture, we retain the baseline long-run specification: railway controls and province fixed effects in OLS, with historical missionary exposure instrumented by predicted missionary exposure in IV. Individual-level exercises add the fixed effects and controls appropriate to the underlying biographies or surveys. Shaanxi exercises use counties nested in 1911 prefectures, absorb historical-prefecture fixed effects, and instrument pre-1950 mission presence with predicted missionary exposure. We report these results as a structured set of mechanism checks rather than as independent causal estimates.

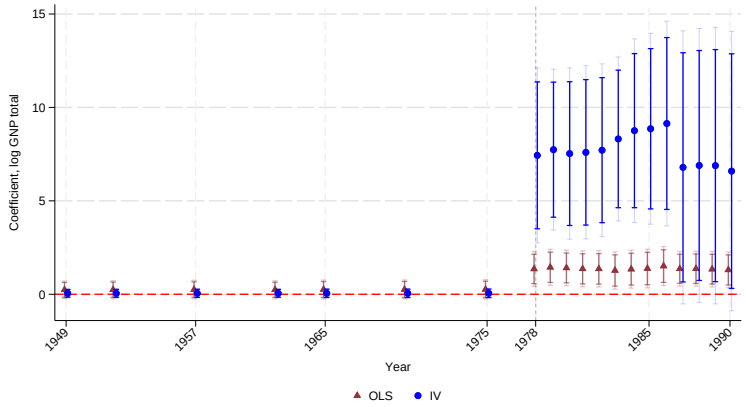
F.5 Shaanxi County-Level Long-Run Replication

Figure F.9: Historical Missionary Exposure and Long-Run Financial Institutions in Shaanxi



Notes: The figure reports year-specific OLS and IV estimates for standardized modern banks or financial institutions in Shaanxi counties. Blue circles show IV estimates and maroon triangles show OLS estimates; light and dark intervals are 95% and 90% confidence intervals. OLS includes 1911 historical-prefecture fixed effects. IV instruments pre-1950 mission presence with predicted missionary exposure and adds railway duration and cumulative railway-area exposure. Early post-1949 financial-institution coverage is sparse, so Mao-period IV estimates are generally not estimable.

Figure F.10: Historical Missionary Exposure and Log GNP in Shaanxi, 1949–1990



Notes: The figure reports year-specific OLS and IV estimates for log total GNP in Shaanxi counties. Specifications, markers, and confidence intervals follow Figure F.9; the dashed vertical line marks 1978. Broad county-level GNP coverage begins in 1978, so the earlier coefficients are retained for continuity but should be interpreted descriptively.

Table F.5: Shaanxi County-Level Bank and GNP Estimates by Period

Outcome	Period	OLS	OLS SE	IV	IV SE	First-stage F	Obs.
Std. financial institutions	1930–1936	0.452	0.407	-0.144	1.966	15.88	30
Std. financial institutions	1949–1976	-0.763	0.665	–	–	–	–
Std. financial institutions	1978–2022	0.430**	0.165	2.047***	0.671	14.93	87
Log GNP	1978–1990	1.370***	0.460	7.711***	2.708	15.00	89

Notes: Outcomes are averaged within county over the indicated period. The financial-institution outcome is standardized within year; log GNP is $\log(1 + \text{GNP})$ and uses 1978–1990, the years with broad county coverage. Specifications follow Figures F.9 and F.10. The Mao-period financial-institution IV is not estimable because early post-1949 coverage is too sparse after fixed effects and railway controls. The historical financial-institution series records cumulative establishments rather than a complete active-stock panel. ***, **, and * indicate significance at the 1%, 5%, and 10% levels.

F.6 Returning Talent and Elite Networks

Table F.6: Mission-Exposed Origins and the Technical Diaspora in Taiwan

	Any Taiwan record		Observed in Taiwan, 1974 or later	
Origin-place exposure	(1)	(2)	(3)	(4)
Any mission institution by 1880	2.73*		2.45**	
	(1.65)		(1.18)	
Any mission school by 1900		6.23*		5.36**
		(3.33)		(2.37)
Native-province FE	Yes	Yes	Yes	Yes
Historical controls	Yes	Yes	Yes	Yes
Observations	11,657	11,657	11,657	11,657
Origin-prefecture clusters	205	205	205	205
Mean dependent variable	5.1%	5.1%	3.0%	3.0%

Notes: Each observation is an engineer/scientist origin record. Coefficients are percentage-point changes from origin-prefecture OLS regressions. The 1974-or-later outcome is the stricter near-reform Taiwan measure. Historical controls include coastal location, main-river access, treaty-port and provincial-capital status, city size, log population, river length, 1820 tax per capita, *jinshi*, and official counts. Standard errors are clustered by origin prefecture. ***, **, and * indicate significance at the 1%, 5%, and 10% levels.

Table F.7: Mission Origins, Foreign Exposure, and Mainland Institutional Roles

	Outcome: mainland or PRC institutional role	
	Mao period	Reform period
Mission-exposed origin	-7.05	-24.10*
	(5.08)	(14.09)
Foreign exposure	-8.38	-49.63***
	(8.12)	(17.16)
Mission-exposed origin × foreign exposure	14.77*	54.64***
	(8.09)	(17.33)
Province FE	Yes	Yes
Birth-decade FE	Yes	Yes
Historical controls	Yes	Yes
Observations	6,357	2,510
Origin-prefecture clusters	222	202
Mean dependent variable	65.2%	71.9%

Notes: Coefficients are percentage points. Mission-exposed origin equals one if the elite's birth or origin prefecture contained a mission institution during ages 0–25. Foreign exposure is biographical evidence of study, residence, or work outside mainland China. In the reform-period regression, adjusted mainland-role probabilities are 93.5% for neither exposure, 69.4% for mission exposure only, 43.8% for foreign exposure only, and 74.4% for both. The implied mission association among foreign-exposed elites is 7.72 (SE 6.67) during the Mao period and 30.53 (SE 18.54) during the reform period. In a pooled person-by-period specification, the reform-minus-Mao difference in this full association is 24.68 percentage points ($p = 0.117$), while the corresponding triple interaction is 42.53 percentage points ($p = 0.005$). Historical controls include log population, examination quota, treaty-port status, coast, main river, rebellion, Boxer activity, and 1820 tax per capita. Standard errors are clustered by origin prefecture. ***, **, and * indicate significance at the 1%, 5%, and 10% levels.

F.7 Commercial Persistence and Foreign Investment

Table F.8: Historical Missionary Exposure and Foreign Direct Investment

	Log FDI, 2017		Log FDI per capita, 2017	
	OLS	IV	OLS	IV
Mission count	0.066***	0.129**	0.018*	0.060*
	(0.011)	(0.051)	(0.009)	(0.034)
Railway controls	Yes	Yes	Yes	Yes
Province FE	Yes	Yes	Yes	Yes
Observations	240	240	240	240
R-squared	0.569		0.483	
First-stage F-statistic		14.22		14.22
Mean dependent variable	9.799	9.799	4.306	4.306
SD dependent variable	2.557	2.557	1.727	1.727

Notes: The unit is a 1911 prefecture. Modern-city FDI is assigned to historical prefectures using area-overlap weights. Raw total and per-capita FDI are winsorized at the 1st and 99th percentiles before applying the reported $\log(1 + x)$ transformations. Mission count is the historical number of missionary institutions. IV instruments mission count with predicted missionary exposure; the mission stock, instrument, and railway controls use the same 1st–99th percentile convention. Robust standard errors are in parentheses. ***, **, and * indicate significance at the 1%, 5%, and 10% levels.

F.8 Religious and Cultural Change

Table F.9: Historical Missionary Exposure and Contemporary Christian Affiliation

Panel A. China Family Panel Studies

	Christian belief	Protestant belief	Catholic belief
Mission count	0.0002	0.0005**	-0.0001
	(0.0002)	(0.0002)	(0.0002)
1911 prefecture FE	Yes	Yes	Yes
Wave FE	Yes	Yes	Yes
Individual controls	Yes	Yes	Yes
Observations	97,509	97,509	97,509
Clusters	122	122	122
Mean dependent variable	0.035	0.028	0.013

Panel B. Chinese Spiritual Life Survey

	Christian belief	Protestant belief	Catholic belief
Mission count	0.0029*	0.0020	0.0010
	(0.0017)	(0.0017)	(0.0009)
1911 province FE	Yes	Yes	Yes
Railway controls	Yes	Yes	Yes
Individual controls	Yes	Yes	Yes
Observations	5,660	5,660	5,660
Clusters	40	40	40
Mean dependent variable	0.028	0.026	0.003

Notes: The CFPS unit is a respondent-wave located to a 1911 county; specifications include 1911 prefecture fixed effects, wave fixed effects, and individual controls, with standard errors clustered by 1911 county. The Spiritual Life Survey uses the high-quality geocoded sample; specifications include 1911 province fixed effects, railway controls, and individual controls, with standard errors clustered by assigned 1911 prefecture. Mission count is the historical missionary-institution count divided by 10. ***, **, and * indicate significance at the 1%, 5%, and 10% levels.

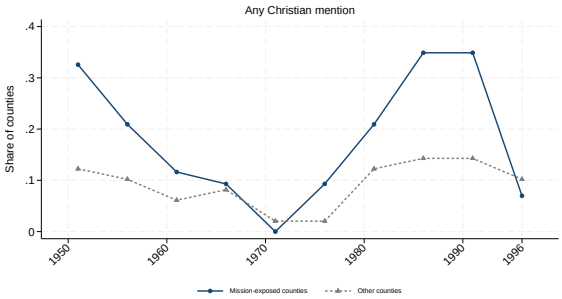
Table F.10: Historical Missionary Exposure and Contemporary Religiosity

	China Family Panel Studies			Chinese Spiritual Life Survey		
	Religious group member	Religion important	Religious activity frequency	Believes in God	Ever prays	Donated to religion
Mission count	0.0000	0.0002	-0.0011	0.0026	-0.0038	0.0020
	(0.0003)	(0.0011)	(0.0038)	(0.0048)	(0.0065)	(0.0076)
Geographic FE	Prefecture	Prefecture	Prefecture	Province	Province	Province
Wave FE	Yes	Yes	Yes	No	No	No
Railway controls	No	No	No	Yes	Yes	Yes
Individual controls	Yes	Yes	Yes	Yes	Yes	Yes
Observations	67,883	74,561	74,885	5,362	5,660	5,706
Mean dependent variable	0.025	0.218	0.598	0.083	0.114	0.226

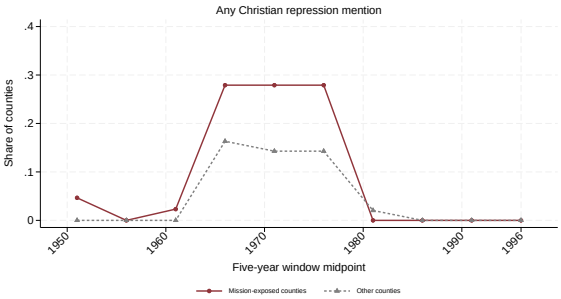
Notes: Sample construction, mission-count scaling, and clustering follow Table F.9. The table shows little systematic association between historical missionary exposure and the intensity of contemporary religious practice. Robust standard errors are in parentheses.

Figure F.11: Christianity and Repression in Shaanxi Local Histories

(a) Christian mentions



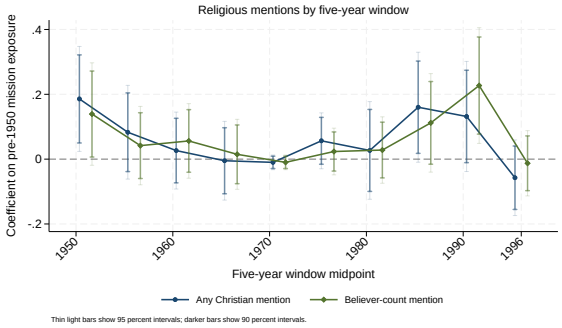
(b) Repression mentions



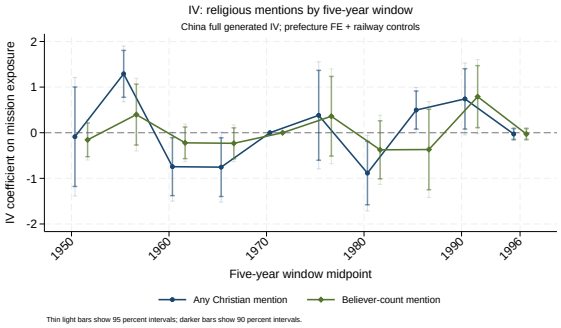
Notes: Split-group sizes: 43 Shaanxi counties with a recorded pre-1950 missionary institution and 49 counties without one.

Figure F.12: Dynamic Estimates for Christian and Repression Mentions in Shaanxi

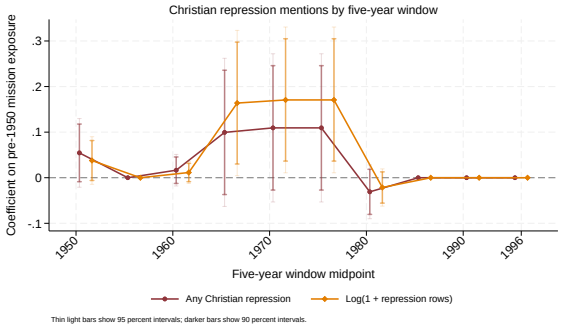
(a) Christian mentions: OLS



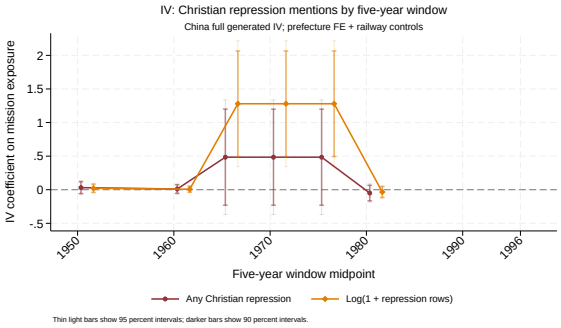
(b) Christian mentions: IV



(c) Repression mentions: OLS



(d) Repression mentions: IV



Notes: Each point is estimated separately by time window. OLS specifications include 1911 historical-prefecture fixed effects. IV specifications instrument the pre-1950 mission-presence indicator with predicted missionary exposure and add railway controls. Bars show 90% and 95% confidence intervals.

Table F.11: Historical Missionary Exposure and Trust

	Trust people generally	Trust family	Trust religious groups
Mission count	0.0377**	0.0028	0.0487
	(0.0162)	(0.0146)	(0.0382)
1911 province FE	Yes	Yes	Yes
Railway controls	Yes	Yes	Yes
Individual controls	Yes	Yes	Yes
Observations	4,389	5,753	2,472
Mean dependent variable	1.781	3.821	1.877

Notes: The data are from the high-quality geocoded Chinese Spiritual Life Survey sample. Mission count is the historical missionary-institution count divided by 10. Standard errors are clustered by assigned 1911 prefecture. ***, **, and * indicate significance at the 1%, 5%, and 10% levels.

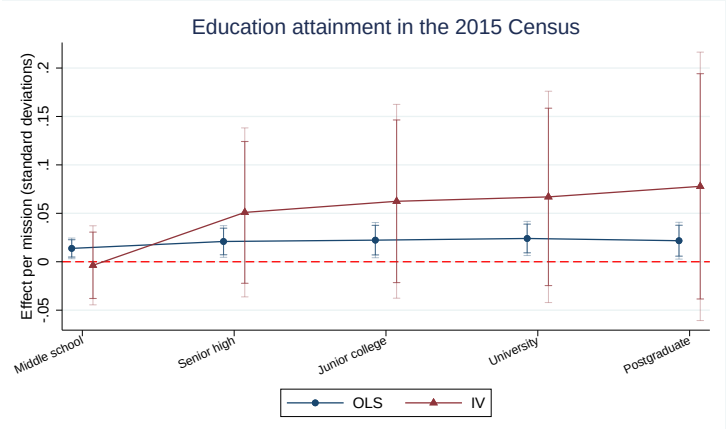
Table F.12: Historical Missionary Exposure and Financial Behavior

	Asset ownership			Risk attitudes and knowledge		
	Has savings	Has financial asset	Has non-deposit asset	Risk tolerance (1–4)	Willing to take investment risk	Knows investment risk
Mission count	0.0020**	0.0019**	0.0051***	0.0047	0.0018	0.0028
	(0.0010)	(0.0009)	(0.0014)	(0.0031)	(0.0015)	(0.0024)
1911 prefecture FE	Yes	Yes	Yes	Yes	Yes	Yes
Wave FE	Yes	Yes	Yes	Yes	Yes	Yes
Individual controls	Yes	Yes	Yes	Yes	Yes	Yes
Observations	131,549	130,797	130,797	6,476	6,476	6,525
Mean dependent variable	0.732	0.770	0.215	1.993	0.576	0.856

Notes: The unit is a CFPS respondent-wave located to a 1911 county. Mission count is the historical missionary-institution count divided by 10. Standard errors are clustered by 1911 county. ***, **, and * indicate significance at the 1%, 5%, and 10% levels.

F.9 Long-Run Education

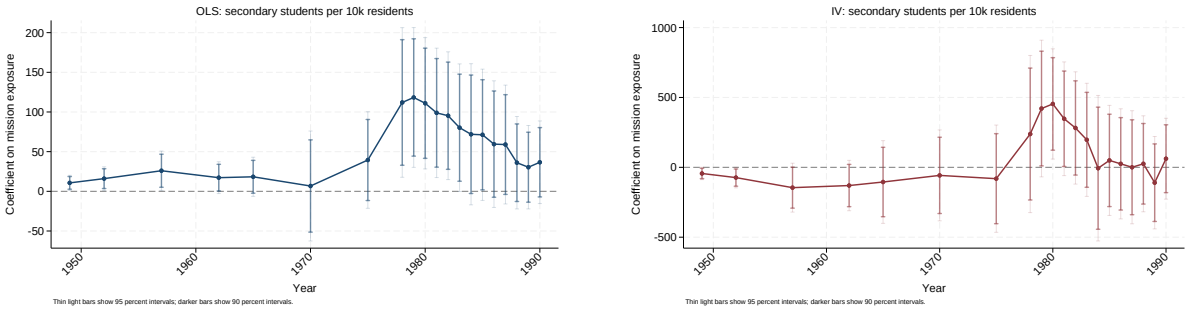
Figure F.13: Historical Missionary Exposure and Education in the 2015 Census



Notes: The unit is a 1911 prefecture and the sample includes adults age 18 and older. Each point comes from a separate regression of a standardized attainment share. Modern counties are assigned using the Census 2015 county-centroid bridge. OLS and IV include province fixed effects and railway controls; IV instruments mission count with predicted missionary exposure. Robust standard errors are used. Dark and light bars show 90% and 95% confidence intervals.

Figure F.14: Historical Mission Exposure and Secondary Students in Shaanxi

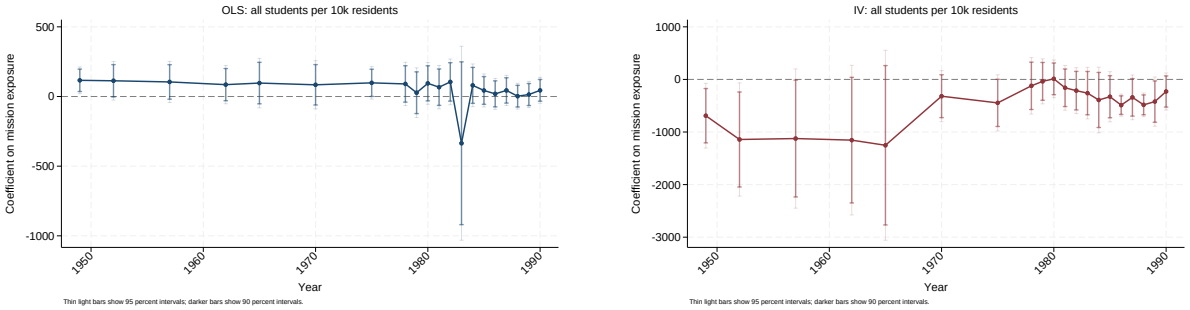
(a) OLS **(b)** IV



Notes: The outcome is secondary students per 10,000 residents in the Shaanxi yearbook county panel. OLS absorbs 1911 historical-prefecture fixed effects. IV instruments the pre-1950 mission-presence indicator with predicted missionary exposure and adds railway controls. Bars show 90% and 95% confidence intervals.

Figure F.15: Historical Missionary Exposure and Students in Shaanxi

(a) OLS **(b)** IV



Notes: The outcome is all students per 10,000 residents in the Shaanxi yearbook county panel. OLS absorbs 1911 historical-prefecture fixed effects. IV instruments the pre-1950 mission-presence indicator with predicted missionary exposure and adds railway controls. Bars show 90% and 95% confidence intervals.

F.10 State Capacity and Infrastructure

Table F.13: Historical Missionary Exposure, State Capacity, and Market Activity in Shaanxi

Panel A. Fiscal capacity

Outcome	1949–1990 IV	1978–1990 IV
Log fiscal expenditure per capita	-1.130*** (0.370)	-0.616*** (0.144)
Log fiscal revenue per capita	-0.845 (0.534)	0.082 (0.286)
Health workers per 10,000 residents	-4.813 (15.494)	-0.294 (17.961)

Panel B. Investment and infrastructure

Outcome	1949–1975 IV	1978–1990 IV
Log fixed-asset investment per capita	-1.182 (1.231)	-1.509 (1.673)
Log basic-construction investment per capita	-1.167 (1.226)	-1.562 (1.623)
Log machinery power per 10,000 residents	-1.320* (0.735)	-2.327** (0.885)
Log rural electricity per capita	-1.513*** (0.365)	-0.405 (0.431)
Log health institutions per 10,000 residents	-0.385 (0.286)	-0.565* (0.334)
Log health-institution beds per 10,000 residents	-0.726 (0.941)	-0.864 (0.817)

Panel C. Market-facing outcomes

Outcome	1949–1975 IV	1978–1990 IV
Log industrial enterprise units	1.516*** (0.442)	1.560*** (0.466)
Log state-owned enterprise units	0.275 (0.491)	-1.436 (1.705)
Log retail sales per capita	0.970** (0.421)	0.486*** (0.157)
Log township enterprise employment	–	1.415*** (0.485)
Log township enterprise units	–	1.022* (0.539)

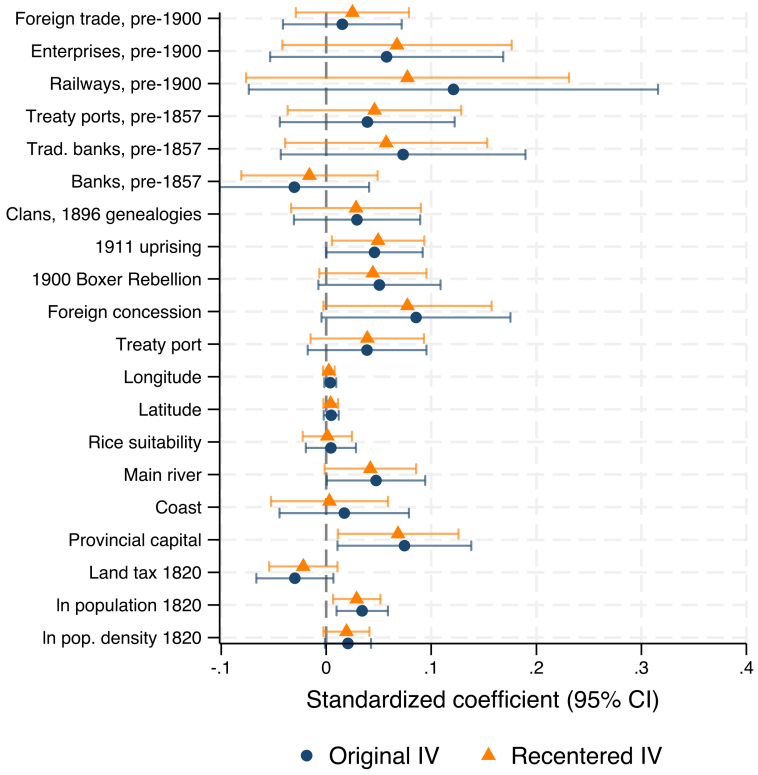
Notes: The unit is a 1911 Shaanxi county. Each cell reports the IV coefficient on pre-1950 mission presence from a separate regression. Mission presence is instrumented with predicted missionary exposure. All specifications absorb 1911 historical-prefecture fixed effects and include railway duration and cumulative railway-area exposure. Panel A uses 89 observations and a first-stage F-statistic of 15.00. Panel B uses 85–88 observations in 1949–1975 and 89 observations in 1978–1990; first-stage F-statistics range from 13.00 to 15.00. Panel C uses 88 observations for the displayed Mao-period outcomes and 89 after reform. Township-enterprise outcomes are available only in the reform period. Robust standard errors are in parentheses. ***, **, and * indicate significance at the 1%, 5%, and 10% levels.

F.11 Placebo Outcomes in the IV Second Stage

As an additional diagnostic, we replace the headline bank and GDP outcomes with fixed prefecture characteristics and early historical outcomes. Each point comes from a separate 2SLS regression in which missionary institutions are instrumented with either the original instrument or the full-permutation recentered instrument. The outcome is standardized, and every regression includes railway duration, railway density, and province fixed effects.

The instruments are balanced on most of these outcomes when considered individually. We interpret the figure as an outcome-by-outcome placebo diagnostic rather than proof that every historical characteristic is balanced.

Figure F.16: Placebo Outcomes: IV Second-Stage Estimates



Notes: Points report separate 2SLS coefficients on instrumented missionary institutions, with standardized placebo outcomes and robust 95% confidence intervals. Blue circles use the original instrument and orange triangles use the full-permutation recentered instrument. All specifications include railway duration, railway density, and province fixed effects. The figure reproduces the SIOE presentation exhibit exactly and therefore uses its earlier 0.5th–99.5th-percentile instrument construction. The pre-1900 and 1911 outcomes can postdate early missionary exposure and should be read as historical diagnostics rather than uniformly predetermined characteristics.

F.12 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.

Table F.14: Recentered IV with Simulated Missionary Flows

Outcome	Instrument	Coef.	SE	K–P F	Obs.
Std. total banks, 2020	Original IV	0.145***	0.051	14.87	247
Std. total banks, 2020	Recentered, full permutation	0.127***	0.043	16.72	247
Std. total banks, 2020	Recentered, 10-year blocks	0.128***	0.044	16.70	247
Direct-grid GDP, 2019	Original IV	7,581***	2,745	15.01	242
Direct-grid GDP, 2019	Recentered, full permutation	6,548***	2,273	16.87	242
Direct-grid GDP, 2019	Recentered, 10-year blocks	6,616***	2,318	16.84	242

Notes: The table reports headline 2SLS estimates for the original long-run IV and two recentered instruments under the 1st–99th percentile convention. 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. Modern bank counts are assigned from counties and districts to 1911 prefectures by their centroids. GDP is measured in millions of 2017 US dollars and constructed by summing 1-km grid cells directly within accepted 1911 prefecture polygons. Table F.15 reports the corresponding first and second stages. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

Table F.15: 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	3.400***	5.923***	5.884***
	(0.882)	(1.448)	(1.440)
RR Duration	0.0690**	0.0667**	0.0667**
	(0.0279)	(0.0282)	(0.0281)
RR Density	-685.3***	-665.5***	-667.3***
	(128.9)	(116.0)	(117.3)
Province FE	Yes	Yes	Yes
Observations	247	247	247
K–P F	14.87	16.72	16.70
Panel B. Second stage: standardized total banks, 2020			
Missionary institutions	0.145***	0.127***	0.128***
	(0.051)	(0.043)	(0.044)
RR Duration	-0.0046	-0.0025	-0.0026
	(0.0065)	(0.0055)	(0.0056)
RR Density	47.5	41.2	41.7
	(32.1)	(29.6)	(29.8)
Province FE	Yes	Yes	Yes
Observations	247	247	247
K–P F	14.87	16.72	16.70
Mean dep. var.	0.000	0.000	0.000
SD dep. var.	1.000	1.000	1.000

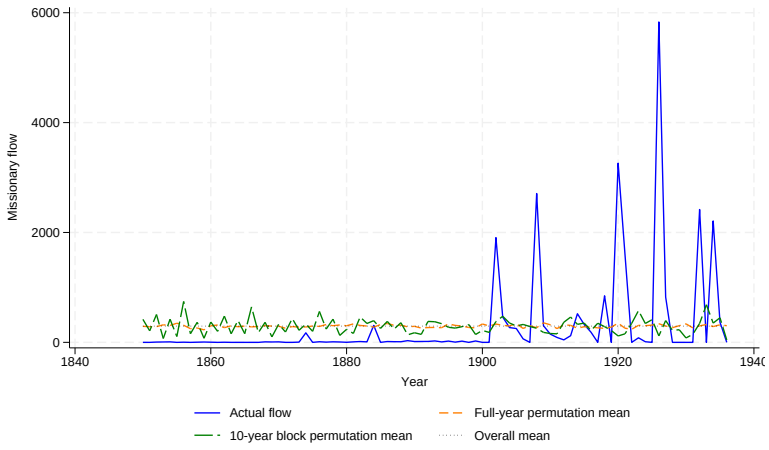
Notes: Robust standard errors are in parentheses. The first-stage dependent variable is missionary institutions in the outcome year. Modern county- and district-level bank counts are assigned to 1911 prefectures by their centroids. The mission stock, instrument, railway controls, and outcome use the 1st–99th percentile convention. All specifications include railway duration, railway density, and province fixed effects. ***, **, and * indicate significance at the 1%, 5%, and 10% levels.

Table F.15: First and Second Stages for Recentered Missionary-Flow IV (continued)

	Original IV	Recentered, full-year	Recentered, 10-year blocks
Panel C. First stage: missionary institutions, direct-grid GDP sample			
Instrument	3.441***	5.985***	5.946***
	(0.888)	(1.457)	(1.449)
RR Duration	0.0675**	0.0653**	0.0653**
	(0.0280)	(0.0283)	(0.0282)
RR Density	-694.7***	-674.0***	-675.7***
	(131.6)	(119.0)	(120.4)
Province FE	Yes	Yes	Yes
Observations	242	242	242
K–P F	15.01	16.87	16.84
Panel D. Second stage: direct-grid GDP, 2019			
Missionary institutions	7,581***	6,548***	6,616***
	(2,745)	(2,273)	(2,318)
RR Duration	-304.1	-187.2	-194.9
	(330.5)	(271.5)	(276.9)
RR Density	1,972,945	1,618,686	1,641,973
	(1,574,214)	(1,397,870)	(1,411,742)
Province FE	Yes	Yes	Yes
Observations	242	242	242
K–P F	15.01	16.87	16.84
Mean dep. var.	46,051	46,051	46,051
SD dep. var.	52,206	52,206	52,206

Notes: Robust standard errors are in parentheses. The first-stage dependent variable is missionary institutions in the outcome year. A separate GDP first stage is reported because the direct-grid GDP and bank outcomes contain different prefectures. The mission stock, instrument, railway controls, and GDP outcome use the 1st–99th percentile convention. All specifications include railway duration, railway density, and province fixed effects. GDP is measured in millions of 2017 US dollars and constructed by summing 1-km grid cells directly within accepted 1911 prefecture polygons. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

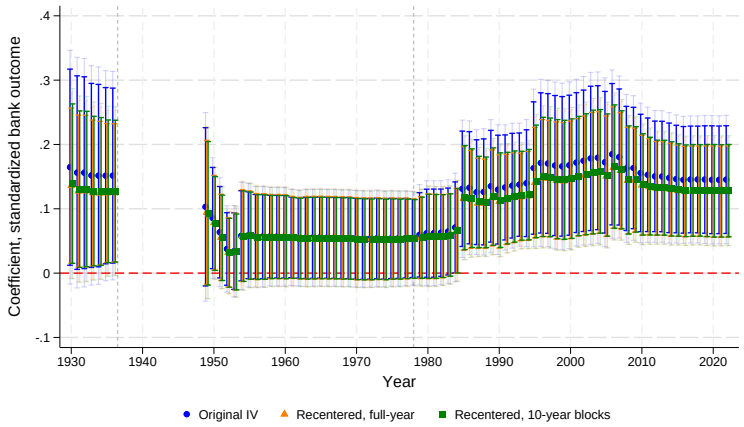
Figure F.17: Actual and Simulated Missionary-Flow Histories



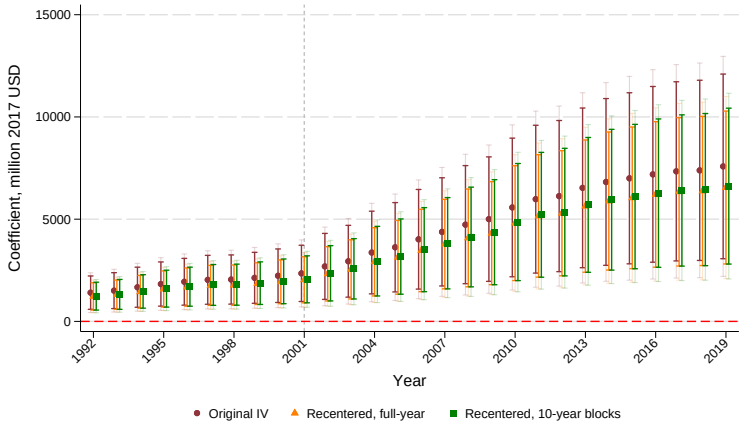
Notes: The figure compares the realized 1st–99th percentile national missionary-flow series with the average counterfactual flow series generated by full-year and 10-year block permutations. These simulated flow histories are used to compute the expected instrument that is subtracted from the original IV.

Figure F.18: Long-Run IV Estimates with Recentered Instruments

(a) Standardized total banks



(b) Direct-grid GDP



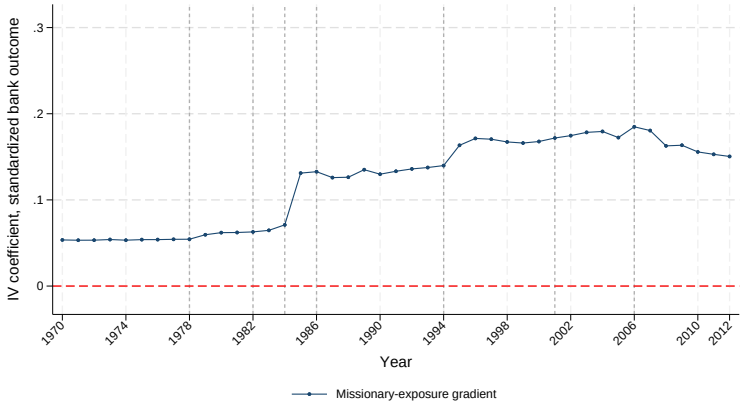
Notes: The figure compares the baseline long-run IV estimates with the recentered-IV estimates based on simulated missionary-flow histories. All inputs and outcomes use the 1st–99th percentile convention. The bank panel uses county- and district-centroid assignments to 1911 prefectures. The GDP panel uses the direct-grid outcome constructed by summing 1-km grid cells directly within accepted 1911 prefecture polygons. The point estimates are slightly smaller after recentering but follow the same time pattern as the baseline estimates.

F.13 Interactions with Opening Policies

The conceptual framework implies that historical missionary exposure should matter more when the national institutional environment raises the return to historically formed market-relevant inputs. We first plot the year-specific coefficients from Equation 4 in a single series, rather than resetting the coefficient to zero before each reform. Figure F.19 shows that the missionary-exposure gradient is largely flat before the opening reforms. It begins to rise after 1978, with the most visible early jump between 1984 and 1985, and rises again during the market-opening sequence of the 1990s and early 2000s.

Unlike the later policy dates, the years before the 1978 opening-reform onset are not already part of an earlier opening-policy sequence. We therefore also report one event-study normalization around 1978:

Figure F.19: Missionary-Exposure Gradient in Standardized Bank Offices, 1970–2012

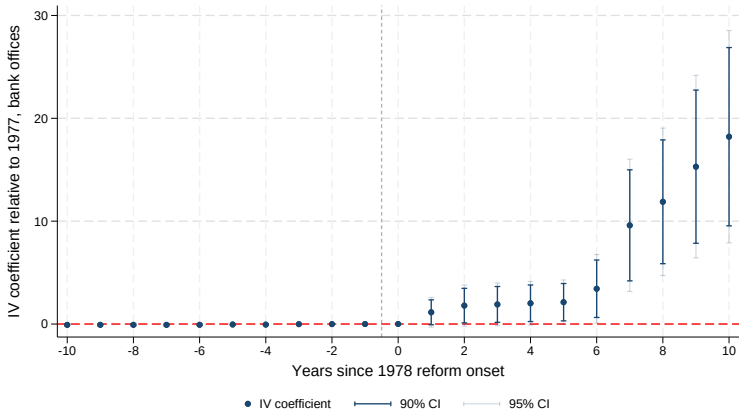


Notes: The figure reports year-specific coefficients from Equation 4. Bank offices are winsorized at the 1st and 99th percentiles and standardized within year. Dashed lines denote 1978 rural reform pilots; 1982 national HRS endorsement; 1984 decollectivization and two-tier banking; 1986 banking-administration rules; 1994 commercialization; 2001 WTO accession; and 2006 completion of the WTO banking phase-in.

$$Y_{i,t} = \alpha_i + \lambda_t + \sum_{\substack{k=-10 \\ k\neq -1}}^{10} \beta_k \text{TotMiss Inst}_i \mathbf{1}\{t = 1978 + k\} + \varepsilon_{i,t}, \tag{5}$$

where each missionary-exposure interaction is instrumented by predicted missionary exposure interacted with the same relative-year indicator, and 1977 is the omitted year. Figure F.20 shows no systematic movement in the ten years before the reform onset; the pre-period coefficients are jointly indistinguishable from zero ($p = 0.465$). The gradient then rises gradually after 1978 and becomes clearly positive from 1984 onward. The later post-period coefficients capture the broader opening sequence, including the decollectivization and banking reforms that followed the initial opening, rather than a single 1978 policy.

Figure F.20: Missionary Exposure and the 1978 Opening-Reform Onset



Notes: The figure reports Equation 5 for the ten years before and after 1978, using 1st–99th percentile-winsorized bank offices. Coefficients are relative to 1977; dark and light intervals are 90% and 95%. Standard errors are clustered by prefecture.

We do not repeat this event-study normalization around the later policy dates. Their pre-periods

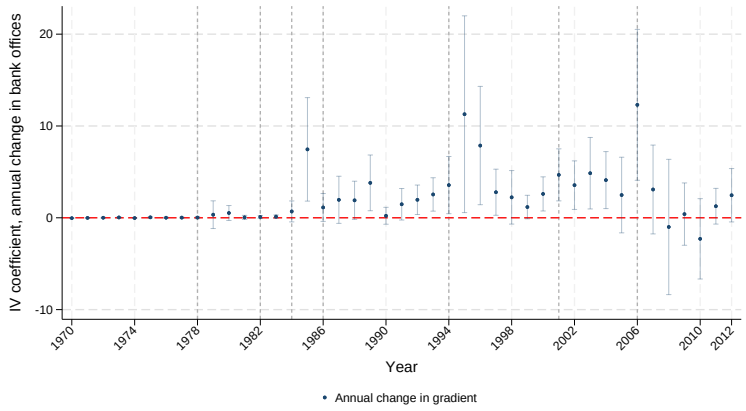
already contain earlier reforms and a rising missionary-exposure gradient, so resetting the year before each policy to zero would mechanically turn that inherited path into apparent negative pre-trends. For those dates, the absolute gradient and growth-shift comparisons below are more informative.

To examine when this gradient changes, we next replace the bank-office outcome with its annual first difference:

$$\Delta Y_{i,p,t} = \xi_{p,t} + \psi_t \text{TotMiss Inst}_{i,p} + \pi_t \text{RR Duration}_{i,p} + \rho_t \text{RR Density}_{i,p} + \nu_{i,p,t}, \tag{6}$$

where $\Delta Y_{i,p,t} = Y_{i,p,t} - Y_{i,p,t-1}$ and missionary institutions are instrumented by predicted missionary exposure as in Equation 3. Figure F.21 reports $\widehat{\psi}_t$ for each year. The largest early increase occurs in 1985, after the 1984 completion of decollectivization and reconstruction of the two-tier banking system. The 2001 coefficient also shows a clear increase around WTO accession. The annual estimates are noisier in the 1990s and 2000s, motivating a more compact comparison around each policy date.

Figure F.21: Annual Change in the Missionary-Exposure Gradient for Bank Offices



Notes: The dependent variable is the annual change in bank offices. Points report the year-specific IV coefficient from Equation 6; intervals are 95%. Dashed lines denote the same policy dates as Figure F.19.

Finally, for each candidate date T_p, we compare the missionary-exposure gradient in annual outcome growth immediately before and after the policy:

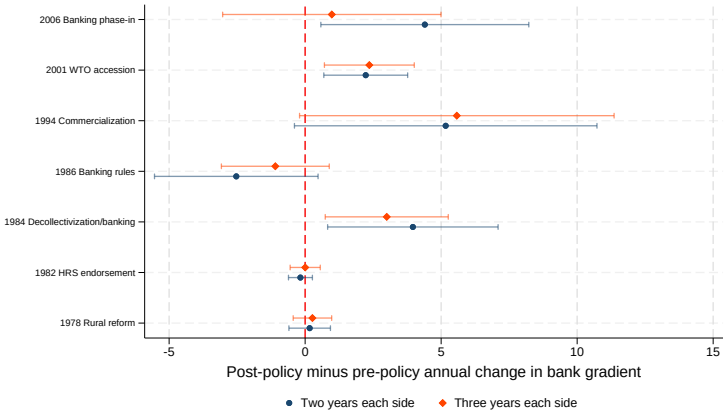
$$\Delta Y_{i,t} = \alpha_i + \lambda_{p(i),t} + \theta_p \text{TotMiss Inst}_i \times \text{Post}_{p,t} + \Gamma'\big(\text{RR}_i \times \text{Post}_{p,t}\big) + \eta_{i,t}, \tag{7}$$

where the missionary interaction is instrumented by predicted missionary exposure interacted with the same post indicator. We estimate Equation 7 using either two or three years on each side of the policy date. Figure F.22 shows that the 1984 and 2001 breaks are positive and statistically distinguishable from zero under both window choices. The 2006 estimate is positive using two years on each side but becomes small and imprecise using three, while the other dates provide less consistent evidence of a break.

Figure F.23 applies the same comparison to direct-grid GDP. The GDP data begin in 1992, so annual changes begin in 1993. The 1994 commercialization marker therefore has only one available pre-policy annual change and cannot support the balanced two- or three-year windows used here. For the subsequent policy dates, the increase around 2001 is positive and statistically distinguishable from zero under both windows. The 2006 estimate is positive but again more sensitive to the window.

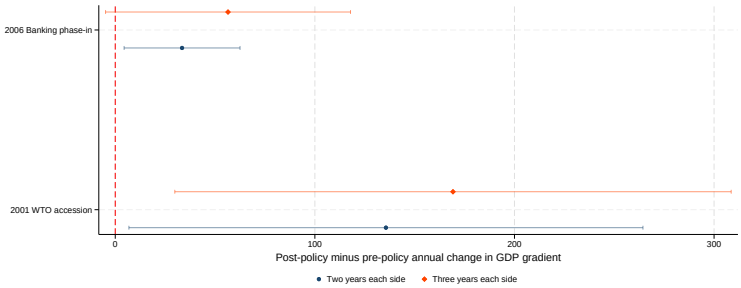
Taken together, these exercises provide the clearest evidence of changes in the missionary-exposure

Figure F.22: Change in Annual Bank-Office Growth Around Candidate Policy Dates



Notes: Each point is the post-period minus pre-period missionary-exposure gradient in annual bank-office changes from Equation 7, using two or three years on each side. Models include prefecture and province-by-year fixed effects and post interactions with the railway controls. Intervals are 95%; standard errors are clustered by prefecture.

Figure F.23: Change in Annual GDP Growth Around Candidate Policy Dates



Notes: Each point is the post-period minus pre-period missionary-exposure gradient in annual GDP changes, using two or three years on each side. GDP is measured in millions of 2017 US dollars and is not standardized. Models and inference otherwise follow Figure F.22. The balanced GDP windows are available for 2001 WTO accession and the 2006 banking phase-in.

gradient around 1984 and 2001. The 1984 break coincides with the completion of rural decollectivization, which dismantled the commune system and shifted production decisions to households, and with the reconstruction of a two-tier banking system that separated central-bank functions from lending by specialized state banks. The 2001 break coincides with China's WTO accession, which deepened its integration into global trade and committed China to a staged opening of domestic banking services to foreign institutions.

Figure F.24: Long-Run 2SLS Robustness: Railway Density and Two Railway Bins

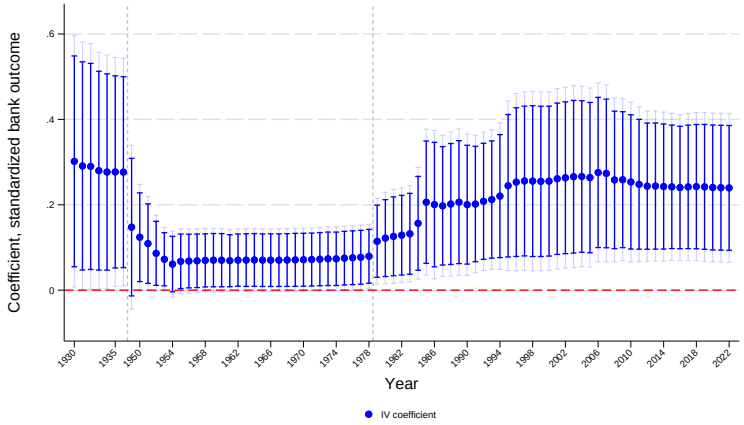
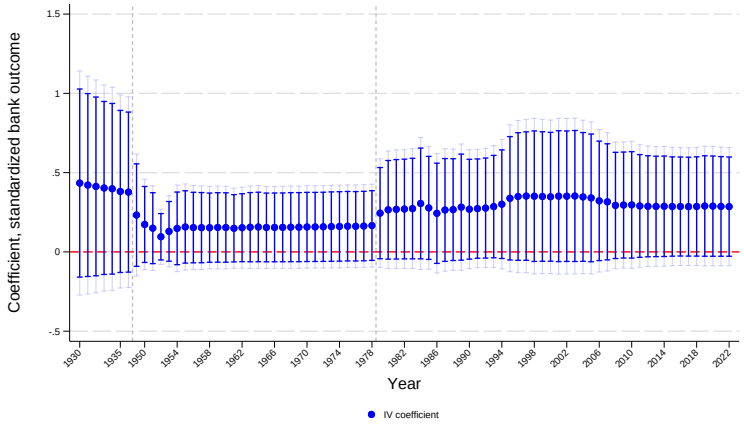


Figure F.25: Long-Run 2SLS Robustness: Railway Density and Six Railway Bins



Notes: Each figure reports year-specific 2SLS coefficients for standardized bank offices using the specification named in its caption. Dark and light intervals show 90% and 95% confidence intervals; dashed lines mark zero, 1949, and 1978. Inputs and outcomes use the 1st–99th percentile convention unless the caption states otherwise. Source: China Financial Supervision and Administration Bureau.

Figure F.26: Long-Run 2SLS Robustness: Railway Mileage per Square Kilometer

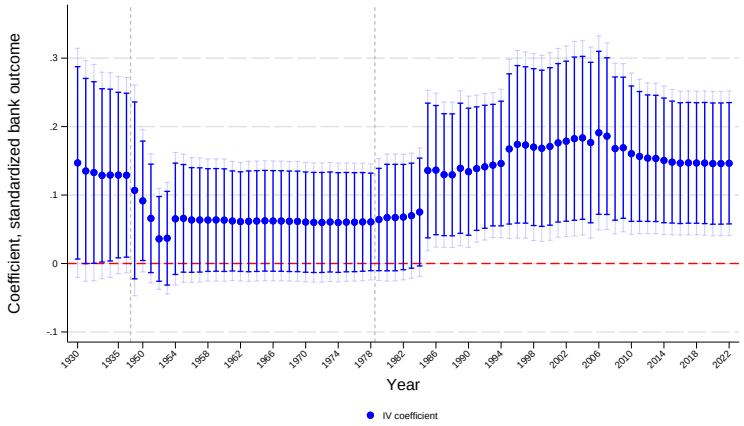
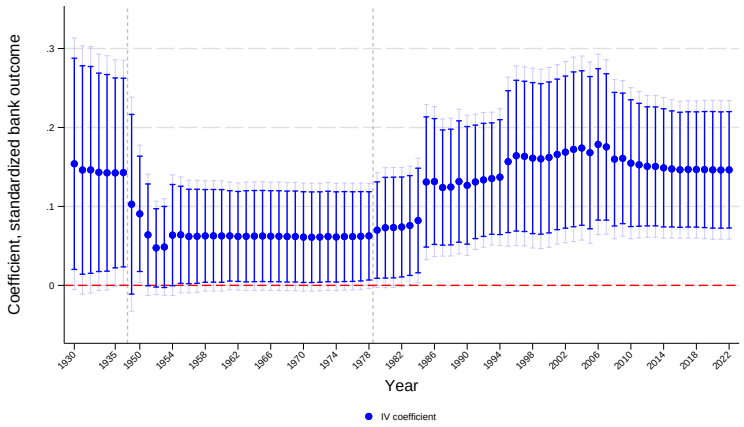


Figure F.27: Long-Run 2SLS Robustness: Latitude and Longitude Controls



Notes: Each figure reports year-specific 2SLS coefficients for standardized bank offices using the specification named in its caption. Dark and light intervals show 90% and 95% confidence intervals; dashed lines mark zero, 1949, and 1978. Inputs and outcomes use the 1st–99th percentile convention unless the caption states otherwise. Source: China Financial Supervision and Administration Bureau.

Figure F.28: Long-Run 2SLS Robustness: Railway Count in 1936

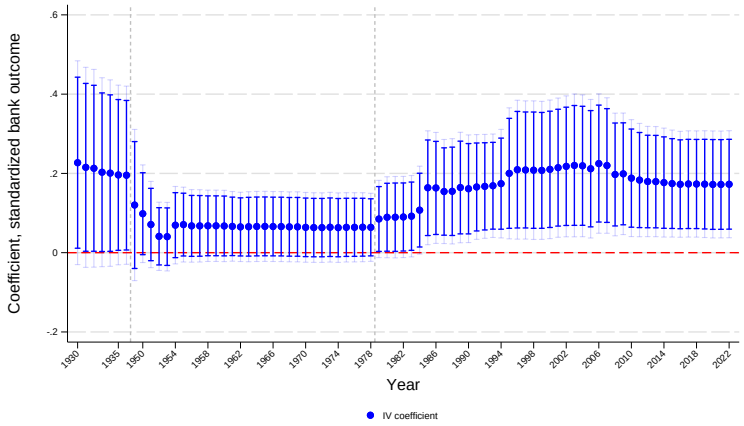
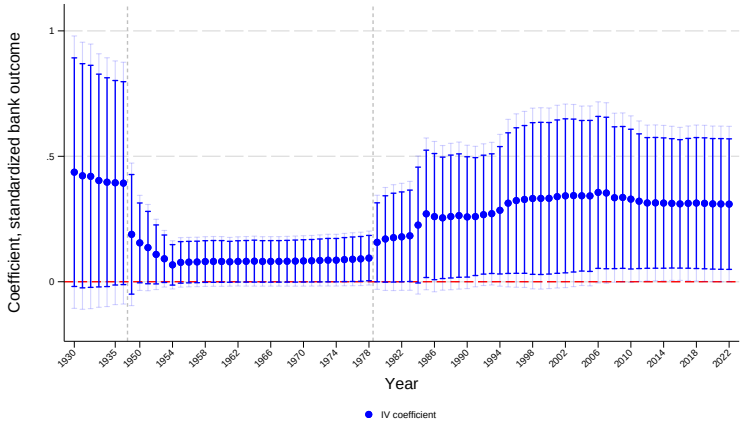


Figure F.29: Long-Run 2SLS Robustness: Railway Duration and Two Railway Bins



Notes: Each figure reports year-specific 2SLS coefficients for standardized bank offices using the specification named in its caption. Dark and light intervals show 90% and 95% confidence intervals; dashed lines mark zero, 1949, and 1978. Inputs and outcomes use the 1st–99th percentile convention unless the caption states otherwise. Source: China Financial Supervision and Administration Bureau.

Figure F.30: Long-Run 2SLS Robustness: Excluding Treaty Ports

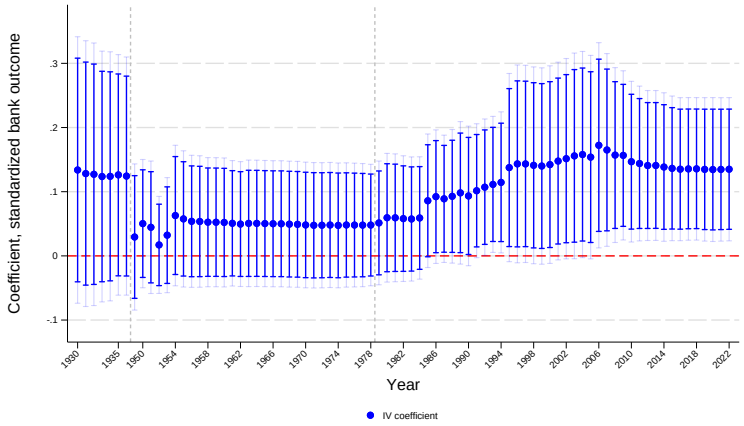
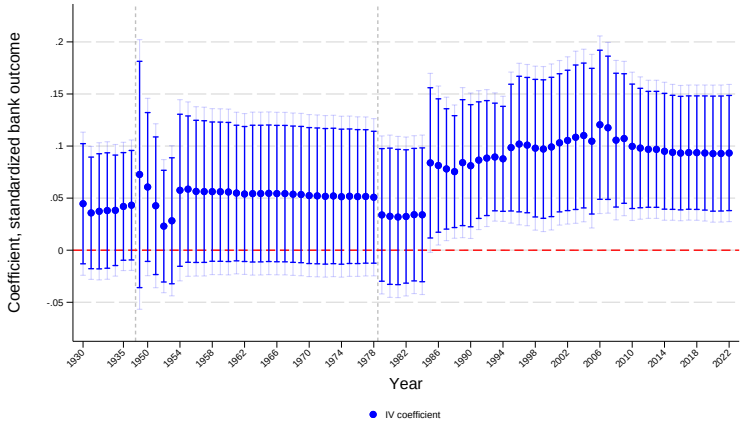


Figure F.31: Long-Run 2SLS Robustness: Excluding the Three Largest Railway Outliers



Notes: Each figure reports year-specific 2SLS coefficients for standardized bank offices using the specification named in its caption. Dark and light intervals show 90% and 95% confidence intervals; dashed lines mark zero, 1949, and 1978. Inputs and outcomes use the 1st–99th percentile convention unless the caption states otherwise. Source: China Financial Supervision and Administration Bureau.

Figure F.32: Long-Run 2SLS Robustness: Alternative Zero-Stage Window, 1850–1950

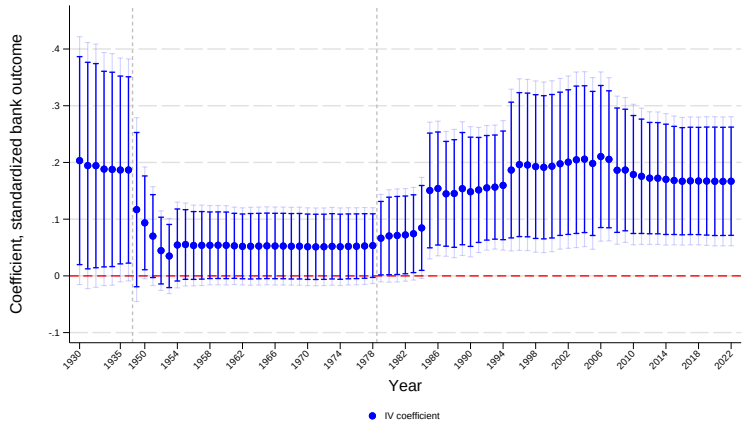
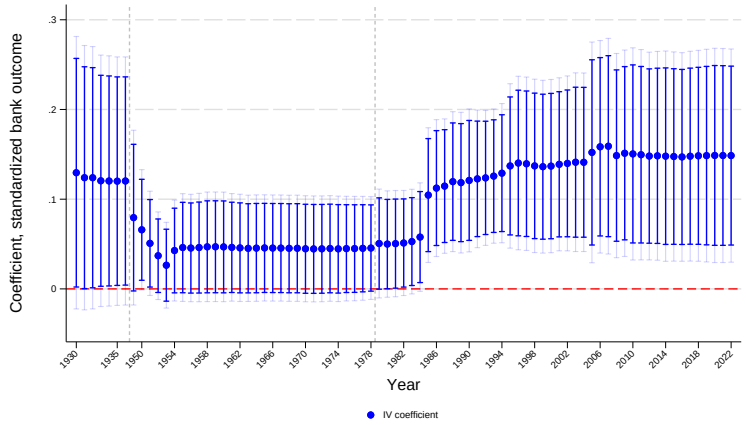
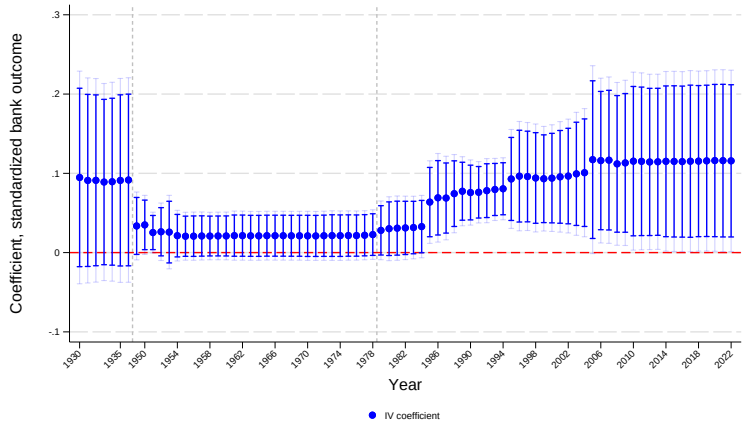


Figure F.33: Long-Run 2SLS Robustness: Alternative Winsorization at the 0.5th and 99.5th Percentiles



Notes: Each figure reports year-specific 2SLS coefficients for standardized bank offices using the specification named in its caption. Dark and light intervals show 90% and 95% confidence intervals; dashed lines mark zero, 1949, and 1978. Inputs and outcomes use the 1st–99th percentile convention unless the caption states otherwise. Source: China Financial Supervision and Administration Bureau.

Figure F.34: Long-Run 2SLS Robustness: No Winsorization



Notes: Each figure reports year-specific 2SLS coefficients for standardized bank offices using the specification named in its caption. Dark and light intervals show 90% and 95% confidence intervals; dashed lines mark zero, 1949, and 1978. Inputs and outcomes use the 1st–99th percentile convention unless the caption states otherwise. Source: China Financial Supervision and Administration Bureau.