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Heritage of Hostility: How Anti-Missionary Violence and Industrial Capacity Shaped China's Quid Pro Quo for Foreign Technology*

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Abstract

Why do some regions fail to adopt the best available technologies? This paper examines how anti-foreign sentiment, proxied by the incidence of anti-missionary violence, and industrial capacity jointly shaped the gains from China's 1983 Quid Pro Quo policy (QPQ, trading market access for technology). Our difference-in-differences analysis shows that the QPQ policy substantially increased foreign technology adoption in cities with more developed early industrial capacity. A subsequent triple-differences specification shows that anti-missionary violence erased around three-quarters of these gains, with the most pronounced effects on critical equipment, licensing agreements, and in cities where officials led the conflicts. Disaggregated analysis with stringent fixed effects demonstrates that hostility toward specific source countries sharply cut technology inflows from those countries. Mechanism analysis suggests that anti-missionary violence contributed to this erosion by deteriorating bilateral municipal ties and deterring the entry of foreign-invested firms. Firm-level matching indicates a 15.8% productivity premium for technology adopters, and a back-of-the-envelope calculation translates this into an average city-level productivity shortfall of 0.128% over 1983–1995 due to anti-foreign sentiment.

Keywords: Foreign Technology Adoption, Quid Pro Quo Policy, Anti-Foreign Sentiment, Industrial Capacity
JEL codes: F63, N45, N75, O14, O33

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1 Introduction

The adoption of foreign technologies plays a significant role in driving productivity growth and economic development (Maskus, 2004; Hu et al., 2005; Rosenberg and Birdzell, 2008; Alviarez et al., 2019; Choi and Shim, 2022; Diao et al., 2024). In most countries, foreign sources of technology contribute to 90 percent or more of domestic productivity growth (Keller, 2004). However, foreign technology adoption in many countries remains unusually low despite trade liberalization (Hsieh and Klenow, 2014). What hinders foreign technology adoption, even when favorable policies and strong industrial foundations are in place? In this paper, we examine how regional anti-foreign sentiment and industrial capacity jointly affect China's Quid Pro Quo (QPQ) policy—trading market access for technology—in shaping foreign technology adoption, highlighting the interplay of cultural attitudes, industrial foundations, and state policy.

Specifically, we focus on China's first QPQ policy established in 1983. From 1950 until the late 1970s, China's foreign technology adoption and economic development remained at low levels. After the Reform and Opening-Up, China faced an urgent need to acquire foreign technologies, especially those from Western countries. In March 1983, the State Council approved the *Report on Further Improving the Operation of Chinese-Foreign Equity Joint Ventures*, which formally affirmed the QPQ policy at the national level.[1] This policy was designed to accelerate the adoption of foreign technologies and to promote subsequent economic development. As a national policy, the intensity of the QPQ policy's impact across cities depends crucially on their pre-existing industrial capacity: cities with more developed industrial capacity were better positioned to absorb, adapt, and apply imported technologies, thereby deriving greater benefits from the policy. By contrast, regions with weaker industrial foundations and limited absorptive capacity faced greater challenges in attracting and adopting foreign technologies (Berlingieri et al., 2019).

However, in addition to policies and industrial capacity, cultural attitudes also exert long-lasting effects on international trade and technology diffusion (Acemoglu and Robinson, 2000). Anti-foreign sentiment constitutes a major barrier to globalization (Caplan and Cowen, 2004). We posit that anti-foreignism could undermine the effectiveness of the QPQ policy and industrial capacity in shaping foreign technology adoption. On the demand side, anti-foreign sentiment can generate local resistance to foreign technologies, investment, and products. On the supply side, it can reduce the willingness of foreign firms to invest in affected regions and impede technology transfer, due to diplomatic tensions and concerns over property rights protection and institutional reliability. Thus, the effectiveness of favorable policies and industrial foundations in promoting foreign technology adoption may be conditional on the intensity of anti-foreignism. This form of hostility has been a persistent feature throughout economic history and has re-emerged in recent years amid escalating geopolitical tensions, contributing to rising risks of deglobalization and leaving

[1] This policy allowed foreign-invested enterprises greater access to sell their products in the Chinese domestic market, not constrained to the specific city that received the foreign technology transfer.

a lasting heritage of hostility.

We focus on this historical period in China for two primary reasons. First, the late 1970s and 1980s marked a watershed period in China's modern history. The pace and scale of the country's economic transformation during this era were unprecedented (Zhu, 2012). Understanding how China embarked on the large-scale adoption of foreign technologies—and the sources of local resistance during this formative era—offers critical insights not only into China's development trajectory, but also into the broader challenges faced by other developing economies in managing external openness and domestic adaptation. Second, the implementation of the 1983 QPQ policy represents a pivotal policy shift and provides an exogenous shock that allows for empirical identification of its impact on foreign technology adoption. To the best of our knowledge, the 1983 QPQ policy has not been examined in the economics literature. While some studies have analyzed China's QPQ policy after 1990 (Holmes et al., 2015; Bai et al., 2020; Ma and Zhang, 2024), it is important to recognize that the policy originated much earlier.

To examine the impact of the QPQ policy, we assemble a novel dataset on foreign technology adoption in China from 1950 to 1990. We employ a difference-in-differences strategy that exploits cross-city variation in pre-determined industrial capacity, proxied by the number of industrial firms established in each city prior to 1927.[2] We find that cities with stronger historical industrial bases adopted significantly more foreign technologies following the policy's implementation in 1983, reflecting their greater capacity to absorb, adapt, and apply imported technologies. To support the identification assumption, we conduct an event study analysis, which reveals that cities with differing levels of early industrial development exhibit no differential pre-trends in foreign technology adoption prior to 1983. Divergent trends emerge only after the policy's implementation, lending support to its effectiveness. To address potential omitted variable bias, we construct an instrumental variable based on the distance to the nearest military factory established during the Qing dynasty's nineteenth-century Self-Strengthening Movement to predict our measure of early industrial capacity. This IV is relevant because these factories served as early hubs of modern machinery, engineering expertise, and skilled labor, enabling nearby regions to develop industrial capacity through spillover effects. The IV estimates further confirm our findings.

After establishing that both the QPQ policy and early industrial capacity play critical roles in shaping foreign technology adoption, we further examine whether anti-foreignism attenuates this effect using a triple-differences strategy. Among cities with comparable industrial foundations, those with stronger anti-foreign sentiment may exhibit greater local resistance to foreign technologies and be less attractive to foreign firms seeking to transfer technology. Building on the above difference-in-differences framework, we introduce a proxy for anti-foreign sentiment as an additional interaction term, measured by the incidence of anti-missionary violence—religious conflicts targeting foreign missionaries in his-

[2] Ideally, pre-determined industrial capacity would be measured by the number of industrial firms established in each city prior to 1950; however, such data are unavailable.

torical China. This measure captures regional variation in hostility toward foreign presence (Liao, 1984), and it is not meaningfully associated with industrial capacity after controlling for the full set of covariates. We find that anti-missionary violence significantly moderates the effect of industrial foundations on foreign technology adoption following the implementation of the policy in 1983. Specifically, among cities with comparable levels of industrial development, those with a history of anti-missionary violence adopt approximately three-quarters fewer foreign technologies. This finding is further corroborated using an event study analysis.

The influence of anti-missionary violence may vary by the mode of technology introduction, the nature of the violence, and regional context. To examine these dimensions, we conduct a series of heterogeneity analyses. We find that the negative effect is particularly pronounced for the introduction of critical equipment and the signing of technology licensing agreements. With respect to the nature of conflict, incidents led by local officials—typically more severe and large-scale—exert a significantly stronger adverse impact on foreign technology adoption. Regionally, the negative effect of anti-foreign sentiment is most pronounced in Han-majority areas, while it is largely absent in ethnically diverse regions, which may exhibit greater openness to cultural exchange and external influences.

One key concern with the triple-differences estimation is the potential for omitted variable bias. We address this concern in two ways. First, we conduct an additional analysis that employs propensity score matching as a pre-processing step to improve covariate balance. Specifically, we match cities that experienced anti-missionary violence to those that did not, but that share similar observable characteristics, such as early industrial capacity. This procedure helps reduce compositional differences between the two groups, allowing for a more credible comparison. By doing so, we render the incidence of anti-missionary violence orthogonal to industrial capacity within this sample, thereby also alleviating the concern that anti-missionary violence directly affects industrial capacity. Second, and more importantly, we disaggregate both anti-missionary violence and technology transfers by source country. This more granular approach enables us to compare technology adoption from different countries within the same city, thereby isolating the effect of country-specific hostility from broader anti-foreign sentiment. Notably, this strategy allows us to control for all time-invariant city-country characteristics as well as country-specific shocks to technology supply. To further strengthen identification, we saturate the model with city-year fixed effects, which effectively absorb any remaining confounders at the city-year level. This high-resolution design offers a stringent causal test: cities with a history of religious conflict targeting a particular country adopted significantly less technology from that country following the 1983 policy.

We conduct extensive robustness checks to assess the reliability of our findings. First, we control for the 1978 reform, an institutional turning point that may have also triggered increased interactions with foreign countries. Second, we account for the historical presence of churches, which is correlated with anti-missionary violence but may influence foreign technology adoption through different channels. Third, we control for the potential impacts of the Cultural Revolution, the Second Sino-Japanese War, and domestic rebellion, all of which could be related to local cultural attitudes. Fourth, we apply Conley standard errors (Conley, 1999) to correct for potential spatial correlation. Fifth, we re-estimate our model using a binary outcome variable for foreign technology adoption, focusing on the extensive margin. Finally, we conduct a placebo exercise by randomly assigning treatment status—the presence of anti-missionary violence. Across all these tests, our main findings remain highly consistent and robust.

We explore potential mechanisms through which anti-foreign sentiment affected foreign technology adoption. First, we focus on bilateral municipal ties. Using a triple-differences approach, we document that, after the QPQ policy, anti-missionary violence dampened the effect of industrial capacity on the likelihood of forming bilateral municipal ties with foreign counterparts, as proxied by sister-city relationships. This finding suggests a deterioration in a city's institutional and cultural engagement with foreign counterparts, reducing overall exchange and interaction, which may have hindered access to foreign technologies (Hu et al., 2021). Second, we find that anti-foreign attitudes shaped local industrial structures by discouraging the entry of foreign-invested firms while favoring state-owned enterprises. This reallocation likely constrained direct channels of foreign technology transfer, as foreign-invested firms typically serve as key conduits for such transfers (Blalock and Gertler, 2008).

To understand the consequences of foreign technology adoption, we further examine its effect on total factor productivity (TFP) using firm-level data from the 1995 Economic Census. Specifically, we employ propensity score matching to compare firms that adopted foreign technologies with observationally similar firms that did not. We find that firms adopting foreign technologies experienced an increase in TFP of approximately 15.8%, representing an economically meaningful gain. This result provides evidence of significant productivity improvements associated with foreign technology adoption in China during the early years of the Reform and Opening-Up period. However, a back-of-the-envelope calculation indicates that cities historically exposed to anti-missionary violence adopted approximately 6.23 fewer foreign technologies between 1983 and 1995, implying an average TFP loss of about 0.128% over the period, an economic manifestation of the heritage of hostility.

We make three contributions to the literature. First, we advance the understanding of foreign technology adoption by highlighting the joint role of cultural attitudes, industrial legacies, and state policy in shaping adoption outcomes. Previous research has identified a range of factors associated with foreign technology adoption, including trade liberalization and openness (Coughlin, 1983; Parente and Prescott, 1994; Wood, 1995; Acemoglu, 2003; Thoenig and Verdier, 2003; Comin and Hobijn, 2004; Keller, 2004; Cervellati et al., 2018), local interest groups (Acemoglu and Robinson, 2000), absorptive capacity (Berlingieri et al., 2019), the strength of the informal sector (Elgin, 2021), geopolitical rivalry (Li et al., 2024), market structure (Vishwasrao and Bosshardt, 2001), geographic distance (Keller, 2002), labor market distortions (Farrokhi et al., 2024), human capital accumulation (Caselli and Coleman, 2001; Comin and Hobijn, 2004), and property rights protection (Caselli and Coleman, 2001; Branstetter et al., 2006). Our study moves beyond single-factor explanations and contributes to a more comprehensive framework for understanding the conditions that facilitate or hinder the adoption of foreign technologies. Our focus on China during a critical historical period (1950–1990)—a setting that has remained understudied because of data constraints—enriches the global comparative perspective on technology adoption by examining how late-industrializing economies balance political objectives, economic foundations, and cultural resistance when engaging with foreign knowledge.[3]

Second, we contribute to the literature on the economic consequences of anti-foreign sentiment. Existing studies have examined how such sentiment affects international trade, wage levels, employment, crime, market performance, and political outcomes (Krueger and Pischke, 1997; Caplan and Cowen, 2004; Andrews et al., 2018; Foley et al., 2018; Tabellini, 2020; Alesina et al., 2020; Kunczer et al., 2021; Bartoš et al., 2021; Ferrara and Fishback, 2024; Dow and Cuypers, 2024; Helms, 2024).[4] To the best of our knowledge, our study is the first to examine how anti-foreign sentiment influences foreign technology adoption—a direct and economically important outcome—and to estimate the productivity costs of anti-foreign sentiment. In our mechanism analysis, we further demonstrate that anti-foreign sentiment deteriorates bilateral municipal ties and deters the entry of foreign-invested firms. Our measure of anti-foreign sentiment—based on the historical incidence of anti-missionary violence—also situates this study within the broader literature on the long-run economic impact of missionary activity (Nunn, 2010; Woodberry, 2012; Acemoglu et al., 2014; Bai and Kung, 2015; Wantchekon et al., 2015; Valencia Caicedo, 2019; Becker et al., 2021; Chen et al., 2022; Mattingly and Chen, 2022; Chen et al., 2023).

Third, we contribute to the literature on the effects of China's QPQ policy. While prior studies primarily focus on the post-1990 period, our work shifts attention to the earlier phase of the policy. For instance, Holmes et al. (2015) analyze the impact of China's QPQ policy from 1990 to 2010 using a dynamic general equilibrium model, measuring technology transfer through patents jointly owned by foreign multinationals and local Chinese partners. Bai et al. (2020) investigate how the policy influenced knowledge spillovers and quality upgrading in China's automobile industry between 2007 and 2014. Ma and Zhang (2024) examine technology spillovers associated with the QPQ policy by analyzing patenting activity between 2000 and 2015. However, although the QPQ policy was officially introduced in 1983, its effects during the 1980s remain largely unexplored. To the best of our knowledge, we are the first to empirically examine the 1983 policy and provide evidence on its role in shaping technology adoption in China.

[3]Our examination of the productivity consequences of foreign technology adoption in the context of China contributes to the broader literature on the productivity-enhancing effects of foreign technologies (e.g., Keller, 2004; Hu et al., 2005; Giorcelli, 2019; Alviarez et al., 2019; Choi and Shim, 2022; Diao et al., 2024).

[4]In contrast, Lan and Li (2015) find evidence in the opposite direction, showing that international trade reduces nationalism in China.

The rest of the paper is organized as follows: Section 2 provides the background. Section 3 describes the data sources and variable construction. Section 4 outlines the empirical strategy. Section 5 presents the main results. Section 6 discusses the heterogeneity analyses. Section 7 reports a series of robustness checks. Section 8 explores the underlying mechanisms. Section 9 examines the productivity gains associated with foreign technology adoption. Finally, Section 10 concludes.

2 Background

In this section, we first introduce the background of foreign technology adoption in China between 1950 and 1990, highlighting key policy changes during this period. Second, we discuss the background of anti-missionary violence, including its potential causes and consequences.

2.1 Foreign Technology Adoption

Between 1950 and 1990, China's approach to foreign technology adoption shifted substantially, shaped by changes in political ideology, economic policy, and global diplomatic alignments. From 1950 to 1960, this period is commonly referred to as the Soviet-oriented phase, during which China maintained close relations with the Soviet Union. China's technology adoption during this time primarily focused on the Soviet Union and its allies. The "156 Projects," initiated with Soviet assistance, served as a cornerstone of China's early efforts to build industrial and military capacity, emphasizing heavy industry as a strategic priority. The scale of this investment amounted to roughly 45% of China's GDP in 1949 (Giorcelli and Li, 2021). Technology transfer took place through multiple channels, including the purchase of equipment, the construction of manufacturing facilities, and, importantly, the transfer of know-how via the training of Chinese engineers, technicians, and production supervisors (Lardy, 1995; Heblich et al., 2022). This period of Sino-Soviet cooperation enabled the launch of a large-scale, centrally coordinated program of industrial construction, which was particularly significant in light of China's underdeveloped industrial base at the time. However, the "lean to one side" policy also constrained China's ability to learn from Western technologies, resulting in a high degree of dependence on Soviet technology and expertise.

Due to diplomatic tensions between the Soviet Union and China in the early 1960s, Sino-Soviet cooperation came to an end, and the adoption of foreign technology from the Soviet Union was halted. From the 1960s to the early 1970s, China entered a period of relative isolation, as it faced technological blockades from both the Soviet Union and the Western world. This era, commonly referred to as the Self-Reliance Phase, was characterized by an emphasis on indigenous technological development. During this period, China increased its efforts to promote domestic innovation and adapt existing technologies. However, these efforts were severely constrained by the country's limited technological capacity, making it an extremely difficult period for technological advancement. The level of foreign technology adoption during this phase remained minimal. Following President Nixon's visit to China in 1972, the Chinese government launched the "43 Program" to import complete sets of industrial technologies and equipment from Western countries, facilitating modest yet meaningful technology transfers during this otherwise restrictive period.

From the late 1970s to 1990, China experienced dramatic changes in its political environment and economic policy. The introduction of the Reform and Opening-Up in 1978 marked a major shift in the country's development orientation, including its approach to foreign technology acquisition. This period, often referred to as the Open Door Phase, was characterized by increased openness to foreign technology and investment. China began to actively seek technological cooperation with a broader range of countries, particularly Western nations and Japan. During this phase, the country also underwent gradual decentralization, granting greater autonomy to local governments and enterprises in making decisions about technology adoption.

At the outset of Open Door Phase, China's efforts to introduce foreign technology did not proceed smoothly. Following the launch of the Reform and Opening-Up in 1978, China enacted the landmark *Law of the People's Republic of China on Chinese-Foreign Equity Joint Ventures* in July 1979. One of the law's primary objectives was to facilitate the acquisition of foreign technology. Article 5 of the law stipulated that "the technology and equipment provided by the foreign partner as investment must be advanced and suited to China's needs." However, for various reasons—including the protection of the domestic market—the law imposed strict restrictions on the ratio of domestic sales to exports for foreign-invested enterprises. These constraints discouraged foreign investment and limited the effectiveness of technology transfer, resulting in relatively few successful cases of foreign technology adoption.

After recognizing this issue, China began implementing the strategy of "trading market access for foreign technology" to further promote the introduction of foreign technology. This approach allowed foreign-invested enterprises greater access to sell their products in the Chinese domestic market. In 1983, the QPQ policy was formally affirmed at the national level. On March 16, the State Council approved the *Report on Further Improving the Operation of Chinese-Foreign Equity Joint Ventures* submitted by the State Economic Commission and the Ministry of Foreign Economic Relations and Trade. The report proposed that:

> For key projects involving urgently needed and modern technologies, more favorable treatment should be offered. When necessary, a portion of the domestic market may be conceded. Without such measures, it will be difficult to break through existing constraints.

This policy significantly enhanced the incentives for foreign firms, particularly those from Western countries and Japan, to invest in China. Joint ventures emerged as a critical vehicle for technology transfer, in addition to traditional channels such as equipment purchases and plant construction. They facilitated more substantive forms of "know-how" transfer, such as technology licensing, consulting services, and co-production arrangements. Moreover, the scope of technology transfer through joint ventures extended across a broad range of industries and was not confined to the heavy industrial sector.

Figure 1 presents the annual number of foreign technology adoptions in China between 1950 and 1990, disaggregated by source country. During the 1950s, China engaged in limited technology transfers, primarily from the Soviet Union. From the 1960s to the early 1970s, foreign technology adoption nearly came to a halt. A modest uptick occurred in 1973 as a result of the "43 Program," but its overall scale remained limited. A more significant increase in foreign technology adoption emerged after 1978. Nonetheless, until 1983, the volume of imported technologies remained relatively constrained. A turning point occurred in 1983, when China formally adopted the QPQ policy. This policy shift triggered a dramatic surge in technology imports, both in terms of volume and diversity of source countries. Japan, the United States, and West Germany emerged as the leading suppliers of foreign technologies to China during this period.

Figure 2 presents the distribution of foreign technology adoptions across industries during the period 1950–1990. As shown, the machinery industry, chemical industry, and electronics and telecommunications industry are the top three sectors with the highest frequencies of foreign technology adoption. These sectors are primarily manufacturing-based and are critical to economic development, with an especially urgent demand for foreign technologies. Figure 3 illustrates the geographical distribution of the total number of foreign technology adoptions in each city across China from 1950 to 1990. The adoptions occurred nationwide, extending well beyond the coastal provinces and special economic zones, indicating a broad-based adoption of foreign technology across the country.

Among these adoptions, approximately 50% involved the importation of key equipment, 37% were technology licensing agreements, 8% consisted of consulting services, and 5% were co-production arrangements. These forms of technology adoption—particularly technology licensing, consulting services, and co-production agreements—place a greater emphasis on transferring "know-how." This encompasses not only the acquisition of equipment but also the dissemination of technical expertise and operational practices that are critical for advancing China's technological capabilities.

2.2 Anti-Missionary Violence

Christianity was introduced to China as early as 635 AD during the Tang Dynasty. While missionary activities continued intermittently from the Yuan through the early Qing period, their scale remained relatively limited. It was only after the First Opium War in 1842—when the Qing government opened treaty ports to foreign trade—that missionary efforts began to expand significantly. Following the Second Opium War in 1860, the Qing government, for the first time, consented to grant missionaries access to the vast interior regions of China (Mattingly and Chen, 2022). In the late 19th and early 20th centuries, missionary activity became widespread in China. By 1922, it had extended to nearly all Chinese cities (Stauffer, 1922).

Throughout several centuries of China's history, the arrival of missionaries had complex social impacts on the country. On the one hand, missionaries played an important role in introducing elements of modern civilization. Many established schools and hospitals, promoted gender equality, and facilitated the diffusion of ideas such as democracy and individual freedom. A growing body of research has documented the positive contributions of missionary activity to economic development and human capital formation in China (Chen et al., 2022; Bai and Kung, 2015; Chen et al., 2023). On the other hand, missionaries frequently came into conflict with local civilians or government authorities, often resulting in casualties on both sides, the destruction of churches and other properties, and even the deterioration of diplomatic relations between China and foreign countries. Such conflicts are commonly referred to as religious conflicts or anti-missionary violence. As early as the Ming dynasty, the spread of Christianity in China was often met with resistance, and such conflicts became even more frequent during the Qing dynasty, particularly after the Second Opium War in 1860. Most of them were localized events, and in the context of underdeveloped transportation and communication systems, some occurred with a degree of suddenness and contingency (Liao, 1984). These conflicts were not confined to China, but also occurred in many other Asian and African countries.[5]

The underlying causes of anti-missionary violence in China were multifaceted. First, following the Opium Wars, the Qing government signed a series of humiliating treaties that compromised national sovereignty. At the same time, the influx of foreign goods—such as textiles—disrupted traditional markets, eroded the livelihoods of Chinese artisans, and contributed to unemployment and economic distress. As a result, many government officials and ordinary citizens viewed foreigners as aggressors and harbored deep-seated hostility toward them. Second, Christian missions often promoted new ideological concepts such as constitutional democracy and gender equality. Some officials and local elites, fearing that these new ideas would threaten their status, deliberately incited the public to resent the church and foreigners. Third, many local residents had never seen foreigners before and their impressions of them were shaped by inflammatory proclamations or defamatory pamphlets, which contributed to widespread xenophobia. Fourth, Christian religious customs often clashed with local traditions—such as ancestor worship and rainmaking rituals—thereby deepening cultural tensions (Huang et al., 2024). Fifth, some missionaries abused their extraterritorial privileges by engaging in misconduct, oppressing local communities, and unlawfully seizing land or other property from residents to construct churches (Mattingly and Chen, 2022). Overall, anti-missionary movements largely reflect broader anti-foreign sentiment in China (Liao, 1984).

[5]For example, the Japanese film *Silence* depicts anti-missionary violence in Japan.

To illustrate xenophobic attitudes toward missionaries, we use Figure 4 as an example. The image is titled "Zhu Jiao Wan Yan Tu" (literally, "Pig Crying and Eye-Gouging Illustration"). The term "Zhu Jiao" is a malicious homophonic distortion of the Chinese term for bishop in Christianity. While one pronunciation of "Zhu Jiao" refers to a bishop in Chinese, the distorted homophone "Zhu Jiao", meaning pig crying, was deliberately employed to mock and vilify both the bishop and the church. The illustration depicts a bishop gouging out eyes, referencing a widely circulated rumor that the church extracted the eyes of common people to make hallucinogenic drugs. Similar rumors included claims that the church harvested other human organs and abducted women and children. These sensationalized accusations, along with such images and pamphlets, were disseminated among local populations who had never encountered foreigners. As a result, they often provoked intense anti-foreign sentiment and sparked violent confrontations between local residents and Christian missions.

Anti-missionary violence had both short-term and long-term adverse effects. Cities that experienced such incidents may have systematically differed from those without such conflicts in terms of prevailing levels of anti-foreign sentiment and its consequences. In the short term, these conflicts resulted in casualties on both sides; in large-scale incidents, the number of deaths and injuries could reach several hundred. They also led to the destruction of churches and the loss of property among local residents. Such violence deepened mutual hostility and reinforced antagonistic attitudes. When local officials were involved, these incidents could escalate diplomatic tensions and, in some cases, even act as a trigger for broader international conflict. Taking the Tianjin anti-missionary violence of 1870 as an example, according to Zhang and Liu (1987), the incident ultimately led to the deaths of a French consul, three accompanying officials, and twelve priests and nuns, as well as the burning of the church. This event had severe diplomatic consequences: warships from seven countries assembled near Tianjin. Empress Dowager Cixi dispatched Zeng Guofan, the Viceroy of Zhili, to Tianjin to handle the investigation. As a result, the prefect and magistrate of Tianjin were dismissed and sentenced to military exile; sixteen principal culprits were executed, and twenty-five others were exiled; reparations were paid for the reconstruction of the church; and Empress Dowager Cixi issued an apology to France.

In the long term, these events reinforced hostile attitudes toward foreigner, eroded mutual trust, and could seriously undermine diplomatic relations. Anti-foreign sentiment became embedded in local political discourse and social norms, generating enduring barriers to engagement with the international community. For Western countries, Chinese cities where anti-missionary violence occurred—particularly when directed at their nationals—were often viewed with suspicion and hostility. Many of these incidents not only provoked widespread outrage in Western countries at that time, but also continue to attract significant attention in recent reports and scholarly works.[6] This perception could reduce the willingness of foreign firms to invest in these areas and curtail the flow of knowledge, tech-

[6]For example, Brizay (2013) and Jenne (2021) provide detailed accounts of the 1870 Tianjin anti-missionary violence.

nology, and capital, not only due to diplomatic resentment, but also because of concerns over property rights protection and institutional reliability. As a result, such conflicts may have impeded long-term international cooperation and economic exchange.

3 Data and Variables

In this section, we describe the data sources and the construction of key variables, including city-level foreign technology adoption, anti-missionary violence, early industrial foundations, and a set of control variables.

3.1 Data on Foreign Technology Adoption

Our data on foreign technology adoption is sourced from the book *Forty Years of Technology Introduction in the People's Republic of China (1950–1990)*.[7] This book was jointly compiled by the Department of Foreign Economic and Trade Affairs of the State Planning Commission, the Department of Technology Import and Export of the Ministry of Foreign Economic Relations and Trade, and the Technology Introduction Information Exchange Center of the Ministry of Machinery and Electronics Industry. The book provides comprehensive and systematic information on contract-level foreign technology adoption in China from 1950 to 1990, including detailed information on the source country, introduction mode, technology name and type, industry, and adopting firm. The dataset comprises approximately 4,800 contracts of foreign technology adoption, about 82% of which occurred between 1983 and 1990. It covers around 40 source countries and 60 industries, mostly in manufacturing, reflecting substantial diversity in both geographic origin and sectoral application.

For example, the book documents that in 1988, Changchun First Automobile Works—now one of China's largest state-owned automobile manufacturers—signed two contracts with Volkswagen AG of the Federal Republic of Germany to initiate domestic automobile production. One contract involved the importation of key equipment, while the other pertained to technology licensing. In 1990, the Institute of Automation at the Chinese Academy of Sciences signed a key equipment importation contract with Hewlett-Packard (HP) of the United States to acquire equipment for research and development in the field of intelligent robotics.

3.2 Data on Anti-Missionary Violence

Our data on anti-missionary violence is sourced from Zhang and Liu (1987), as used in Mattingly and Chen (2022). The book documents approximately 690 influential religious conflicts in historical China, 97% of which occurred before 1911, the end of the Qing

[7] It was published by Wenhui Press in 1992.

dynasty. It provides detailed information on the year, location, participants, targeted missionaries and their countries of origin, as well as brief descriptions of the events. This information allows us to identify whether government officials were involved in the conflicts and which foreign countries were implicated. Approximately 17% of all anti-missionary incidents involved the participation of government officials. Figure 5 displays the regions in China where religious conflicts occurred, encompassing a large proportion of cities nationwide.[8]

3.3 Data on Early Industrial Capacity

China's initial steps toward industrialization began during the Self-Strengthening Movement in the mid-19th century, when it sought to learn from the West and establish modern enterprises, thereby laying the groundwork for a nascent industrial foundation. Du (1991) provides a comprehensive record of industrial firms founded between 1858 and 1927, which we use to construct our measure of early industrial foundations. This dataset has been employed in prior studies, including Ma (2024) and Bo et al. (2023). It includes approximately 4,000 firms with detailed information on their founding year, location, industry, and other characteristics. These firms are modern enterprises characterized by advanced organizational structures and the use of modern industrial technologies, rather than traditional handicraft workshops. Approximately 98.6% of these firms are domestically owned, while the remaining are joint ventures or enterprises under foreign ownership or control.

Specifically, we calculate the number of industrial firms established in each prefecture between 1858 and 1927 as a proxy for early industrial capacity. This proxy is predetermined and not subject to reverse causality from our outcome variable. Ideally, pre-determined industrial capacity would be proxied by the number of industrial firms established in each city prior to 1950; however, such data are not available. During the period of warfare between 1937 and 1949 and the socialist campaigns aimed at suppressing the private sector from 1950 to 1976, the vast majority of industrial firms established before 1927 may have disappeared or exited. Nevertheless, regions with a higher historical concentration of such firms likely reflect more favorable underlying conditions and stronger industrial foundations. As shown in Figure 6, the number of firms established before 1927 is strongly positively correlated with the number of firms founded between 1950 and 1990, indicating the long-term persistence of industrial foundation. This industrial foundation may signal a greater ability to absorb foreign technology and promote economic development when national policies later shifted toward economic modernization.

Figure 7 displays the distribution of this measure across cities in major regions of China. As shown, coastal regions on average host a greater number of industrial firms; however,

[8] City matching of anti-missionary violence is based on the location mentioned in each incident. Vague regions (e.g., "nationwide") and Taiwan are excluded. For multi-location entries (21 cases), only the first-mentioned city is used, as it is typically the primary site. Including all cities would add 8 conflict cases without affecting results.

there is also substantial variation across inland regions.

3.4 Control Variables and Other Data

We include two sets of control variables in our analysis. First, geographic controls include distance to the coast, terrain ruggedness, latitude, and longitude. These variables capture exogenous geographic conditions that may be correlated with both foreign technology adoption and the historical incidence of anti-missionary conflicts. All geographic variables are either computed or extracted using ArcGIS. Second, we include a set of socioeconomic controls that proxy for human capital, institutional legacy, and local economic development. These controls comprise both time-invariant and time-varying variables. Time-invariant variables include the density of Jinshi (presented scholars in historical China), treaty port indicator, provincial capital indicator, total population in 1982, population density in 1982, the share of college students in 1982, industrial employment in 1982, and industrial output per capita in 1982. The Jinshi data are sourced from Bai and Jia (2016), while the treaty port and provincial capital indicators are hand-collected. The remaining variables are obtained from the 1982 census. The time-invariant variables are interacted with year trends to account for their potential dynamic impacts over time. The time-varying socioeconomic variables include a Special Economic Zone (SEZ) dummy and an airport dummy. Both variables may have influenced a city's accessibility to foreign technologies and its integration into global economic networks.

For other variables used in our IV analysis, mechanism analysis, productivity analysis, and robustness checks, the data sources are as follows. In the IV analysis, the instrument is based on the distance to the nearest military factory established during the Qing dynasty's nineteenth-century Self-Strengthening Movement. Data on the location and establishment of military factories are obtained from Fan (2003). For the mechanism analysis, we use firm registration data by type from the universe of Chinese enterprises, as recorded by the State Administration for Industry and Commerce (SAIC). Information on international sister-city relationships is manually collected by searching each Chinese city's official records of foreign sister cities. In the productivity analysis, firm-level data are sourced from the 1995 Annual Survey of Industrial Firms. For the robustness checks, data on historical churches are obtained from Zhang and Liu (1987). Data on the Cultural Revolution are taken from Andrew Walder's compilation of Cultural Revolution-related deaths, which are based on county-level gazetteers. Data on Japanese occupation are drawn from Wallace and Weiss (2015). Data on rebellions during the Qing dynasty are sourced from Nanjing Military Academy (2002).

Table 1 reports summary statistics for the outcome, key explanatory variables, control variables, and those used in heterogeneity or mechanism analyses. Because geographic and some of the socioeconomic variables are time-invariant, we interact them with year trends to capture their evolving influence over time.

4 Empirical Strategy

This section outlines our identification strategy for isolating the causal impact of China's QPQ policy in 1983 and, crucially, for revealing how anti-missionary violence blunted its effects. We begin with a difference-in-differences that exploits cross-city variation in pre-existing industrial capacity as a continuous treatment intensity, then advance to a triple-differences model by adding an interaction with a city's history of anti-foreign religious conflict to quantify the extent to which anti-foreign sentiment hindered foreign technology adoption and eroded the benefits of the policy.

4.1 Difference-in-Differences: QPQ Policy and Foreign Technology Adoption

To identify the causal impact of China's 1983 QPQ policy on city-level technology adoption, we exploit cross-city variation in industrial capacity as a continuous measure of treatment intensity, proxied by the number of industrial firms established before 1927. As explained in Section 3.3, this proxy is pre-determined and not affected by our outcome variable, and it strongly predicts the number of industrial firms established between 1950 and 1990. Because industrial firms were the main adopters of foreign technologies, this measure provides a suitable basis for absorptive capacity: cities with more such firms were better positioned to absorb, adapt, and apply imported technologies. We implement this strategy by interacting the continuous measure of industrial foundations with a post-1983 indicator in a difference-in-differences framework:

$$Y_{c,t} = \alpha + \beta_1\, Capacity_c \times Post_t + \beta_2\, X_{c,t} + \mu_c + \delta_{p,t} + \varepsilon_{c,t} \tag{4.1}$$

where $Y_{c,t}$ is the number of foreign technology adoption in city c in year t, observed for 332 cities from 1950 to 1990. The variable $Capacity_c$ is the number of pre-existing industrial firms in city c, capturing the strength of absorptive capacity. The variable $Post_t$ is a dummy that equals one for years since 1983, marking the period following the policy change. City fixed effects μ_c absorb all time-invariant city-specific factors, while province-year fixed effects $\delta_{p,t}$ absorb all unobservable province-level factors such as broader regional economic shocks or province-specific policies.[9] Control variables $X_{c,t}$ include both time-varying factors and time-invariant characteristics (by interacting with year trends). Standard errors $\varepsilon_{c,t}$ are two-way clustered by city and year to account for potential serial correlation within cities over time and contemporaneous shocks that may affect all cities in a given year. To limit the undue influence of extreme outliers, we winsorize the adoption measure at its 99th percentile. This approach preserves the integrity of our sample while ensuring that exceptionally large values do not drive our findings.[10]

[9] The inclusion of province-year fixed effects fully absorbs the influence of the four directly governed municipalities (Beijing, Shanghai, Tianjin, and Chongqing), which are province-level cities and could otherwise act as outliers.

[10] The robustness of our findings persists in the absence of winsorizing the variable.

4.2 Triple-Differences: Anti-Missionary Violence, QPQ Policy, and Foreign Technology Adoption

The above difference-in-differences estimation quantifies the overall effect of the QPQ policy on technology adoption. We now further examine how anti-foreign sentiment may have moderated this effect. Specifically, a city with a strong industrial base yet a history of anti-missionary violence could be less receptive to foreign technology transfers, thereby limiting the benefits of the policy. Therefore, we introduce a triple-differences approach that interacts historical violence with the 1983 policy shock and absorbtive capacity:

$$\begin{aligned} Y_{c,t} = \alpha &+ \beta_1\, Violence_c \times Capacity_c \times Post_t + \beta_2\, Capacity_c \times Post_t + \beta_3\, Violence_c \times Post_t \\ &+ \beta_4\, X_{c,t} + \mu_c + \delta_{p,t} + \varepsilon_{c,t} \end{aligned} \tag{4.2}$$

where $Violence_c$ is an indicator variable capturing whether city c experienced anti-missionary violence. The coefficient β_1 on the triple interaction $Violence_c \times Capacity_c \times Post_t$ estimates the extent to which the presence of anti-missionary violence erodes the effect of the QPQ policy on technology adoption, relative to cities without such violence. All other terms including the same control variables $X_{c,t}$, city fixed effects μ_c, and province-year fixed effects $\delta_{p,t}$ used in the difference-in-differences specification 4.1 are maintained to account for observed confounders, time-invariant city characteristics, and province-level shocks, thereby isolating the moderating role of anti-missionary violence in the technology benefits of the policy.

Our identification strategy for both the continuous difference-in-differences and the triple-differences frameworks hinges on two key conditions. First, we require extended parallel trends: in the absence of the 1983 QPQ policy, technology adoption would have evolved similarly across cities, regardless of their pre-existing industrial foundation or historical anti-missionary conflict exposure. We confirm this via event-study tests showing no differential pre-1983 trends. Second, the policy's uniform nationwide rollout, together with our use of predetermined treatment measures—industrial firm counts fixed before 1927 and conflict exposure determined long before 1983—and the inclusion of city fixed effects, province-year fixed effects, and a comprehensive set of time-varying and time-invariant controls, ensures that both treatment intensity and conflict heterogeneity are orthogonal to contemporaneous shocks. Under these conditions, the difference-in-differences interaction credibly recovers the QPQ policy's causal impact on technology uptake, and the triple-differences interaction isolates how anti-foreignism moderated that effect.

5 Empirical Results

In this section, we present our empirical findings. We begin with the baseline difference-in-differences analysis linking the QPQ policy and pre-existing industrial capacity to foreign technology adoption. We then estimate the triple-differences model to assess how anti-foreign sentiment impeded the adoption by conditioning the impact of the policy. Next, an event-study specification tests the parallel-trends assumption and maps the timing of effects. We then address endogeneity in our difference-in-differences estimates using an instrumental variable strategy and reinforce our triple differences design with two complementary methods: propensity score matching and a disaggregated DDD specification featuring city-country, country-year and, in its most rigorous form, city-year fixed effects to eliminate any remaining confounders.

5.1 Baseline Results

Table 2 presents our baseline DID estimates of how the 1983 QPQ policy boosted city-level technology adoption. Specifically, the interaction $Capacity_c \times Post_t$ measures how pre-existing absorptive capacity amplified post-1983 technology introductions relative to the pre-1983 period, net of city fixed effects, province-year shocks, and other potential confounders.

In Column (1), which includes city and province-year fixed effects and geographic controls interacted with linear time trends, the estimated coefficient on $Capacity_c \times Post_t$ is 0.027 ($p < 0.01$). This implies that, holding constant unobserved time-invariant city characteristics and province-level shocks, each additional firm established before 1927 is associated with an increase in annual foreign technology introductions after the policy. In Column (2), the preferred specification, we augment the model with a rich set of socioeconomic covariates. The point estimate declines only modestly to 0.018 ($p < 0.05$), underscoring that our core result is not driven by concurrent changes in infrastructure, human capital, or economic development. Columns (3) and (4) then apply two sample restrictions to further stress-test identification. Column (3) omits the Cultural Revolution years (1966-1976), when adoption dynamics may have been atypical, while Column (4) restricts attention to cities that adopted at least one foreign technology over the full period, addressing concerns about structural differences between adopters and non-adopters.[11] In both cases, the magnitude and significance of the DID effect remain essentially unchanged.

The baseline DID estimate of $\beta_1 = 0.018$ as in Column (2) implies that, in the post-1983 period, each additional pre-existing industrial firm raises a city's annual foreign technology adoptions by 0.018 units. To gauge the economic magnitude, note that the average city records 0.216 technology introductions per year and hosts 7.726 legacy firms. Thus, a city with the typical historical industrial base can expect roughly 0.14 additional technology adoptions per year, about 65% of its average adoption rate, relative to a city with no pre-existing firms.[12] This underscores that China's QPQ policy delivered economically meaningful boosts to technology uptake, disproportionately benefiting cities with stronger

[11] Our results remain robust when restricting the sample to the post-1976 period.
[12] We obtain the value of 0.14 by multiplying 0.018 by 7.726.

initial industrial foundations.

How does anti-foreignism blunt the gains from China's 1983 QPQ policy and thus hinder the adoption of foreign technologies? As shown in Table 3, we estimate the triple differences specification by incorporating the triple interaction $Violence_c \times Capacity_c \times Post_t$ to assess whether anti-foreign sentiment moderates the benefits of China's QPQ policy on technology adoption. Specifically, this specification reveals whether the technology gains driven by a strong industrial foundation under the 1983 policy change are systematically eroded in cities scarred by anti-missionary violence.

Column (1) reports a coefficient of -0.072 ($p < 0.01$) on the triple-interaction $Violence_c \times Capacity_c \times Post_t$, indicating that in cities with historical anti-missionary violence, the boost from industrial foundations to post-1983 technology adoption is substantially eroded. Column (2), as our preferred specification, further introduces socioeconomic controls. The estimated coefficient of -0.062 ($p < 0.01$) remains similar in both magnitude and statistical significance, suggesting that the result is not confounded by contemporaneous regional developments or evolving economic conditions. Column (3) removes observations from the Cultural Revolution period (1966-1976) to account for potential disruptions to adoption dynamics during that era, and the result remains stable. In Column (4), we limit the sample to cities that have previously adopted foreign technologies, and find no statistically significant change.[13] The persistence of the effect across all specifications reinforces the conclusion that historical violence against foreign missionaries meaningfully weakens the industrial foundation's capacity to spur technology adoption following the 1983 policy reform.

Economically, the triple-difference estimate $\beta_1 = -0.062$ in Column (2) implies a dramatic undermining of the policy's benefits in xenophobic cities. Suggested by the estimate $\beta_2 = 0.080$, each additional pre-existing firm raises post-1983 technology adoptions by 0.080 units in non-xenophobic cities. Thus, historical incidents of anti-missionary violence reduce this per-firm gain by approximately three-quarters (77.5%). This striking magnitude underscores how deeply entrenched cultural hostility can impede the adoption of cutting-edge foreign technologies and, potentially, nullify the associated productivity gains.

As a balance check, Table 4 shows that the anti-missionary indicator is not meaningfully associated with our pre-1927 measure of industrial capacity once the full set of time-invariant controls is included. This null result mitigates the concern that the violence measure simply proxies for baseline differences in industrialization that would mechanically generate heterogeneous post-QPQ adoption rates. We address this issue more formally in Section 5.4, where a propensity-score matching procedure is used to ensure treated and control cities are balanced on industrial capacity before estimating the moderating effect of historical hostility.

Taken together, our evidence shows decisively that China's 1983 QPQ policy unlocked substantial foreign technology adoption, especially in cities with deep pre-existing indus-

[13]Our results remain robust when we normalize the number of foreign technology adoptions by local population size.

trial legacies. Importantly, this effect survives the addition of rich controls, sample cuts, and alternative specifications. However, in striking contrast, we find that the gains from the policy are almost entirely wiped out in cities scarred by historical anti-foreign sentiment: the triple-differences coefficient is large, negative, and robust, implying that anti-foreign cultural hostility erodes roughly three-quarters of the technology-uptake boost delivered by industrial capacity. In sum, while market reforms can unleash powerful technological booms and potentially yield productivity gains, our results underscore that the entrenched heritage of hostility continues to shape and even blunt China's technological modernization.

5.2 Event Study: Pre-Trends and Treatment Effects

A key identifying assumption underlying both our DID and DDD specifications is that, absent the 1983 policy, cities with stronger industrial foundations or deeper anti-foreign legacies would have followed parallel pre-existing trends in technology adoption. To validate the parallel-trends assumption, we therefore implement an event-study design that traces how technology adoption evolves around the 1983 policy for cities at different "treatment intensities". Concretely, we replace the single post-1983 indicator with a full set of event-time interactions in our difference-in-differences specification and estimate:

$$Y_{c,t} = \alpha + \sum_{t=1978}^{1990} \beta_{1,t}\, Capacity_c \times Year_t + \beta_2\, X_{c,t} + \mu_c + \delta_{p,t} + \varepsilon_{c,t} \tag{5.1}$$

where $Y_{c,t}$ is the number of foreign technology adoption in city c in year t. $Year_t$ is an year indicator, spanning from 1978 to 1990, with 1982 omitted as the reference year. $\beta_{1,t}$ is the coefficient of interest, measuring the marginal effect of one additional pre-existing industrial firm on technology adoption in year t. All the remaining terms such as controls $X_{c,t}$, city fixed effects μ_c, province-year fixed effects $\delta_{p,t}$, as well as the two-way clustered standard errors $\varepsilon_{c,t}$ are as specified in Equation 4.1.

Analogously, the event-study specification corresponding to our triple-differences framework is given by:

$$\begin{aligned} Y_{c,t} = \alpha &+ \sum_{t=1978}^{1990} \beta_{1,t}\, Violence_c \times Capacity_c \times Post_t + \sum_{t=1978}^{1990} \beta_{2,t}\, Capacity_c \times Year_t \\ &+ \sum_{t=1978}^{1990} \beta_{3,t}\, Violence_c \times Year_t + \beta_4\, X_{c,t} + \mu_c + \delta_{p,t} + \varepsilon_{c,t} \end{aligned} \tag{5.2}$$

where $Year_t$ is defined in the same way as Equation 5.1. Once again, we set 1982 as the reference year and thus omit it in our regressions. $\beta_{1,t}$ traces how the moderating effect of anti-missionary violence on the industrial-foundation impact evolves from 1978 to 1990. All the other terms including the structure of fixed effects are the same as those in Equation 4.2.

Panel A of Figure 8 presents the difference-in-differences event study estimates with

95% confidence intervals. All pre-1983 coefficients (1978 through 1982) are statistically indistinguishable from zero, validating the parallel-trends assumption. However, in 1984-the first full year after the 1983 policy-the estimate rises to about 0.014 ($p < 0.05$), in line with our baseline DID result. The effect peaks around 1986 and then attenuates, becoming less precisely estimated after 1987, consistent with the observed decline in China's annual technology adoptions following their mid-1980s high.

Panel B of Figure 8 shows the analogous triple-differences event study. Pre-1983 estimates through 1982 remain flat and insignificant, confirming no differential trends. Beginning in 1984, the triple-difference coefficient falls sharply to approximately -0.08 ($p < 0.01$), deepens to roughly -0.17 in 1985, and then stabilizes near -0.08 in 1986. Importantly, the effect remains statistically significant in both 1989 and 1990, even as the total number of foreign technology adoptions declined during this period. This pattern demonstrates that historical violence against foreigners immediately and persistently dampened the industrial-foundation effect on technology adoption in the wake of the implementation of the QPQ policy, slowing the overall pace of foreign technology uptake.

5.3 Instrumental Variable Results

Another primary concern for our difference-in-differences design is that unobserved or omitted city-level factors such as long-run institutional quality might simultaneously drive both the establishment of pre-existing industrial firms and the pace of post-1983 foreign technology adoption. While our baseline regressions include city fixed effects, province-year fixed effects, and a rich set of control variables, they may still fail to fully account for deeper unobservable historical endowments at the city level.

To address this endogeneity, we construct an instrumental variable based on the distance to the nearest military factory established during the nineteenth-century Qing's Self-Strengthening Movement. Crucially, the Qing empire located these arsenals not on the basis of local commercial potential, but according to strategic defense considerations such as proximity to hostile frontiers or established garrison towns. Moreover, historical evidence has shown that military-led investments during the Self-Strengthening Movement catalyzed broader industrial ecosystems (Bo et al., 2023), making distance to the nearest military factory a relevant predictor of subsequent firm formation. Figure 7 presents the number of industrial firms established by 1927 across Chinese prefectures alongside the spatial distribution of military factories. A clear spatial pattern emerges: prefectures located in closer proximity to military factories tend to host a higher number of industrial firms. Figure 9 illustrates the relationship between a city's distance to the nearest military factory and the total number of firms established by 1927. The downward trend shows that cities located closer to military factories tended to have more firms by 1927, highlighting a strong negative correlation between factory proximity and early industrial foundation.

Formally, we interact the distance to the nearest military factory with the post-1983 dummy to instrument the key variable of our interest and estimate the first-stage equation:

$$Capacity_c \times Post_t = \alpha + \beta_1 \, Military_c \times Post_t + \beta_2 \, X_{c,t} + \mu_c + \delta_{p,t} + \varepsilon_{c,t} \tag{5.3}$$

where the dependent variable is the endogenous variable $Capacity_c \times Post_t$. The instrumental variable $Military_c$ measures the minimum distance from city c to the nearest military factory established during the Qing dynasty's Self-Strengthening Movement.[14]

Panel B of Table 5 reports the first-stage estimates. In the fully controlled specification shown in Column (2), the estimated coefficient on the interaction $Military_c \times Post_t$ is -0.030 ($p < 0.01$), implying that a one-kilometer increase in distance to the nearest Qing-era military factory reduces the pre-existing firm count by roughly 0.03.

Next, we estimate the second-stage equation of the following form:

$$Y_{c,t} = \alpha + \beta_1 \, \widehat{Capacity_c \times} \, Post_t + \beta_2 \, X_{c,t} + \mu_c + \delta_{p,t} + \varepsilon_{c,t} \tag{5.4}$$

where $\widehat{Capacity_c \times} \, Post_t$ is the fitted value given by the Equation 5.3.

As displayed in Panel A of Table 5, the second-stage estimates not only confirm but also strengthen our baseline results. In the preferred specification in Column (2) that controls for the full suite of socioeconomic controls, a one-unit increase in the instrumented interaction $\widehat{Capacity_c \times} \, Post_t$ increases annual foreign technology introductions by 0.068 ($p < 0.01$). The estimates remain stable and highly significant when excluding the Cultural Revolution years or restricting to adopter cities in Columns (3) and (4), respectively. Across all specifications, by isolating a plausibly exogenous source of variation in industrial capacity, the IV approach sharpens our identification of the 1983 QPQ policy's causal impact and reveals how its benefits scaled with the depth of a city's industrial heritage.

Our IV estimates are larger than the corresponding OLS estimates. One possible explanation is the local average treatment effect (LATE). Regions whose industrial capacity is predicted by the military factories established during the nineteenth century, the compliers, may be particularly inclined to adopt foreign technologies. This could reflect the long-term development of industrial base, which enhance the ability to utilize imported technologies. A second explanation relates to measurement error in industrial capacity. Our measure is based on firms established prior to 1927, which are predetermined but may not accurately reflect industrial capacity after 1950. This disconnect may introduce measurement error, leading to a bias in the OLS estimates.

5.4 Matched Sample Results

Building on our validated parallel-trends assumption, we next address a complementary concern in the triple-differences identification strategy: "violence" and "non-violence" cities

[14]The results are unchanged when using the logarithm of distance to construct the instrument.

may still systematically differ in observed pre-treatment characteristics that are correlated with both anti-missionary violence and post-1983 technology uptake. Such compositional differences do not threaten identification per se, but they can reduce the credibility and precision of the estimated treatment effects; specifically, if violence is (positively or negatively) associated with baseline industrial capacity, the triple interaction could reflect this baseline correlation rather than a true moderating effect.

To account for this issue, we employ propensity score matching as a pre-processing step to ensure covariate balance—including the pre-1927 industrial-capacity measure—and to restrict the analysis to cities within the common support of observable characteristics. As the first step, we estimate each city's propensity to experience anti-missionary violence using a logistic regression on a comprehensive set of covariates: number of industrial firms, latitude, longitude, distance to coast, terrain ruggedness, provincial-city status, Jinshi density, treaty-port indicator, population, population density, college-enrollment share, industrial employment share, and industrial output per capita.

Next, we implement two matching algorithms-nearest-neighbor and Epanechnikov kernel matching-to construct matched samples based on the previously estimated propensity scores. Specifically, nearest-neighbor matching pairs each "violence" city with the "non-violence" city whose propensity score lies closest within a specified caliper, whereas Epanechnikov kernel matching constructs for each "violence" city i a weighted average of all "non-violence" cities by assigning weights $1 - \left(\frac{|p_i - p_j|}{h}\right)^2$ to each "non-violence" city j if $|p_i - p_j| \leq h$, where p and h denote the propensity score and bandwidth, respectively. Both methods ensure that the matched samples exhibit similar historical, geographic, and socioeconomic characteristics, thereby reducing bias from observed compositional differences and building a more credible counterfactual for estimating the triple-differences effect. It is important to note that this approach ensures that the anti-missionary violence indicator is orthogonal to industrial capacity, thereby alleviating concerns that it merely proxies for cross-city differences in industrialization that would mechanically generate heterogeneous post-QPQ foreign technology adoption.

Table 6 and Figure 10 jointly demonstrate the effectiveness of the propensity score matching procedure. Column (1) of Table 6 reports the logit estimates used to generate propensity scores, showing that variables such as Jinshi density, population size, and historical treaty presence significantly predict a city's likelihood of experiencing anti-missionary violence. The remaining columns present balance diagnostics from nearest-neighbor and Epanechnikov kernel matching, with pairwise t-tests indicating minimal and statistically insignificant differences between "violence" and "non-violence" cities across all covariates, evidence that matching successfully balances observed characteristics. This is visually reinforced in Figure 10, where Panels A and B depict pre- and post-match distributions of propensity scores under both methods. In each case, the post-match (dashed) curves exhibit tighter alignment and greater overlap between "violence" and "non-violence" cities relative to the pre-match (solid) curves, confirming the quality of the match and the credibility of the counterfactual comparisons.

Within each matched sample, we re-estimate the baseline triple-differences model as in Equation 4.2. As reported in Table 7, the coefficient on $Violence_c \times Capacity_c \times Post_t$ is -0.040 ($p < 0.05$) in the nearest-neighbor matched sample and -0.062 ($p < 0.01$) in the Epanechnikov kernel matched sample. Both estimates remain negative, statistically significant, and closely in line with our main results. These diagnostics underscore that our triple-differences effect reflects the true variation in anti-missionary violence rather than pre-existing differences in observed city characteristics.

5.5 Disaggregated Results

Beyond systematic differences in observed pre-treatment characteristics, unobserved or omitted factors may also simultaneously influence both foreign technology adoption and our measure of anti-foreignism, potentially threatening the validity of our triple-differences estimates. For instance, shifts in technology supply from exporting countries may drive transfers irrespective of local conditions, and city-level foreign relations, in particular trade ties, cultural exchanges, and diplomatic linkages with specific countries, may also shape the adoption patterns.

To mitigate these concerns, we leverage our contract-level data on each technology's country of origin in a disaggregated triple-differences framework. We focus on the six principal suppliers—Japan, the United States, Germany, the United Kingdom, Italy, and France—which together account for more than three quarters of transfers (see Figure 1).[15] We then manually match each city's record of country-specific anti-missionary incidents to its annual count of technologies received from that same country. Utilizing this additional country-level dimension, we isolate the causal moderating influence of anti-missionary violence on the 1983 policy's impact on foreign technology adoption by estimating a disaggregated triple-differences model with a rigorous set of fixed effects:

$$Y_{c,s,t} = \alpha + \beta_1 \, Direct_{c,s} \times Capacity_c \times Post_t + \beta_2 \, Direct_{c,s} \times Post_t + \mu_{c,s} + \gamma_{s,t} + \delta_{c,t} + \varepsilon_{c,s,t} \tag{5.5}$$

where $Y_{c,s,t}$ is the count of technologies adopted in city c from source country s in year t, and $Direct_{c,s}$ equals one if city c experienced a anti-missionary violence specifically targeting country s, which could directly affect technology adoption from that country. This "fully saturated" structure of fixed effects now absorbs all time-invariant city-country traits $\mu_{c,s}$, all country-specific annual shocks $\gamma_{s,t}$, and crucially, all city-specific annual shocks $\delta_{c,t}$. Consequently, any regressor that varies only at the city-year level, including the aggregate triple-differences term $Violence_c \times Capacity_c \times Post_t$ or the difference-in-differences term

[15] We do not account for technology obtained from other countries for two main reasons: the number of adoptions from these countries is relatively small and exhibits limited variation; additionally, anti-missionary violence rarely targeted these unlisted countries. It is also worth noting that the data reflects instances of anti-missionary violence targeting Japanese missionaries in China.

$Capacity_c \times Post_t$, is perfectly collinear with the city-year fixed effects and drops out of the estimation. The only coefficients that remain identifiable in the disaggregated specification are β_1 on $Direct_{c,s} \times Cpacity_c \times Post_t$, and β_2, on $Direct_{c,s} \times Post_t$, both of which vary at the city-country-year level. Standard errors $\varepsilon_{c,t}$ are two-way clustered by city and year to address serial correlation and common shocks.

By adding a country dimension, our disaggregated model sharpens causal identification in three ways. First, it exploits city-country-year variation to remove all city-wide shocks through city-year fixed effects, isolating how anti-foreign hostility toward each source country differentially affects technology adoption. Second, by including city-country fixed effects $\mu_{c,s}$, we control for all time-invariant differences in a city's predisposition toward specific countries in addition to city fixed effects. Third, country-year fixed effects $\gamma_{s,t}$ account for country-specific technology supply shocks that could confound the analysis, ensuring that the estimated effects are not driven by differential trends in technology exports from specific countries.

Table 8 presents the fully disaggregated results, which include city-year fixed effects and therefore exploit only city-country-year variation. In Column (1), the coefficient on the triple-differences term $Direct_{c,s} \times Capacity_c \times Post_t$ is -0.005 and highly significant ($p < 0.01$), indicating that, following the 1983 policy, each additional pre-existing industrial firm in cities with a history of violence against a specific source country is associated with roughly 0.005 fewer technology adoptions from that country. This result is robust to excluding the Cultural Revolution period and to restricting the sample to adopters as in Columns (2) and (3), confirming the persistent, targeted dampening effect of country-specific anti-foreignism on technology transfer.

Table 9 then replaces city-year with province-year fixed effects, allowing direct comparison of the country-specific effect $Direct_{c,s} \times Capacity_c \times Post_t$ with the broader effect of $Violence_c \times Capacity_c \times Post_t$. The country-specific coefficient remains -0.005 ($p < 0.01$), which is more than one-third the size of the aggregate anti-foreign effect (-0.012 to -0.014), indicating that hostility aimed at specific countries further depresses technology diffusion beyond general anti-foreign sentiment. Moreover, the magnitude and significance of the direct violence interaction remain stable through Columns (1) and (2) as we sequentially add geographic and socioeconomic controls, and persist when we exclude the Cultural Revolution period and restrict the sample to adopters in Columns (3) and (4).

These disaggregated estimates address potential omitted-variable bias and causally reinforce our triple-differences findings by showing that anti-missionary violence systematically eroded the QPQ policy's positive effect on technology transfers. Historical anti-foreignism not only broadly suppressed China's post-1983 inflows but also specifically targeted certain suppliers, driving a robust, supplier-level decline in adoption.

6 Heterogeneity Analysis

In this section, we unpack the heterogeneity of anti-missionary violence's moderating effect by examining four dimensions: introduction mode (equipment imports, licensing, co-production, consulting), violence nature (official involvement and recurrence), regional context (Han-majority vs. diverse and coastal vs. inland), and source country (Japan, U.S., Germany, U.K., Italy, France, Others). Each analysis reveals where and through which channels anti-missionary violence most sharply impeded China's QPQ-driven technology transfers.

6.1 The Effect of Anti-Missionary Violence by Introduction Modes

As the first exercise, our triple-differences estimates reveal meaningful heterogeneity in the moderating influence of anti-missionary violence on China's QPQ policy for foreign technology, showing how it differentially impedes technology transfers across various channels. Panel A of Figure 11 disaggregates foreign technology introductions into four modalities—key equipment imports, technology licensing, co-production agreements, and consulting services—ranked by the overall volume of technology adoption. It then plots the estimated triple-differences coefficient for each modality. The most pronounced effect appears for key equipment imports: the estimate hovers around -0.05, indicating that in cities with historical religious conflicts each additional pre-existing firm generated approximately 0.05 fewer imported machines post-1983 compared with less xenophobic cities. Technology licensing exhibits a similarly negative coefficient of roughly -0.05, although less statistically significant, suggesting that licensing arrangements were marginally susceptible to cultural barriers. By contrast, the estimates are small and statistically indistinguishable from zero for co-production and consulting. These latter modes typically involve knowledge exchanges with foreign experts on site, channels that may circumvent popular hostility by embedding foreign partners within local institutions.

6.2 The Effect of Anti-Missionary Violence by Violence Nature

Due to the richness of our historical dataset, we are able to identify whether government officials in Imperial China were directly involved in each recorded religious violence. The involvement of officials suggests that some conflicts may have been state-sanctioned or at least tolerated by local authorities, making them more organized and potentially more damaging to long-run openness, particularly in shaping local attitudes toward foreign engagement such as post-1983 technology adoption. To test whether the effect of historical violence against foreign missionary is more pronounced for these official-involved violence, we introduce an additional triple-interaction term $Official_c \times Capacity_c \times Post_t$ into our DDD specification. The results as in Table 10 show that the moderating effect of conflicts involving government officials is consistently negative and statistically significant across all specifications. The estimated coefficients range from -0.038 to -0.045, indicating a sharper erosion of the policy's technology diffusion benefits in cities where the state's involvement in anti-foreign violence was explicit, nearly matching the baseline effect of $Violence_c \times Capacity_c \times Post_t$. These findings suggest that government-facilitated hostility had especially persistent effects, reinforcing the cultural and institutional barriers to foreign technology transfer decades later.

In addition, we examine whether repeated anti-missionary incidents exert a larger dampening effect than a single episode. As displayed in Table 11, across four specifications, the baseline triple-difference coefficient $Violence_c \times Capacity_c \times Post_t$ remains tightly estimated at approximately -0.042 to -0.044 and is statistically significant, confirming that any conflict episode reduces technology adoption. The additional interaction for multiple incidents $Multiple_c \times Capacity_c \times Post_t$ is estimated at -0.036 in the simplest model and is marginally significant ($p<0.10$), but it loses significance once geographic and socioeconomic controls are included. These results suggest that while multiple-time violence may compound the negative impact of anti-foreignism on technology transfers, the incremental penalty beyond the first conflict is smaller and less robust.

6.3 The Effect of Anti-Missionary Violence by Regions

As the next step, we explore whether the moderating effect of anti-foreignism varies with regional ethnic makeup. Panel A of Table 12 repeats our baseline DDD for Han-majority cities, while Panel B focuses on ethnically diverse areas, specifically the Ethnic Autonomous Regions of China. In Han-majority regions, the triple-differences coefficient on $Violence_c \times Capacity_c \times Post_t$ remains large and highly significant across all specifications, indicating that historical anti-missionary violence substantially eroded the policy's industrial-foundation gains in foreign technology adoption. By contrast, in ethnically diverse regions the point estimates are small, statistically indistinguishable from zero. The results suggest that where local populations are more heterogeneous, anti-foreign animus tied to religious conflict did not crystallize into a durable barrier against technology transfer, perhaps because intergroup interactions and pluralistic norms mitigated collective hostility. In more culturally homogeneous settings, by contrast, anti-foreign legacies appear to have hardened into social norms that significantly dampened the uptake of foreign technologies.

We further examine whether the attenuating effect of anti-missionary violence on post-1983 technology adoption varies between coastal and inland regions. Table 13 presents the triple-differences estimates separately for these two geographic areas. In coastal regions (Panel A), the estimated coefficient on $Violence_c \times Capacity_c \times Post_t$ is consistently negative and statistically significant across all specifications, with point estimates ranging from -0.056 to -0.068. Despite the greater openness and stronger institutional capacities typically associated with coastal areas, these findings indicate that entrenched local hostility continued to dampen foreign technology transfers in the era of QPQ. Panel B shows that the effect is also robust and statistically significant in the inland regions, with coefficients ranging from -0.070 to -0.083. Although the magnitude is slightly larger than in coastal areas, overlapping confidence intervals imply that the difference is not statistically significant.

6.4 The Effect of Anti-Missionary Violence by Source Countries

Finally, to examine heterogeneity in the moderating effect of anti-foreign sentiment, we assess whether its influence varies systematically by the source country of foreign technology. Panel B of Figure 11 reports the triple-difference estimates by country of origin for Japan, the United States, Germany, the United Kingdom, Italy, France, and a residual "Other" category, ordered by the total volume of technology adoptions. The estimates reveal generally negative effects across most source countries, suggesting that historical hostility depressed foreign technology inflows regardless of origin. Although the magnitude of the coefficient is somewhat larger for Japanese technologies, this pattern should not be overinterpreted. Anti-missionary sentiment captures a broader xenophobic disposition and local suspicion toward foreign influence, and Japan as one of the most active technology partners for China in the 1980s was naturally exposed to these underlying cultural frictions. In particular, the historical records also include incidents involving Japanese missionaries. Overall, the results imply that cities with stronger anti-foreign legacies tended to attract less foreign technology from major partners following the QPQ policy.

7 Robustness Checks

In this section, we subject our baseline estimates to a rigorous series of checks by controlling for the 1978 reform, historical church, the Cultural Revolution, the Second Sino-Japanese War and domestic rebellion, correcting standard errors for spatial dependence, re-estimating with a binary adoption outcome, and conducting placebo draws. Each exercise investigates the stability of our findings under alternative assumptions and empirical designs.

7.1 The Effect of the 1978 Reform

To further strengthen our identification, we additionally control for the possibility that the observed post-1983 effects of anti-foreignism may reflect broader responses to China's earlier 1978 reform, an institutional turning point that initiated market-oriented liberalization. While our baseline analysis centers on the 1983 policy shift that explicitly enabled technology transfer at the city level, the 1978 reform may have also triggered anticipatory adjustments in foreign engagement. To disentangle these two episodes, we augment the triple-differences specification by introducing an additional interaction term, $Violence_c \times Capacity_c \times Post_t^{1978}$, where $Post_t^{1978}$ is an indicator equal to one in years after

1978. This allows us to estimate a separate anti-foreign effect tied specifically to the earlier liberalization period.

The results of this extended model are reported in Table 14. Across all specifications, the estimated coefficient on the 1983-related interaction $Conflict_c \times Firm_c \times Post_t$ remains negative and statistically significant, confirming that the main DDD effect is not an artifact of broader post-1978 trends. Meanwhile, the insignificance of the $Violence_c \times Capacity_c \times Post_t^{1978}$ interaction confirms that the effects we identify are not driven by the broader market-oriented reforms initiated in 1978, but are instead closely tied to the more targeted and decentralized technology-transfer policies implemented in 1983. These results reinforce our interpretation that the 1983 policy of QPQ marked a distinct shift in the institutional environment, one in which localized historical hostility became an economically meaningful constraint on foreign technology adoption.

7.2 The Effect of Historical Church

To ensure that our estimated effect of anti-missionary hostility is not confounded by broader religious activities, we introduce an additional interaction term, $Church_c \times Capacity_c \times Post_t$, where $Church_c$ measures church presence in city c in 1664. This specification addresses the concern that cities with more active historical church networks may have experienced both differential conflict incidence and a greater propensity to adopt foreign technology, for example, due to superior infrastructure, human capital, or cultural connections. By including this triple-difference term, we disentangle the specific impact of anti-missionary hostility from any direct effect of general religious infrastructure on post-1983 technology uptake.

The results of this robustness check are reported in Table 15. In all four specifications, the coefficient on $Violence_c \times Capacity_c \times Post_t$ remains negative and highly significant, confirming that anti-missionary violence continues to depress the adoption of foreign technology even when controlling for overall church presence. In contrast, the coefficient on $Church_c \times Capaciy_c \times Post_t$ is statistically indistinguishable from zero. These findings demonstrate that our measure of anti-foreign sentiment captures a distinct channel, beyond general religious activities, through which historical hostility inhibits technology uptake.

7.3 The Effect of Other Historical Conflicts: Cultural Revolution, the Second Sino-Japanese War, and Domestic Rebellion

The next set of robustness checks examines whether other historical conflicts might confound our estimated effect of anti-missionary violence. We focus on three events that could either have fostered anti-foreign sentiment or shaped local institutions and cultural norms. The Cultural Revolution (1966-1976) unleashed pervasive political turmoil and ideological hostility toward foreign influence, potentially creating institutional rigidities and cultural norms that impede technology uptake. Likewise, the Japanese occupation during the Second Sino-Japanese War (1937-1945) inflicted severe disruption and engendered lasting animosity toward foreign powers. Domestic rebellions, while not directly targeting foreigners, may nevertheless signal underlying institutional weakness and a conflict-prone environment. To isolate our measure of anti-missionary hostility from these alternative channels, we augment the baseline DDD regression with three additional triple-interaction terms. First, we add $CulturalRev_c \times Capacity_c \times Post_t$, where $CulturalRev_c$ captures city-level intensity of the Cultural Revolution, measured by the number of deaths caused by the Cultural Revolution per capita, thereby absorbing any differential policy effect driven by Cultural Revolution-induced hostility. Second, we include $JapanOcc_c \times Capacity_c \times Post_t$, where $JapanOcc_c$ measures city-level exposure to Japanese occupation. Third, we control for $Rebellion_c \times Capacity_c \times Post_t$, where $Rebellion_c$ is a binary indicator equal to 1 if the city experienced a domestic rebellion during the Qing dynasty, and 0 otherwise.

Table 16 reports estimates after adding the $CulturalRev_c \times Capacity_c \times Post_t$ term. Across the four specifications, the coefficient on our main interaction $Violence_c \times Capacity_c \times Post_t$ remains large, negative, and highly significant, while the Cultural Revolution interaction is small and never significant. Columns (3) and (4) replicate our sample restrictions and again show no meaningful effect of Cultural Revolution intensity. These results confirm that our main coefficient on anti-foreign sentiment is not confounded by Cultural Revolution-induced hostility.

Table 17 presents an analogous exercise for the Japanese occupation term. Again, the triple-difference coefficient on anti-missionary violence is stable and highly significant. The estimated coefficient on $JapanOcc_c \times Capacity_c \times Post_t$ is negative and marginally significant, suggesting a modest additional deterrent, but its inclusion leaves our main estimate virtually unchanged. This confirms that our measure of anti-foreign sentiment via religious conflicts captures a distinct channel beyond potentially confounding anti-foreign legacies against Japan as studied in Che et al. (2015).

Table 18 reports the corresponding results for the domestic rebellion term. The estimated coefficient on the triple-interaction term that includes anti-missionary violence remains stable and highly significant. However, the coefficient on the triple interaction involving the rebellions is small and statistically insignificant, indicating that domestic rebellions did not significantly alter the effect of the QPQ policy. Adding this term does not affect our main estimate, demonstrating that domestic conflicts such as rebellions do not confound the unique impact of anti-missionary violence.

7.4 Spatial Correlation

Spatial correlation presents an additional concern for statistical inference, as geographically proximate cities may share unobserved correlated shocks. If such spatial clustering exists and is not properly accounted for, standard errors can be underestimated, leading to overstated statistical significance of the estimated effects. To address this, we re-estimate both our DID and DDD models using spatial heteroskedasticity and autocorrelation consistent (HAC) standard errors (Conley, 1999), which corrects for spatial correlation in residuals within a specified distance band. We implemented three distance cut-off points, 100 km, 300 km, and 500 km, to allow for varying ranges of spatial dependence.

Table 19 presents the estimation results. Across all specifications and both the baseline DID and DDD estimates, the point estimates of the key interaction terms remain essentially unchanged, and their statistical significance is preserved under each spatial-HAC correction. This confirms that our results are not driven by spatially correlated errors and that our inference regarding the causal effects of the QPQ policy and its moderation by anti-missionary violence is robust to potential spatial dependence.

7.5 Binary Outcome

To capture not only the intensive margin of technology introductions but also their extensive margin, we re-estimate our DDD model using a binary outcome equal to one if a city adopts at least one foreign technology in a given year and zero otherwise. This specification tests whether anti-foreign sentiment also shifts the city's probability of adopting any technology following the 1983 policy change.

Table 20 shows that the estimated coefficient on $Violence_c \times Capacity_c \times Post_t$ remains negative, statistically significant in most specifications. Columns (1) and (2) add geographic and socioeconomic controls; Columns (3) and (4) implement the Cultural Revolution exclusion and adopters-only restrictions. The persistence of a significant negative triple-difference confirms that anti-foreign hostility not only dampens the volume of technology transfers but also reduces the probability that cities engage with foreign technologies at all after the implementation of the policy.

7.6 Placebo Test

Finally, to ensure that our DDD results reflect genuine historical anti-foreignism rather than random variation, we perform a placebo exercise by randomly assigning "violence" status to 54% of cities (matching the observed prevalence) and labeling the remainder as "non-violence". For each of 1,000 iterations, we re-estimate the baseline DDD specification and record the estimated coefficient on $Violence_c \times Capacity_c \times Post_t$.

As Table 21 shows, the distribution of these 1,000 placebo estimates is tightly centered around zero with a mean of -0.001 and a standard error of 0.001 in three of the four specifications, and none approaches the magnitude or significance of our true estimate. This exercise confirms that the pronounced, negative triple-differences effect we observe is not a spurious artefact of chance but is driven by the historical occurrence of anti-missionary violence.

8 Mechanism Analysis

This section investigates two mechanisms through which historical anti-foreign sentiment impeded technology adoption after the 1983 QPQ policy. The first examines bilateral municipal ties, using sister-city partnerships as a proxy for a city's institutional and cultural engagement with foreign counterparts. The second focuses on foreign-invested firms, which served as key channels for the introduction of foreign technologies. These analyses clarify how both institutional and market-based dimensions of international relationships mediated the impact of the QPQ policy on foreign technology adoption.

8.1 Bilateral Relationship

To capture a city's capacity and willingness to engage in cross-border institutional exchange, we use the formation of sister-city partnerships as a proxy for its broader bilateral relationships with foreign counterparts. Formal bilateral municipal ties such as sister-city agreements, municipal cooperation accords, and analogous subnational partnerships constitute a distinct channel for technology diffusion. These relationships institutionalize recurring exchanges among city governments, universities, firms, and civil-society organizations and thereby sustain flows of people, tacit knowledge, and collaborative projects that complement one-off contracts (Hu et al., 2021). After 1983, Chinese cities became increasingly likely to establish sister-city relationships with foreign cities as the opening-up progressed, especially in cities that were historically more developed. Because these ties are explicitly bilateral, they depend on reciprocal willingness to engage; historical anti-foreign sentiment can weaken that reciprocity and reduce both the depth and the durability of cross-border municipal engagement.

To test this channel empirically, we estimate the same DDD framework used for the main outcome but replace the dependent variable with an indicator for whether city c has at least one formal sister-city (or equivalent municipal partnership) with a foreign city in year t. The triple interaction $Violence_c \times Capacity_c \times Post_t$ therefore measures how historical anti-missionary violence modifies the extent to which pre-existing industrial capacity translated into the formation of bilateral municipal ties.

Table 22 reports these estimates. The triple interaction is negative and statistically significant across baseline and augmented specifications; the preferred estimate is approximately -0.02. Interpreted at the city level, conditional on fixed effects and covariates, each additional legacy firm is associated with an approximately two percent smaller post-1983 increase in the probability of forming a sister-city tie in cities with greater historical violence. This result is robust to adding geographic, policy, and socioeconomic controls, to excluding years affected by the Cultural Revolution, and to restricting the sample to cities that ultimately adopted technology.

The event-study counterpart (Figure 12, panel A) provides temporal evidence consistent with a causal interpretation: pre-1983 coefficients (1978–1982) are centered near zero and statistically insignificant, while the immediate post-reform years show a pronounced negative deviation that reaches its nadir in 1984 and then attenuates toward zero in subsequent years. This timing indicates that the anti-foreign legacy most strongly impeded the initial expansion of bilateral municipal ties at the moment cities were first mobilizing to exploit QPQ opportunities.

In conjunction, these results indicate that historical anti-foreign sentiment materially undermined city-level bilateral engagement: by lowering the likelihood that industrially endowed cities would form sister-city and analogous municipal partnerships in the immediate aftermath of the 1983 QPQ policy, the anti-foreign legacy severed a recurrent, reciprocal channel for learning and cooperation and thereby slowed the diffusion of foreign technologies.

8.2 Foreign Investment

Foreign investment constitutes a complementary aspect of a city's external relations, running in parallel to bilateral municipal ties such as sister-city networks: the former captures market-based, firm-level linkages between local firms and foreign suppliers, investors, and multinational affiliates, while the latter institutionalize reciprocal municipal engagement. Such foreign-funded entry serves as a direct channel for technology adoption by delivering capital and advanced equipment, exposing local firms to foreign managerial practices, and enabling sustained, hands-on interaction with foreign technicians and managers (Blalock and Gertler, 2008; Liu, 2008).

We examine this mechanism by re-running the baseline DDD with outcomes that describe the ownership mix of new entrants in city c and year t. Specifically, the dependent variables record (i) the share of new entrants that are foreign-funded,[16] (ii) the share that are state-invested (SOEs), and (iii) the share that are private domestic firms. The triple interaction $Violence_c \times Capacity_c \times Post_t$ therefore measures how historical anti-missionary violence altered the degree to which an industrial legacy translated into foreign-led versus state-led entry following the 1983 policy change.

Table 23 presents the results. The triple interaction on the foreign-funded share is negative and statistically significant, with a preferred point estimate of roughly -0.01. In contrast, the corresponding coefficient for state-invested entrants is positive and notable (approximately 0.8–1.2 percent across specifications), while the effect on domestic private entry is indistinguishable from zero. These compositional shifts are robust to the inclusion of geographic, policy and socioeconomic controls and to alternative sample restrictions.

The event-study analogue (Figure 12, panel B), which uses as the dependent variable the city-year share of foreign-invested new entrants, reinforces this interpretation: pre-

[16] Given that firms with Hong Kong, Macau, or Taiwan investment have systematically different characteristics, they are omitted from the analysis.

trend coefficients (1978–1982) are centered near zero, whereas the immediate post-reform period displays a marked negative divergence in the foreign-invested firm share, with point estimates near -0.015 in 1985–1986 and confidence intervals excluding zero. Thereafter the negative gap attenuates and becomes less precisely estimated, suggesting that cultural frictions were most binding during the initial liberalization surge.

Mechanically, a shift toward state-dominated modes of entry reduces opportunities for frequent, hands-on interaction between local engineers and independent foreign technicians, constrains managerial discretion needed to adapt imported designs, and raises contracting and monitoring costs for complex technology transfers. In short, the ownership-structure evidence shows that historical anti-foreign sentiment did not merely lower the gross number of foreign contracts; it systematically shifted the posterior composition of entry toward forms less conducive to tacit knowledge transmission after the implementation of the QPQ policy.

8.3 Discussion and Implications

Recasting the mechanisms in parallel emphasizes that both bilateral municipal ties and firm-level foreign investment are facets of a city's external relations, but they operate through different institutional logics. The first channel, bilateral municipal relationships such as sister-city ties, is an institutional and cultural conduit: these reciprocal links institutionalize repeated exchanges, person-to-person contact, and joint projects that sustain tacit learning. The second channel through foreign-funded entry and the ownership composition of post-1983 entrants is a market-based, business conduit through which capital, equipment, managerial practices, and hands-on technical interaction travel. Empirically, we find that historical anti-missionary violence substantially reduced the formation of city-level bilateral links and simultaneously shifted entry toward state-dominated forms and away from foreign-funded firms.

These two channels are complementary and mutually reinforcing: the absence of sustained bilateral municipal engagement lowers the demand for and the effectiveness of repeated firm-level collaboration, while a compositional shift away from foreign-funded firms reduces the supply of independent foreign technicians and managers who would otherwise sustain city-level relationships through joint projects and personnel exchange. Together, these forces explain why otherwise similar, industrially endowed cities experienced markedly different adoption trajectories after QPQ. The policy increased opportunities at the national level, but local cultural legacies determined whether those opportunities translated into durable channels for learning and productivity gains.

Policy implications follow directly. First, market-opening measures should be paired with programs that rebuild reciprocal institutional ties at the subnational level: proactive sister-city matchmaking, supported municipal exchange programs, and funded joint innovation platforms can help re-embed foreign collaboration within trusted institutional routines. Second, incentives and institutional reforms that enhance the role and voice of foreign investors in local governance such as clearer rules on joint-venture governance and transparent procurement can make firm-level entry more conducive to tacit learning. Finally, because cultural legacies are persistent, policy packages should combine short-term trust-building (exchanges, visible cooperative projects) with medium-run investments in institutional transparency that sustain reciprocal engagement. Taken together, these measures would raise the probability that national liberalization yields broad, durable technology adoption at the city level.

9 Productivity Analysis

In this section, we examine the productivity effects of foreign technology adoption. We first assess firm-level gains using matched data to isolate the impact of adoption while controlling for firm, industry, and city characteristics. Using a back-of-the-envelope method, we then aggregate these effects to the city level to evaluate the broader productivity consequences of historical anti-missionary sentiment.

9.1 Firm-level Productivity Gains from Foreign Technology Adoption

Although our earlier results show that China's QPQ policy spurred foreign technology inflows and that anti-missionary violence curtailed them, the true economic stakes lie in the productivity improvements these technologies can deliver. Foreign technology adoption in our study do more than transfer physical equipment. Indeed, it embed new processes, skills, and organizational practices through detailed contractual arrangements and perhaps generates larger productivity gains than equipment imports alone.

To quantify the real benefit of adoption and to gauge how QPQ and anti-foreign sentiment shape firm performance, we merge our detailed contract-level data (1950–1990) with the 1995 Annual Survey of Industrial Firms (ASIF) and calculate each firm's log total factor productivity. Specifically, after harmonizing the datasets—such as by dropping firms that violate accounting principles—the ASIF data include 252,111 firms in total, of which 425 are successfully matched to at least one foreign technology adoption based on the adopter's company name. We estimate a Solow residual from an OLS log-Cobb-Douglas regression of value added on capital and labor, including four-digit industry and city fixed effects to absorb cross-sectional heterogeneity. We then take the residual from this OLS log-Cobb-Douglas regression as our firm-level productivity measure.

Next, to generate the propensity scores, we run a logit model where the dependent variable equals one if a firm adopted at least one foreign technology and zero otherwise. The regression includes a rich set of firm-level characteristics such as output, capital, labor, wages, firm age, export status, FDI status, state-ownership status, and a dummy for Hong Kong-Macau-Taiwan capital, while absorbing four-digit industry effects and city fixed effects. The predicted values from this logit serve as each firm's propensity score, which we then use to match adopters and non-adopters.

We match treated firms to controls using two algorithms: nearest-neighbor, which selects the closest three control firms for each treated firm, and Epanechnikov kernel, which weights all controls by a quadratic function of their propensity-score distance. For each matched sample, we can compute the average treatment effect on the treated as following:

$$\text{ATT} = \frac{1}{N_I} \sum_{i \in \text{Treated}} \Big(Y_i - \sum_{j \in \text{Control}} w_{ij} Y_j \Big) \tag{9.1}$$

where N_I denotes the total number of treated firms; Y_i is treated firm i's log productivity; Y_j is control firm j's productivity; and w_{ij} is the weight assigned to control firm j when matching to treated firm i, equal to $1/3$ for each of the three nearest neighbors in the nearest-neighbor algorithm, and given by the Epanechnikov kernel function (declining quadratically with propensity-score distance) in the kernel matching algorithm.

Table 24 presents the ATT estimates for both matching procedures, and in each case foreign technology adoption is linked to a significant uplift in log productivity. Under 3-nearest-neighbor matching, the ATT is 0.158, which translates into roughly a 15.8 percent productivity premium for adopters. Using Epanechnikov kernel matching, the ATT rises to 0.181, implying about an 18.1 percent gain in firm productivity.

This suggestive evidence shows that, after accounting for observable firm characteristics and common industry and city factors, firms adopting foreign technologies achieve substantially higher productivity. The resulting productivity premium underscores the economic importance of technology transfer and reinforces our city-level findings: by facilitating the adoption of foreign technology, the QPQ policy and its modulation by anti-foreign sentiment had tangible impacts on firm performance during the country's early economic development.

9.2 Back-of-the-Envelope Estimation of City-level Productivity Losses (1983–1995)

To translate the documented reduction in technology adoptions into a welfare-relevant measure, we estimate the implied loss in city-level total factor productivity resulting from historical anti-missionary violence. The calculation combines the estimated per-legacy-firm QPQ gain, the observed attenuation of that gain in xenophobic cities, the mean number of legacy firms (industrial capacity), the estimated average firm-level TFP gain from foreign adoption, and a 13-year horizon covering 1983–1995. This period spans both the implementation of the QPQ policy and the year of the industrial firm survey used for our TFP estimation, thereby capturing the full window during which policy-induced technology diffusion and its productivity effects were most salient.

Specifically, based on the triple-differences estimation (Equation 4.2), the per-legacy-firm QPQ gain in non-violence cities is 0.080, while historical anti-missionary sentiment reduces this gain by $\beta = 0.062$. With an average of $\bar{F} = 7.726$ legacy firms per city, this translates into an annual shortfall of $\bar{F} \times \beta = 7.726 \times 0.062 = 0.479$ foreign-technology adoptions per city per year. Over the 13-year period, the cumulative loss amounts to $l = 0.479 \times 13 = 6.23$ foregone adoptions per city.

Based on the firm-level matching analysis, each lost adoption would have raised one industrial firm's TFP by $g = 0.158$, and that the average city contains $N = 766$ industrial firms in 1995 (ASIF), the implied city-average TFP shortfall over 1983–1995 is $(l/N) \times g = (6.23/766) \times 0.158 = 0.00128$, or approximately 0.128 percent.

In magnitude, this back-of-the-envelope calculation suggests that cities historically exposed to anti-missionary violence experienced about 6.23 fewer foreign-technology adoptions over 1983–1995, translating into an average TFP shortfall of about 0.128 percent over the period for a city with 766 industrial firms. While indicative rather than exact, this exercise highlights the potentially nontrivial productivity costs of persistent cultural resistance to foreign engagement. The estimate abstracts from within-city spillovers, heterogeneity in persistence, and general-equilibrium effects, and should therefore be interpreted as a lower bound on the aggregate productivity impact.

10 Final Remarks

Foreign technology adoption, although essential for enhancing productivity and fostering economic development, is shaped by a complex interplay of institutional, economic, and cultural factors. Using a difference-in-differences approach, we document that China's QPQ Policy of 1983 significantly increased foreign technology adoption in cities with more developed early industrial capacity. However, drawing on a triple-differences framework, we show that these positive effects were substantially weakened in regions exhibiting stronger anti-foreign attitudes, as proxied by the historical presence of anti-missionary violence. Disaggregated analyses at the city-source country level further reveal that hostility toward specific foreign countries selectively suppressed the adoption of technologies originating from those countries relative to technologies from other foreign sources.

To unpack the underlying mechanisms, we show that stronger anti-foreign attitudes deteriorated bilateral municipal ties, weakening local diplomatic and economic relationships with foreign cities and, in turn, reducing mutual engagement and opportunities for technology transfer. In addition, we find that anti-foreign sentiment reshaped local industrial structures by discouraging the entry of foreign-invested firms, thereby undermining a crucial channel for foreign technology transfer. Finally, using propensity score matching on firm-level data, we show that firms adopting foreign technologies exhibit substantial productivity premiums relative to comparable non-adopters. Put differently, it illustrates the productivity losses resulting from the decline in adoption driven by anti-missionary violence. To assess the heritage of hostility, a back-of-the-envelope calculation indicates that cities historically exposed to anti-missionary violence adopted approximately 6.23 fewer foreign technologies between 1983 and 1995, implying an average TFP loss of about 0.128% over the period.

Together, these findings highlight how cultural attitudes can mediate the economic benefits of national-level policy reforms aimed at integrating foreign technologies, underscoring the enduring economic scars left by anti-foreignism. In recent years, the resurgence of anti-foreignism, racism, and heightened geopolitical tensions in many countries has threatened the stability of international economic interactions, jeopardizing cross-border collaboration, trade, and investment, and even contributing to trends of deglobalization. Against this backdrop, it is important to recall the adverse economic consequences historically associated with anti-foreignism and to reaffirm the value of openness, cooperation, and cross-national engagement as critical pillars for sustained economic development in an increasingly interconnected world.

Our findings carry important implications for contemporary policymakers. First, strengthening local absorptive capacity is indispensable for realizing the gains from foreign technology transfer. Cities with deeper industrial foundations benefited more from China's QPQ policy, underscoring the need to incorporate historical legacies into industrial upgrading strategies and to invest in human capital, technical expertise, and institutional quality. Second, fostering an conducive social and cultural environment is as crucial as designing industrial policy. While industrial policies can expand access to advanced technologies, their effectiveness is contingent on local receptiveness. Formal policy instruments alone cannot secure technological catch-up; complementary efforts to build trust, reduce cultural barriers, and cultivate international openness are necessary to ensure that policies translate into effective adoption.

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Appendices

Figures

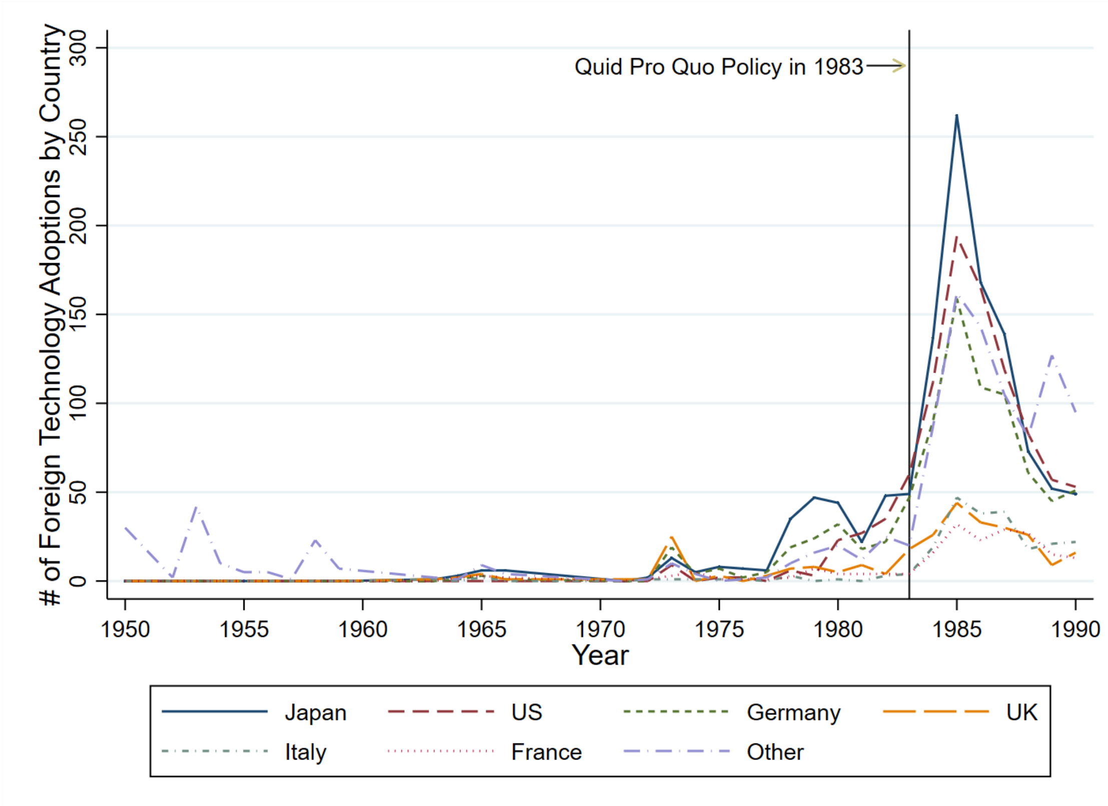


Figure 1: Foreign Technology Adoption by Source Country

Note: This figure illustrates the annual count of foreign technology adoption in China from 1950 to 1990, by source country. The six largest suppliers including Japan, the United States, West Germany (labeled "Germany"), the United Kingdom, Italy, and France are shown individually; the "Other" category aggregates all remaining suppliers, led by the Soviet Union, Switzerland, and Canada.

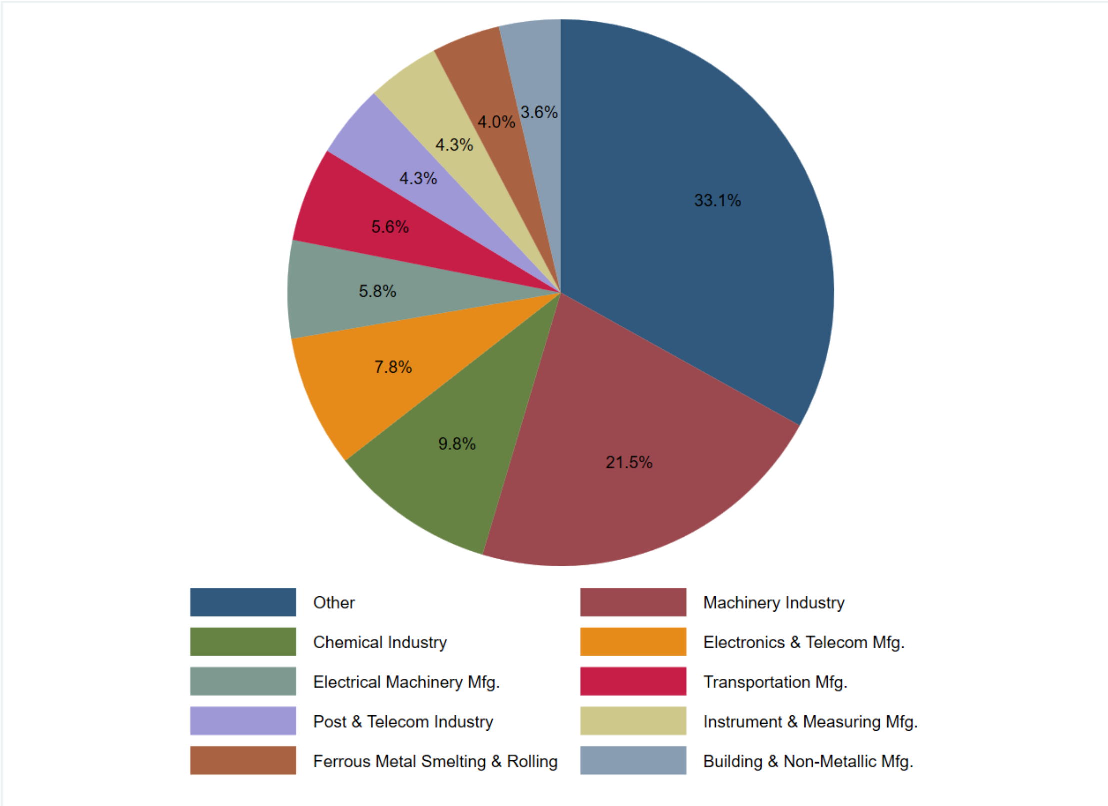


Figure 2: Foreign Technology Adoption by Industry

Note: This figure shows the total frequencies of the top ten industry categories in terms of foreign technology adoption from 1950 to 1990, represented as percentage shares in the pie chart. Industry categories with fewer than 150 adoptions have been grouped into "Other" for clarity.

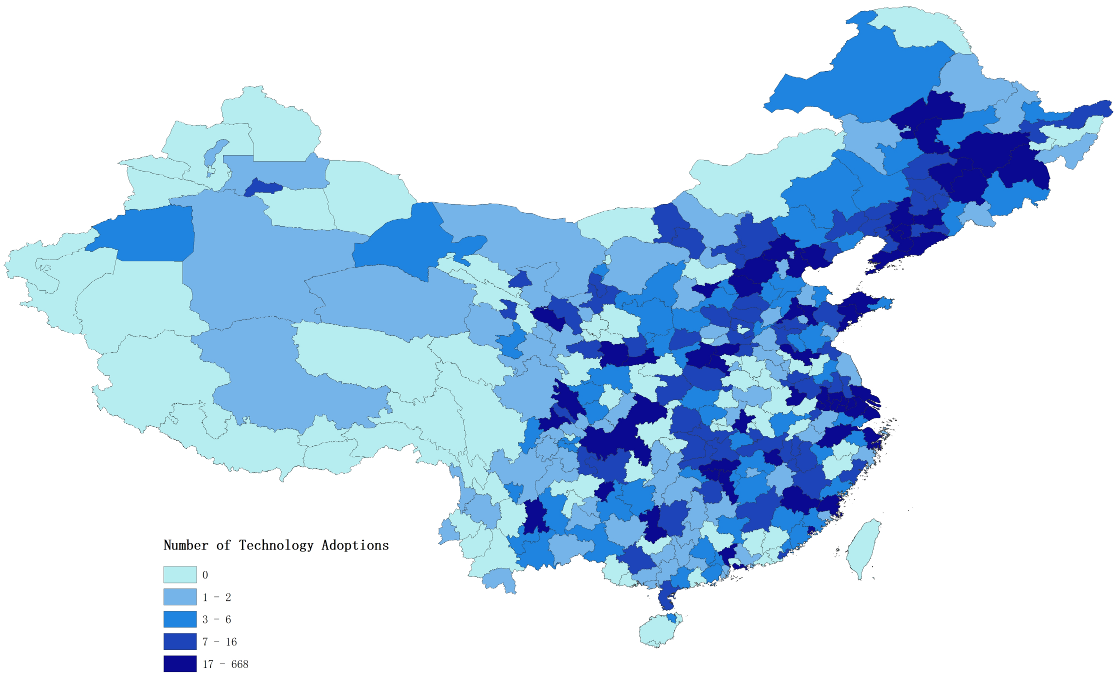


Figure 3: Foreign Technology Adoption

Note: This figure presents a geographic visualization of the cumulative number of foreign technology adoption across Chinese prefectures from 1950 to 1990. Prefectures are shaded by adoption count, with darker tones indicating higher frequencies.

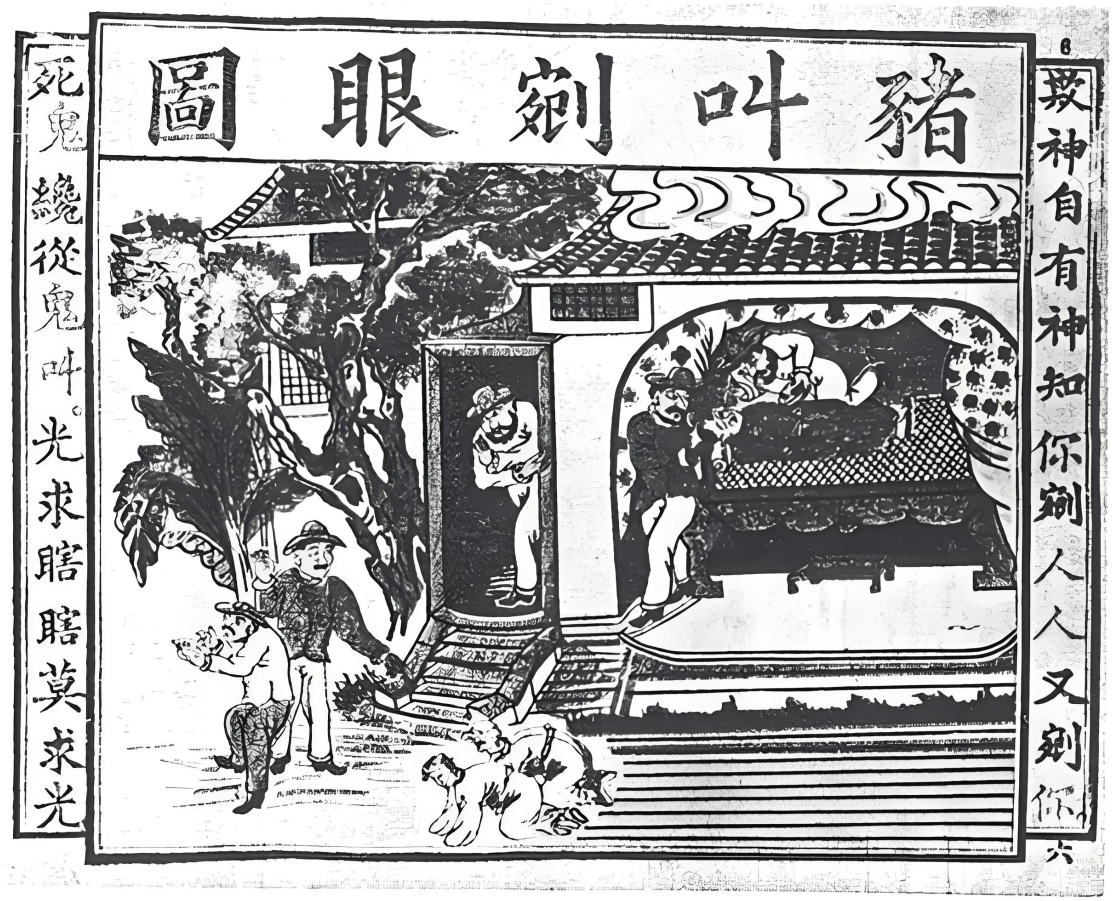


Figure 4: Pig Crying and Eye-Gouging Illustration

Note: This figure illustrates a widely circulated rumor accusing Christian bishops of extracting the eyes of local residents. The title of the figure, "Zhu Jiao Wan Yan Tu" (literally, "Pig Crying and Eye-Gouging Illustration"), employs a malicious homophonic distortion of the Chinese term for "bishop." While one pronunciation of "Zhu Jiao" refers to a bishop in Christianity, the homophone "Zhu Jiao" (meaning "pig crying") was intentionally used to mock and vilify both the bishop and the Church.

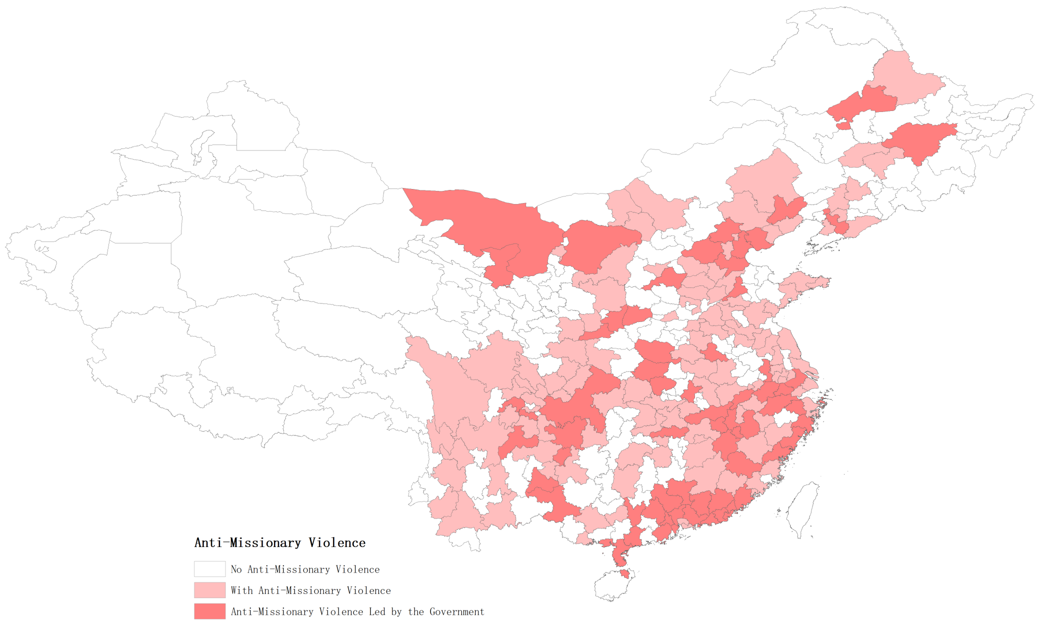


Figure 5: Anti-Missionary Violence

Note: This figure presents a geographic visualization of the historical incidence of anti-missionary violence across Chinese prefectures. Prefectures shaded in pink experienced at least one recorded anti-missionary violence that was not led by the government, while those shaded in red experienced at least one recorded anti-missionary violence led by the government.

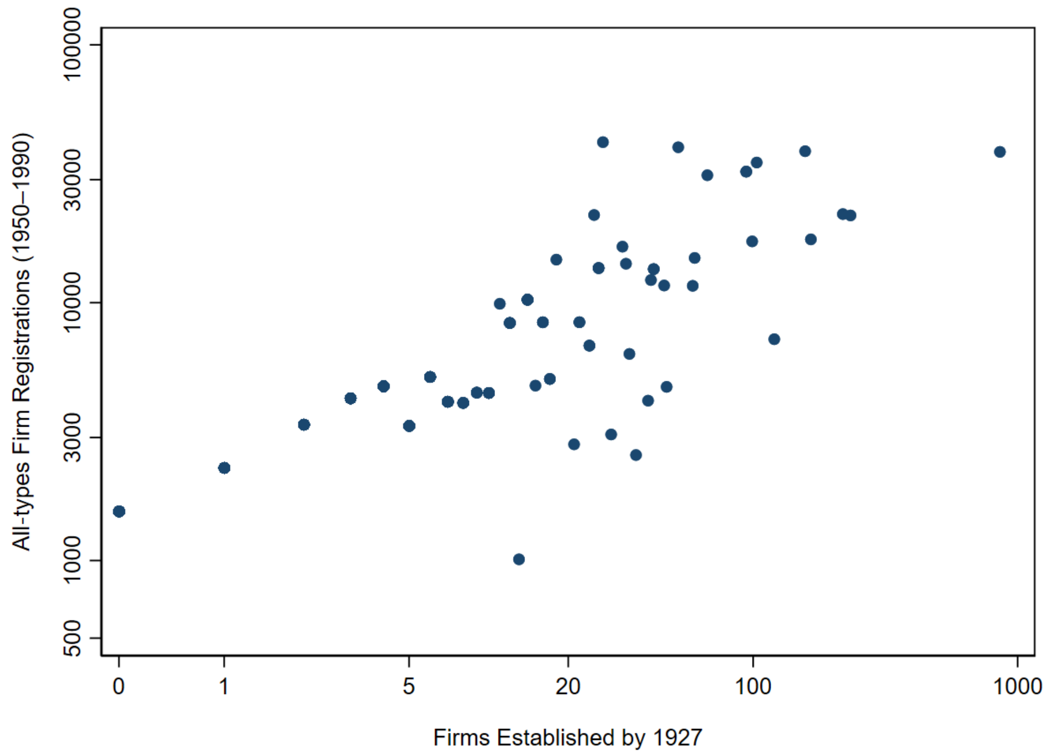


Figure 6: Firms Established by 1927 and All-type Firms Registered (1950–1990)

Note: This figure plots the total number of all-type firm registrations from 1950 to 1990 against the number of firms established by 1927 across Chinese prefectures.

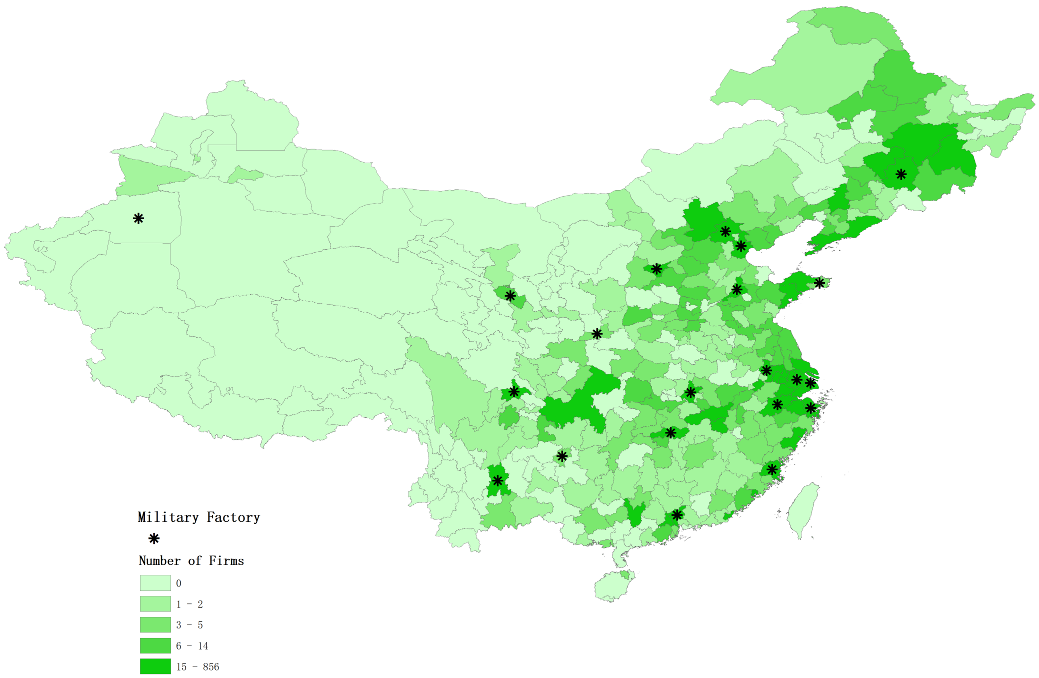
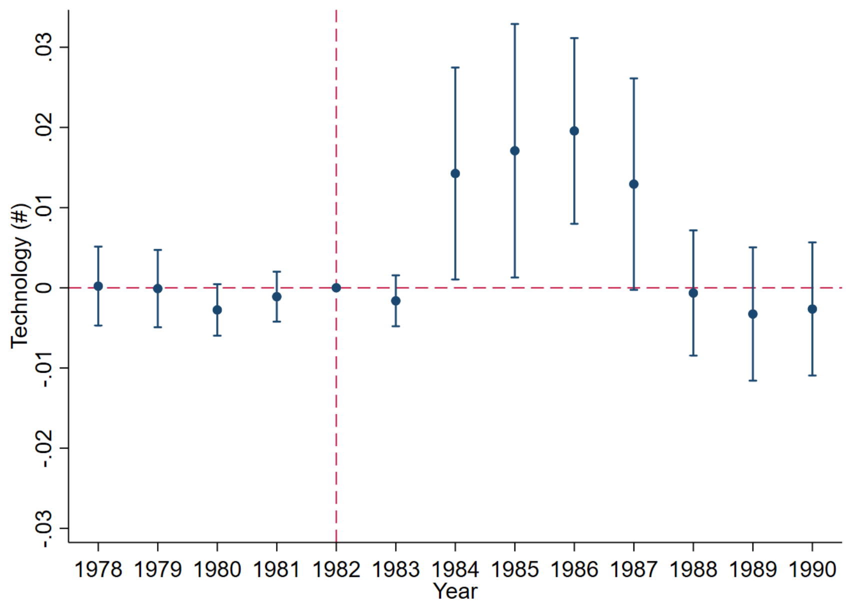
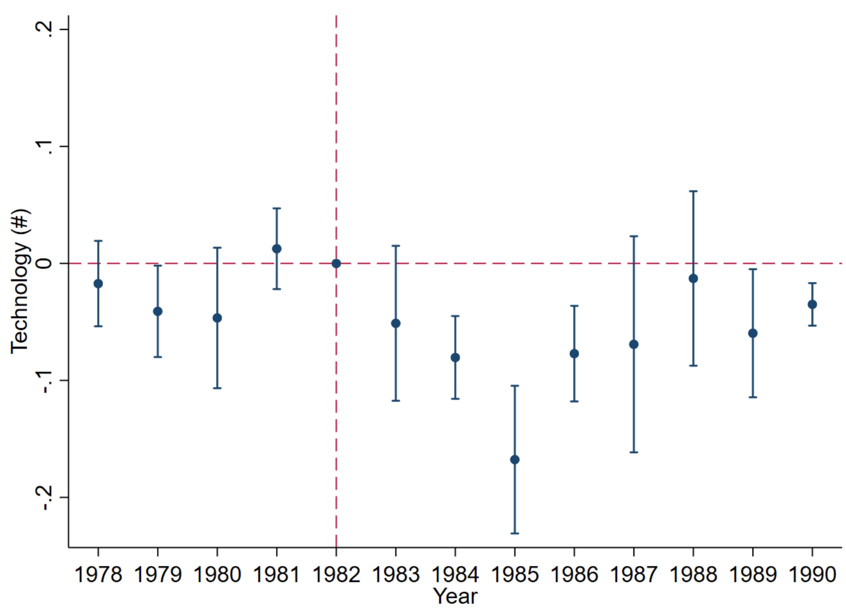


Figure 7: Firms Established by 1927

Note: This figure presents a geographic visualization of the cumulative number of firms established by 1927 across Chinese prefectures. Prefectures are shaded by firm count, with darker tones indicating higher frequencies. The black gear symbol indicates military factories established during the Qing dynasty's Self-Strengthening Movement.



Panel A Difference-in-Differences



Panel B Triple Differences

Figure 8: Event Study

Note: Panel A plots the event-study estimates of the effect of pre-existing firm from Equation 5.1; Panel B plots the corresponding estimates of the moderating effect of anti-missionary violence from Equation 5.2; both include 95% confidence intervals. The dependent variable $Y_{c,t}$ is the number of foreign technology adoptions in city c in year t. Both panels report results for the full sample with geographic controls interacted with year trends: latitude, longitude, distance to coast, terrain ruggedness, and time-varying policy and socioeconomic covariates interacted with year trends: airport presence, SEZ status, provincial-city status, Jinshi density, treaty-port indicator, population, population density, college-enrollment share, industrial employment share, and industrial output per capita. City fixed effects and province-year fixed effects are included in all specifications. Standard errors are two-way clustered by city and year.

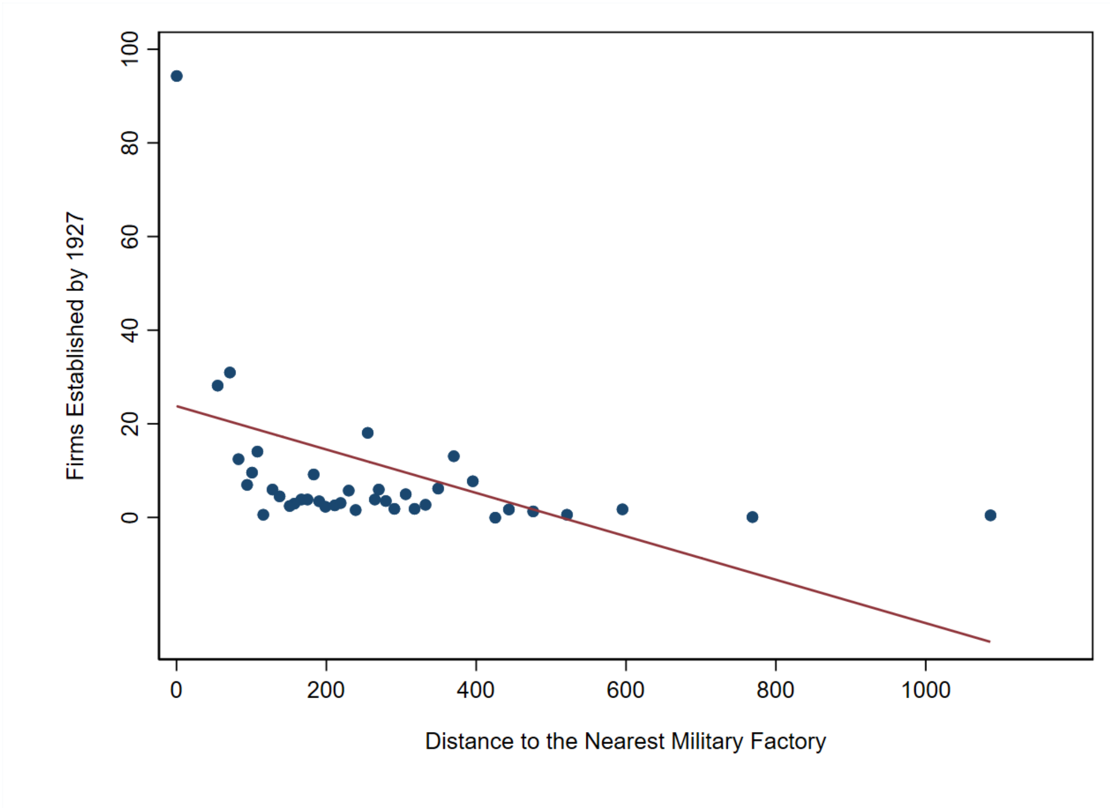
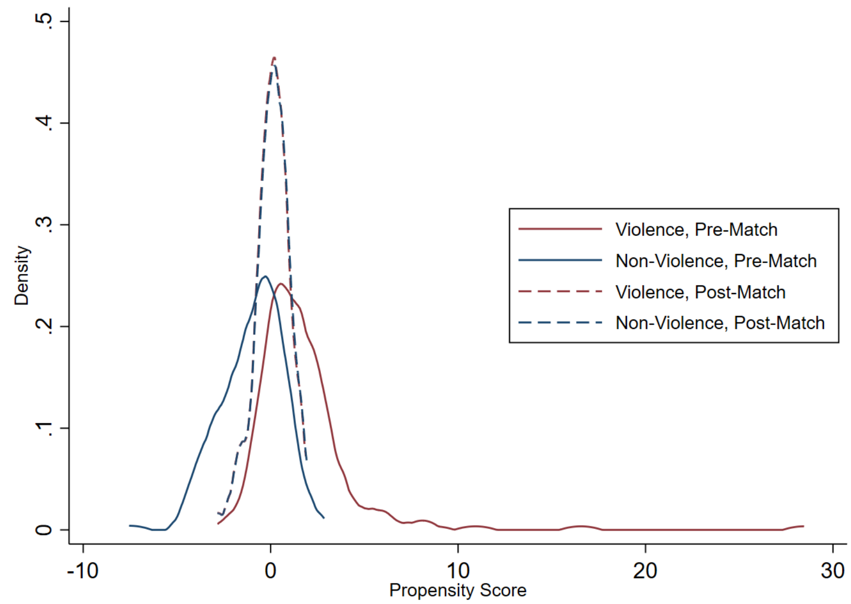
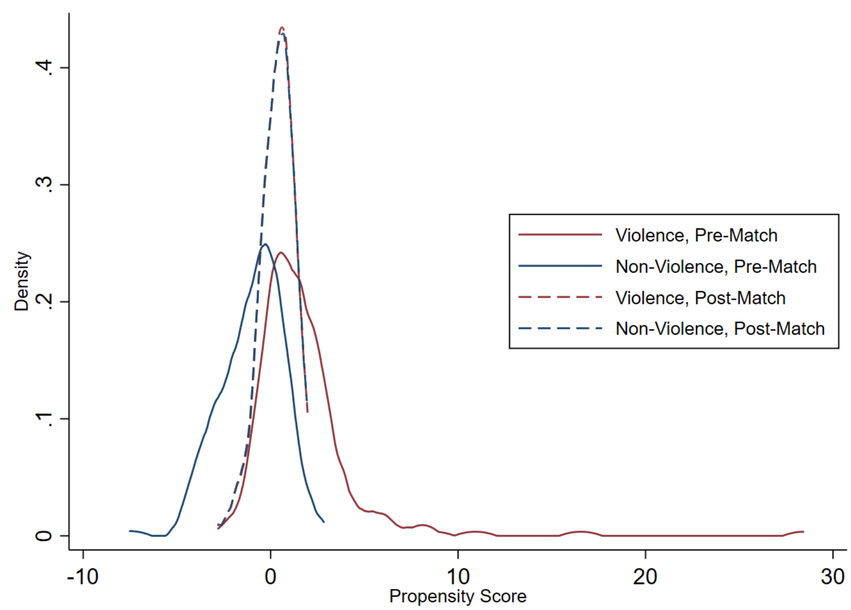


Figure 9: Distance to the Nearest Military Factory and Firms Established by 1927

Note: This figure plots the the number of firms established by 1927 against the distance to the nearest military factory across Chinese prefectures. Each point represents either an individual prefecture or the average firm registrations for a given level of the distance.



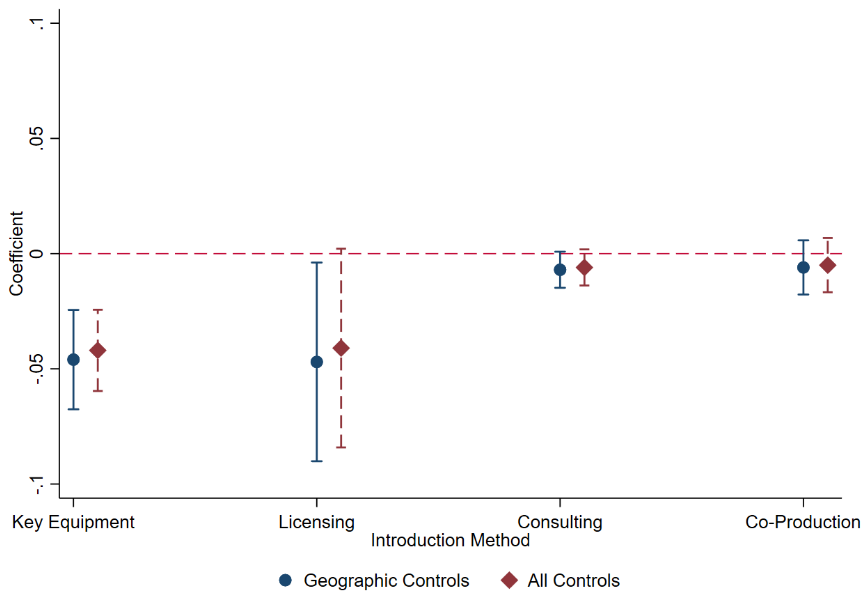
Panel A Nearest-Neighbor Matching



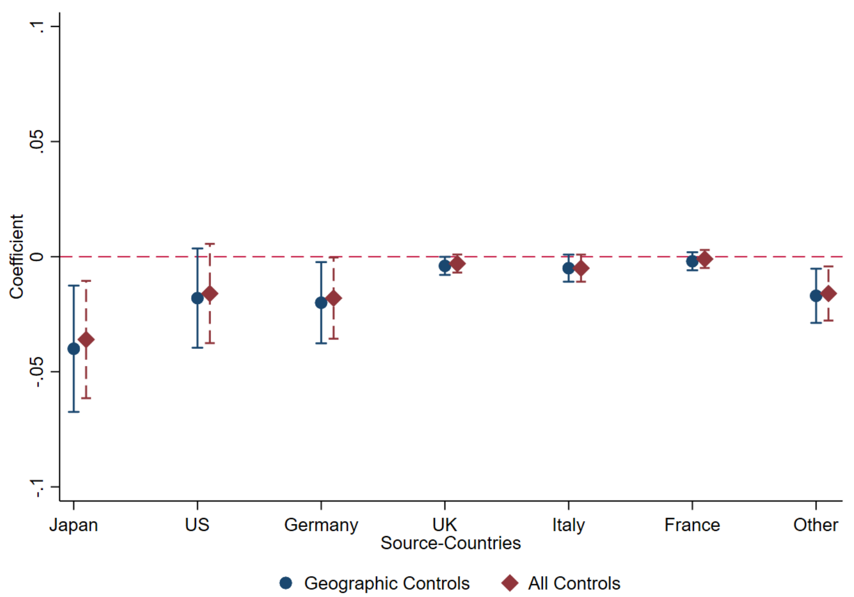
Panel B Kernel Matching

Figure 10: Matched Sample Results: Propensity-Score Distribution

Note: Panels A and B plot kernel-density estimates of the propensity-score distributions for treated (violence) and control (non-violence) observations, before and after matching. Panel A (Nearest-Neighbor Matching) shows nearest-neighbor matching without replacement; Panel B (Kernel Matching) shows kernel matching using an Epanechnikov kernel. Solid lines represent pre-match distributions and dashed lines post-match. The propensity score in both panels is estimated via a logistic regression of violence on firm, Jinshi density, provincial-city status, treaty-port indicator, population, population density, college-enrollment share, industrial-employment share, industrial output per capita, distance to coast, terrain ruggedness, latitude, and longitude.



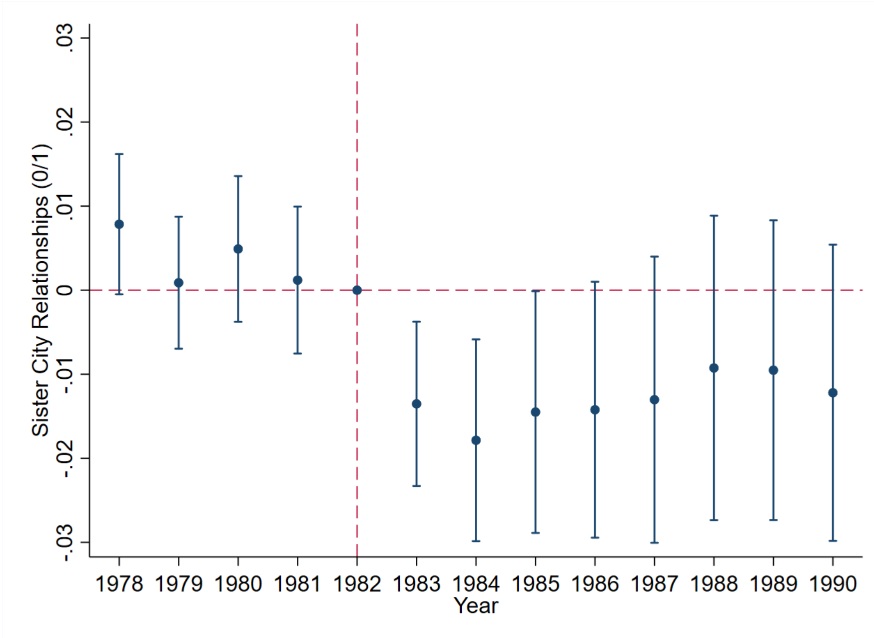
Panel A Introduction Methods



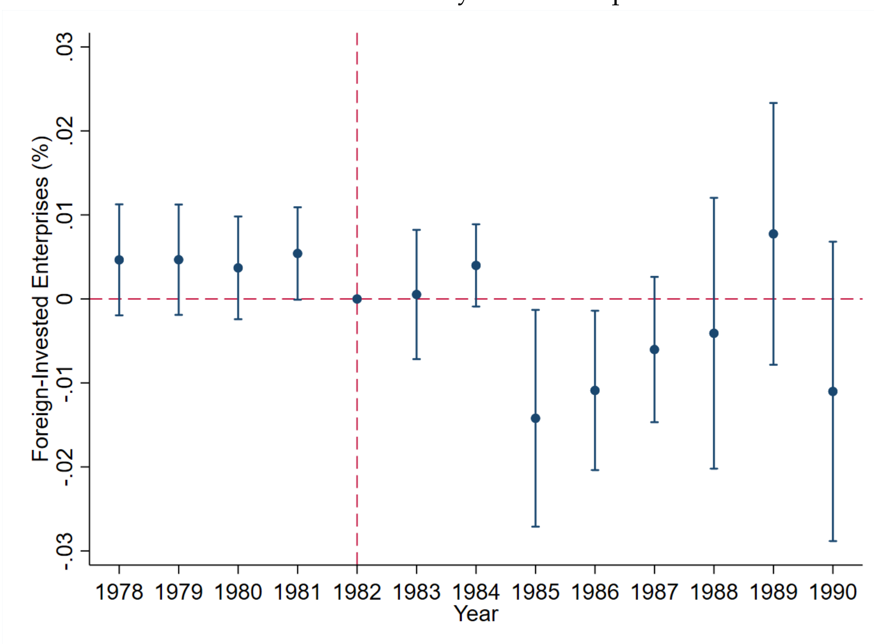
Panel B Source-Countries

Figure 11: Heterogeneity Analysis

Note: Panels A and B plot the triple-differences estimates of the moderating effect of anti-missionary violence from Equation 4.2, with 95% confidence intervals. Dependent variable $Y_{c,t}$ denotes, for city c in year t, the count of foreign technology adoption by mode of technology introduction (Panel A), and the count of foreign technology adoption by source country (Panel B). Categories are ordered by total adoption volume. Blue markers denote results for the full sample with geographic controls interacted with year trends: latitude, longitude, distance to coast, terrain ruggedness. Red markers adds time-varying policy and socioeconomic covariates interacted with year trends: airport presence, SEZ status, provincial-city status, Jinshi density, treaty-port indicator, population, population density, college-enrollment share, industrial employment share, and industrial output per capita. City fixed effects and province-year fixed effects are included in all specifications. Standard error are two-way clustered by city and year.



Panel A Sister City Relationships



Panel B Foreign-Invested Enterprises

Figure 12: Mechanism Analysis: Event Study

Note: Panels A and B plot the event-study estimates of the moderating effect of anti-missionary violence from Equation 5.2, with 95% confidence intervals. Dependent variable $Y_{c,t}$ denotes, for city c in year t, status of sister city relationships (Panel A), and the ratio of foreign-invested enterprises (Panel B). Both panels report results for the full sample with geographic controls interacted with year trends: latitude, longitude, distance to coast, terrain ruggedness, and time-varying policy and socioeconomic covariates interacted with year trends: airport presence, SEZ status, provincial-city status, Jinshi density, treaty-port indicator, population, population density, college-enrollment share, industrial employment share, and industrial output per capita. City fixed effects and province-year fixed effects are included in all specifications. Standard errors are two-way clustered by city and year.

Tables

Summary Statistics

Table 1: Summary Statistics

Variables	Count	Mean	SD
Foreign Technology Adoption	13,612	0.248	1.255
Anti-Missionary Violence	13,612	0.548	0.498
Industrial Capacity	13,612	7.726	22.541
Official	13,612	0.196	0.397
Latitude	13,612	33.099	6.825
Longitude	13,612	111.579	9.793
Distance to Coast	13,612	648,460.223	657,481.612
Ruggedness	13,612	2.743	2.287
Airport	13,612	0.077	0.267
Special Economic Zone	13,612	0.004	0.060
Treaty	13,612	0.120	0.326
Provincial	13,612	0.081	0.273
Jinshi Density	13,612	1.200	1.563
Population	13,612	2.823	1.845
Population Density	13,612	192.462	164.848
College	13,612	38.687	33.114
Industrial Employment	13,612	15.987	12.521
Industrial Output per Capita	13,612	73,378.157	57,670.533
Church	13,612	0.256	1.673
Cultural Revolution Death	11,234	0.512	1.585
Japan Occupation	13,489	0.647	0.478
Foreign-Invested Enterprise	13,612	0.145	2.077
State-Invested Enterprise	13,612	39.703	44.149
Private-Invested Enterprise	13,612	3.542	13.502
Sister City Relationship	13,612	0.047	0.212

Note: Foreign Technology Adoption is the annual count of contract-level technology imports by city (1950–1990), sourced from Forty Years of Technology Introduction in the People's Republic of China (Wenhui Press, 1992). Anti-Missionary Violence is a binary indicator for whether an anti-missionary violence occurred in a city, and Official is a binary indicator for whether government officials were involved in that violence. Both variables come from Chinese Missionary Incidents (Zhongguo Jiaoan Shi) (Sichuan Academy of Social Sciences Press, 1987). Industrial Capacity measures the number of modern enterprises established between 1858 and 1927 in each city, based on Du Xuncheng's National Capitalism and the Government of Old China (1840–1937) (Shanghai Academy of Social Sciences Press, 1991). Geographic controls such as Latitude, Longitude, Distance to Coast, and Ruggedness are computed or extracted using ArcGIS. Airport and Special Economic Zone are year-varying dummies indicating whether a city hosted an airport or was designated an SEZ, respectively. Treaty and Provincial are indicators for historical treaty ports and provincial capitals. Jinshi Density (number of presented scholars, normalized by population) is from Bai et al. (2016). Population, Population Density, College, Industrial Employment, and industrial output per capita are drawn from the 1982 national census. Church measures the number of historical churches. Cultural Revolution Death records city-level number of deaths due to the Cultural Revolution normalized by population. Japan Occupation measures exposure to Japanese occupation (1937–1945), drawn from Wallace and Weiss (2015). Foreign-Invested Enterprise, State-Invested Enterprise, and Private-Invested Enterprise measure shares of firms by ownership type, compiled from enterprise registries. Sister City Relationship is a hand-collected indicator for whether a city had a formal international sister-city partnership.

Main Results

Table 2: Baseline Results: Difference-in-Differences

Dependent Var.	Foreign Technology Adoption			
	(1)	(2)	(3)	(4)
Capacity × *Post*	0.027***	0.018**	0.015**	0.016**
	(0.009)	(0.007)	(0.006)	(0.007)
Geographic Controls × Year	Yes	Yes	Yes	Yes
Socioeconomic Controls × Year	No	Yes	Yes	Yes
City FEs	Yes	Yes	Yes	Yes
Province × Year FEs	Yes	Yes	Yes	Yes
Observations	13,612	13,612	9,960	10,537
R^2	0.415	0.487	0.529	0.494
Mean Dependent Var.	0.216	0.216	0.216	0.216

Note: The dependent variable $Y_{c,t}$ is the number of foreign technology adoptions in city c in year t; $Post_t$ equals one for years $\geq$ 1983; $Capacity_c$ is the number of industrial firms established before 1927. Column (1) reports results for the full sample with geographic controls interacted with year trends: latitude, longitude, distance to coast, terrain ruggedness. Column (2) adds socioeconomic controls (time-invariant variables are interacted with year trends): airport presence, SEZ status, provincial-city status, Jinshi density, treaty-port indicator, population, population density, college-enrollment share, industrial employment share, and industrial output per capita. Column (3) omits observations from the Cultural Revolution period (1966–1976). Column (4) restricts the sample to cities that adopted foreign technology at least once. City fixed effects and province-year fixed effects are included in all specifications. Standard errors, shown in parentheses, are two-way clustered by city and year. * p<0.1; ** p<0.05; *** p<0.01.

Table 3: Baseline Results: Triple Differences

Dependent Var.	Foreign Technology Adoption			
	(1)	(2)	(3)	(4)
Violence × *Capacity* × *Post*	-0.072***	-0.062***	-0.058***	-0.063***
	(0.018)	(0.017)	(0.016)	(0.016)
Capacity × *Post*	0.098***	0.080***	0.073***	0.079***
	(0.020)	(0.018)	(0.017)	(0.018)
Geographic Controls × Year	Yes	Yes	Yes	Yes
Socioeconomic Controls × Year	No	Yes	Yes	Yes
City FEs	Yes	Yes	Yes	Yes
Province × Year FEs	Yes	Yes	Yes	Yes
Observations	13,612	13,612	9,960	10,537
R^2	0.424	0.493	0.533	0.500
Mean Dependent Var.	0.216	0.216	0.216	0.216

Note: The dependent variable $Y_{c,t}$ is the number of foreign technology adoptions in city c in year t; $Post_t$ equals one for years $\geq$ 1983; $Capacity_c$ is the number of industrial firms established before 1927; $Violence_c$ is an indicator of anti-missionary incidents. Column (1) reports results for the full sample with geographic controls interacted with year trends: latitude, longitude, distance to coast, terrain ruggedness. Column (2) adds socioeconomic controls (time-invariant variables are interacted with year trends): airport presence, SEZ status, provincial-city status, Jinshi density, treaty-port indicator, population, population density, college-enrollment share, industrial employment share, and industrial output per capita. Column (3) omits observations from the Cultural Revolution period (1966–1976). Column (4) restricts the sample to cities that adopted foreign technology at least once. City fixed effects and province-year fixed effects are included in all specifications. Standard errors, shown in parentheses, are two-way clustered by city and year. * p<0.1; ** p<0.05; *** p<0.01.

Table 4: Balance Check: Anti-Missionary Violence and Industrial Capacity

	(1) Industrial Capacity	(2) Industrial Capacity
Anti-Missionary Violence	2.408	0.970
	(2.712)	(2.771)
Ruggedness	-0.650	0.659
	(0.721)	(0.814)
Distance to Coast	-0.000	-0.000
	(0.000)	(0.000)
Latitude	-0.117	-0.006
	(0.810)	(0.815)
Longitude	-0.046	-0.092
	(0.706)	(0.709)
Provincial	20.629***	12.517*
	(4.160)	(7.135)
Treaty	19.358***	17.366***
	(3.712)	(3.675)
Jinshi Density	3.244***	2.872***
	(0.959)	(0.972)
Population		2.112**
		(0.876)
Population Density		0.022*
		(0.012)
College		-0.011
		(0.078)
Industrial Employment		0.020
		(0.187)
Industrial Output per Capita		0.000***
		(0.000)
Province FE	Yes	Yes
Observations	336	336
R^2	0.867	0.876

Notes: The dependent variable Y_c is the pre-1927 count of industrial firms in city c. Column (1) is the specification with geographic controls and socioeconomic controls that are historical variables; Column (2) adds socioeconomic controls in 1982 (Population, Population Density, College, Industrial Employment, Industrial Output per Capita). Standard errors in parentheses. * p<0.10; ** p<0.05; *** p<0.01.

Table 5: Instrumental Variable Results

Panel A. Second Stage	Foreign Technology Adoption			
	(1)	(2)	(3)	(4)
Capacity × *Post*	0.075***	0.068***	0.062***	0.061***
	(0.020)	(0.021)	(0.021)	(0.019)
Panel B. First Stage	*Capacity* × *Post*			
Military × *Post*	-0.041***	-0.030***	-0.028***	-0.050***
	(0.012)	(0.009)	(0.009)	(0.015)
Geographic Controls × Year	Yes	Yes	Yes	Yes
Socioeconomic Controls × Year	No	Yes	Yes	Yes
City FEs	Yes	Yes	Yes	Yes
Province × Year FEs	Yes	Yes	Yes	Yes
Observations	13,612	13,612	9,960	10,537
KP F-statistic	12.173	10.775	9.731	11.828
R^2	0.313	0.405	0.463	0.437
Second-Stage Mean Dependent Var.	0.216	0.216	0.216	0.216

Note: The dependent variable $Y_{c,t}$ is the number of foreign technology adoptions in city c in year t in the second stage (Panel A) and *Capacity* × *Post* in the first stage (Panel B); $Post_t$ equals one for years $\geq$ 1983; $Capacity_c$ is the number of industrial firms established before 1927. $Military_c$ is the minimum distance to the nearest military factory established during the Qing dynasty's Self-Strengthening Movement. Column (1) reports results for the full sample with geographic controls interacted with year trends: latitude, longitude, distance to coast, terrain ruggedness. Column (2) adds socioeconomic controls (time-invariant variables are interacted with year trends): airport presence, SEZ status, provincial-city status, Jinshi density, treaty-port indicator, population, population density, college-enrollment share, industrial employment share, and industrial output per capita. Column (3) omits observations from the Cultural Revolution period (1966–1976). Column (4) restricts the sample to cities that adopted foreign technology at least once. City fixed effects and province-year fixed effects are included in all specifications. Standard errors, shown in parentheses, are two-way clustered by city and year. * p<0.1; ** p<0.05; *** p<0.01.

Table 6: Matched Sample Results: Logit Estimates and Post-Match Balance

	Logit	Nearest-Neighbor		Kernel Epanechnikov	
		Difference	t-statistic	Difference	t-statistic
Industrial Capacity	0.025	-0.776	-1.001	-0.898	-1.070
	(0.026)				
Latitude	-0.048	0.164	0.140	0.381	0.430
	(0.039)				
Longitude	-0.019	-0.191	-0.159	0.540	0.570
	(0.045)				
Distance to Coast	-0.000*	22,674.136	0.336	10,000.000	0.000
	(0.000)				
Ruggedness	0.091	0.071	0.165	-0.136	-0.400
	(0.090)				
Treaty	1.086*	0.030	0.725	-0.054	-1.450
	(0.638)				
Provincial	-0.889	0.000	0.000	-0.002	-0.070
	(1.044)				
Jinshi Density	0.401***	0.048	0.301	0.155	1.310
	(0.135)				
Population	0.581***	-0.071	-0.312	0.085	0.450
	(0.119)				
Population Density	0.001	-11.627	-0.485	8.230	0.450
	(0.001)				
College	0.014	-0.777	-0.205	-1.051	-0.300
	(0.012)				
Industrial Employment	-0.009	-0.146	-0.086	-0.186	-0.140
	(0.026)				
Industrial Output per Capita	-0.000	-4,892.391	-0.837	-3,201.000	-0.600
	(0.000)				
Observations	336				

Notes: Column (1) reports logit estimates for the propensity score model, with standard errors in parentheses below. Columns (2)–(3) show the mean difference and associated t-statistic in the nearest-neighbor matched sample. Columns (4)–(5) report the same for the Epanechnikov kernel matched sample (bandwidth = 0.05). $^{*}p < 0.1$, $^{**}p < 0.05$, $^{***}p < 0.01$

Table 7: Matching Sample Results

Dependent Var.	Foreign Technology Adoption	
	Nearest Neighbor	Kernel
	(1)	(2)
Violence × *Capacity* × *Post*	-0.040**	-0.062***
	(0.018)	(0.011)
Geographic Controls ×Year	Yes	Yes
Socioeconomic Controls×Year	Yes	Yes
City FEs	Yes	Yes
Province×Year FEs	Yes	Yes
Matched Cities	134	200
Observations	5,412	8,159
R^2	0.377	0.482
Mean Dependent Var.	0.216	0.216

Note: The dependent variable $Y_{c,t}$ is the number of foreign technology adoptions in city c in year t; $Post_t$ equals one for years $\geq$ 1983; $Capacity_c$ is the number of industrial firms established before 1927; $Violence_c$ is an indicator of anti-missionary incidents. Column (1) presents the results from the matched sample using nearest-neighbor matching without replacement, while Column (2) reports the results from the matched sample using kernel matching (Epanechnikov). Both specifications control for geographic controls interacted with year trends: latitude, longitude, distance to coast, terrain ruggedness, and time-varying policy and socioeconomic covariates interacted with year trends: airport presence, SEZ status, provincial-city status, Jinshi density, treaty-port indicator, population, population density, college-enrollment share, industrial employment share, and industrial output per capita. City fixed effects and province-year fixed effects are included in all specifications. Standard errors, shown in parentheses, are two-way clustered by city and year. * p<0.1; ** p<0.05; *** p<0.01.

Table 8: Disaggregated Results

Dependent Var.	Country-Specific Foreign Technology Adoption		
	(1)	(2)	(3)
Direct × *Capacity* × *Post*	-0.005***	-0.004***	-0.005***
	(0.001)	(0.001)	(0.001)
City × Country FEs	Yes	Yes	Yes
Country × Year FEs	Yes	Yes	Yes
City × Year FEs	Yes	Yes	Yes
Observations	82,656	60,480	64,698
R^2	0.535	0.554	0.538
Mean Dependent Var.	0.044	0.044	0.044

Note: The dependent variable $Y_{c,s,t}$ is the count of foreign technology adoption from source country s in city c in year t; $Post_t$ equals one for years $\geq$ 1983; $Capacity_c$ is the number of industrial firms established before 1927; $Direct_{c,s}$ is an indicator of anti-missionary incidents specifically against country s. Column (1) reports results for the full sample. Column (2) omits observations from the Cultural Revolution period (1966–1976). Column (3) restricts the sample to cities that adopted foreign technology at least once. City-country fixed effects, country-year fixed effects, and city-year fixed effects are included in all specifications. Standard errors, shown in parentheses, are two-way clustered by city and year. * p<0.1; ** p<0.05; *** p<0.01.

Table 9: Disaggregated Results: Province×Year FEs

Dependent Var.	Country-Specific Foreign Technology Adoption			
	(1)	(2)	(3)	(4)
Direct × *Capacity* × *Post*	-0.005***	-0.005***	-0.004***	-0.005***
	(0.001)	(0.001)	(0.001)	(0.001)
Violence × *Capacity* × *Post*	-0.014**	-0.012**	-0.012**	-0.013**
	(0.005)	(0.005)	(0.005)	(0.005)
Geographic Controls × Year	Yes	Yes	Yes	Yes
Socioeconomic Controls × Year	No	Yes	Yes	Yes
City × Country FEs	Yes	Yes	Yes	Yes
Country × Year FEs	Yes	Yes	Yes	Yes
Province × Year FEs	Yes	Yes	Yes	Yes
Observations	82,656	82,656	60,480	64,698
R^2	0.537	0.544	0.566	0.546
Mean Dependent Var.	0.044	0.044	0.044	0.044

Note: Dependent variable $Y_{c,s,t}$ is the count of foreign technology adoption from source country s in city c in year t; $Post_t$ equals one for years $\geq$ 1983; $Capacity_c$ is the number of industrial firms established before 1927; $Violence_c$ is an indicator of anti-missionary incidents; $Direct_{c,s}$ is an indicator of anti-missionary incidents specifically against country s. Column (1) reports results for the full sample with geographic controls interacted with year trends: latitude, longitude, distance to coast, terrain ruggedness. Column (2) adds socioeconomic controls (time-invariant variables are interacted with year trends): airport presence, SEZ status, provincial-city status, Jinshi density, treaty-port indicator, population, population density, college-enrollment share, industrial employment share, and industrial output per capita. Column (3) omits observations from the Cultural Revolution period (1966–1976). Column (4) restricts the sample to cities that adopted foreign technology at least once. City-country fixed effects, country-year fixed effects, and province-year fixed effects are included in all specifications. Standard errors, shown in parentheses, are two-way clustered by city and year. * p<0.1; ** p<0.05; *** p<0.01.

Heterogeneity Analysis

Table 10: Heterogeneity Analysis: Effects of Government Officials' Participation in Religious Conflicts

Dependent Var.	Foreign Technology Adoption			
	(1)	(2)	(3)	(4)
$Official \times Capacity \times Post$	-0.045***	-0.041***	-0.038***	-0.040***
	(0.013)	(0.009)	(0.009)	(0.009)
$Violence \times Capacity \times Post$	-0.044**	-0.038**	-0.035**	-0.038***
	(0.016)	(0.014)	(0.013)	(0.014)
Geographic Controls × Year	Yes	Yes	Yes	Yes
Socioeconomic Controls × Year	No	Yes	Yes	Yes
City Fixed Effects	Yes	Yes	Yes	Yes
Province × Year Fixed Effects	Yes	Yes	Yes	Yes
Observations	13,612	13,612	9,960	10,537
R^2	0.450	0.512	0.549	0.518
Mean Dependent Var.	0.216	0.216	0.216	0.216

Note: The dependent variable $Y_{c,t}$ is the number of foreign technology adoptions in city c in year t; $Post_t$ equals one for years $\geq$ 1983; $Capacity_c$ is the number of industrial firms established before 1927; $Violence_c$ is an indicator of anti-missionary incidents; $Official_c$ is an indicator of government officials' participation in anti-missionary incidents. Column (1) reports results for the full sample with geographic controls interacted with year trends: latitude, longitude, distance to coast, terrain ruggedness. Column (2) adds socioeconomic controls (time-invariant variables are interacted with year trends): airport presence, SEZ status, provincial-city status, Jinshi density, treaty-port indicator, population, population density, college-enrollment share, industrial employment share, and industrial output per capita. Column (3) omits observations from the Cultural Revolution period (1966–1976). Column (4) restricts the sample to cities that adopted foreign technology at least once. City fixed effects and province-year fixed effects are included in all specifications. Standard errors, shown in parentheses, are two-way clustered by city and year. * p<0.1; ** p<0.05; *** p<0.01.

Table 11: Heterogeneity Analysis: Effects of Multiple Anti-Missionary Incidents

Dependent Var.	Foreign Technology Adoption			
	(1)	(2)	(3)	(4)
Violence × *Capacity* × *Post*	-0.042**	-0.044***	-0.042***	-0.044***
	(0.020)	(0.015)	(0.014)	(0.015)
Multiple × *Capacity* × *Post*	-0.036*	-0.023	-0.020	-0.023
	(0.020)	(0.014)	(0.013)	(0.014)
Geographic Controls × Year	Yes	Yes	Yes	Yes
Socioeconomic Controls × Year	No	Yes	Yes	Yes
City Fixed Effects	Yes	Yes	Yes	Yes
Province × Year Fixed Effects	Yes	Yes	Yes	Yes
Observations	13,612	13,612	9,960	10,537
R^2	0.431	0.495	0.535	0.502
Mean Dependent Var.	0.216	0.216	0.216	0.216

Note: The dependent variable $Y_{c,t}$ is the number of foreign technology adoptions in city c in year t; $Post_t$ equals one for years $\geq$ 1983; $Capacity_c$ is the number of industrial firms established before 1927; $Violence_c$ is an indicator of anti-missionary incidents; $Multiple_c$ equals one if a city experienced more than one incident. Column (1) reports results for the full sample with geographic controls interacted with year trends: latitude, longitude, distance to coast, terrain ruggedness. Column (2) adds socioeconomic controls (time-invariant variables are interacted with year trends): airport presence, SEZ status, provincial-city status, Jinshi density, treaty-port indicator, population, population density, college-enrollment share, industrial employment share, and industrial output per capita. Column (3) omits observations from the Cultural Revolution period (1966–1976). Column (4) restricts the sample to cities that adopted foreign technology at least once. City fixed effects and province-year fixed effects are included in all specifications. Standard errors, shown in parentheses, are two-way clustered by city and year. * p<0.1; ** p<0.05; *** p<0.01.

Table 12: Heterogeneity Analysis: Han-Majority vs. Ethnically Diverse Regions

Dependent Var.	Foreign Technology Adoption			
	(1)	(2)	(3)	(4)
Panel A	Han-Majority Regions			
Violence × *Capacity* × *Post*	-0.076***	-0.065***	-0.061***	-0.068***
	(0.019)	(0.017)	(0.016)	(0.016)
Observations	11,152	11,152	8,160	9,184
R^2	0.434	0.510	0.553	0.518
Panel B	Ethnically Diverse Regions			
Violence × *Capacity* × *Post*	-0.089	-0.045	-0.023	0.033
	(0.090)	(0.063)	(0.053)	(0.064)
Observations	2,460	2,460	1,800	1,353
R^2	0.187	0.232	0.248	0.259
Geographic Controls × Year	Yes	Yes	Yes	Yes
Socioeconomic Controls × Year	No	Yes	Yes	Yes
City FEs	Yes	Yes	Yes	Yes
Province × Year FEs	Yes	Yes	Yes	Yes
Mean Dependent Var.	0.216	0.216	0.216	0.216

Note: The dependent variable $Y_{c,t}$ is the number of foreign technology adoptions in city c in year t; $Post_t$ equals one for years ≥ 1983; $Capacity_c$ is the number of industrial firms established before 1927; $Violence_c$ is an indicator of anti-missionary incidents. Column (1) reports results for the full sample with geographic controls interacted with year trends: latitude, longitude, distance to coast, terrain ruggedness. Column (2) adds socioeconomic controls (time-invariant variables are interacted with year trends): airport presence, SEZ status, provincial-city status, Jinshi density, treaty-port indicator, population, population density, college-enrollment share, industrial employment share, and industrial output per capita. Column (3) omits observations from the Cultural Revolution period (1966–1976). Column (4) restricts the sample to cities that adopted foreign technology at least once. City fixed effects and province-year fixed effects are included in all specifications. Standard errors, shown in parentheses, are two-way clustered by city and year. * p<0.1; ** p<0.05; *** p<0.01.

Table 13: Heterogeneity Analysis: Coastal vs. Inland Regions

Dependent Var.	Foreign Technology Adoption			
	(1)	(2)	(3)	(4)
Panel A	Coastal Regions			
Violence × *Capacity* × *Post*	-0.065***	-0.063***	-0.056***	-0.068***
	(0.020)	(0.016)	(0.014)	(0.016)
Observations	4,551	4,551	3,330	3,936
R^2	0.448	0.533	0.570	0.539
Panel B	Inland Regions			
Violence × *Capacity* × *Post*	-0.083***	-0.073***	-0.070***	-0.071***
	(0.029)	(0.025)	(0.024)	(0.024)
Observations	9,061	9,061	6,630	6,601
R^2	0.406	0.466	0.511	0.477
Geographic Controls × Year	Yes	Yes	Yes	Yes
Socioeconomic Controls × Year	No	Yes	Yes	Yes
City FEs	Yes	Yes	Yes	Yes
Province × Year FEs	Yes	Yes	Yes	Yes
Mean Dependent Var.	0.216	0.216	0.216	0.216

Note: The dependent variable $Y_{c,t}$ is the number of foreign technology adoptions in city c in year t; $Post_t$ equals one for years $\geq$ 1983; $Capacity_c$ is the number of industrial firms established before 1927; $Violence_c$ is an indicator of anti-missionary incidents. Column (1) reports results for the full sample with geographic controls interacted with year trends: latitude, longitude, distance to coast, terrain ruggedness. Column (2) adds socioeconomic controls (time-invariant variables are interacted with year trends): airport presence, SEZ status, provincial-city status, Jinshi density, treaty-port indicator, population, population density, college-enrollment share, industrial employment share, and industrial output per capita. Column (3) omits observations from the Cultural Revolution period (1966–1976). Column (4) restricts the sample to cities that adopted foreign technology at least once. City fixed effects and province-year fixed effects are included in all specifications. Standard errors, shown in parentheses, are two-way clustered by city and year. * p<0.1; ** p<0.05; *** p<0.01.

Robustness Checks

Table 14: Robustness Checks: Control for China's 1978 Reform and Opening-up Policy

Dependent Var.	Foreign Technology Adoption			
	(1)	(2)	(3)	(4)
Violence × *Capacity* × *Post*	-0.061***	-0.058***	-0.057***	-0.058***
	(0.018)	(0.018)	(0.018)	(0.017)
Violence × *Capacity* × $Post^{1978}$	-0.013	-0.006	-0.000	-0.007
	(0.014)	(0.016)	(0.017)	(0.016)
Geographic Controls × Year	Yes	Yes	Yes	Yes
Socioeconomic Controls × Year	No	Yes	Yes	Yes
City FEs	Yes	Yes	Yes	Yes
Province × Year FEs	Yes	Yes	Yes	Yes
Observations	13,612	13,612	9,960	10,537
R^2	0.430	0.493	0.534	0.500
Mean Dependent Var.	0.216	0.216	0.216	0.216

Note: The dependent variable $Y_{c,t}$ is the number of foreign technology adoptions in city c in year t; $Post_t$ equals one for years $\geq$ 1983; $Capacity_c$ is the number of industrial firms established before 1927; $Violence_c$ is an indicator of anti-missionary incidents; $Post_t^{1978}$ equals one for years $\geq$ 1978. Column (1) reports results for the full sample with geographic controls interacted with year trends: latitude, longitude, distance to coast, terrain ruggedness. Column (2) adds socioeconomic controls (time-invariant variables are interacted with year trends): airport presence, SEZ status, provincial-city status, Jinshi density, treaty-port indicator, population, population density, college-enrollment share, industrial employment share, and industrial output per capita. Column (3) omits observations from the Cultural Revolution period (1966–1976). Column (4) restricts the sample to cities that adopted foreign technology at least once. City fixed effects and province-year fixed effects are included in all specifications. Standard errors, shown in parentheses, are two-way clustered by city and year. * p<0.1; ** p<0.05; *** p<0.01.

Table 15: Robustness Checks: Control for Historical Church

Dependent Var.	Foreign Technology Adoption			
	(1)	(2)	(3)	(4)
Violence × *Capacity* × *Post*	-0.074***	-0.063***	-0.059***	-0.064***
	(0.019)	(0.017)	(0.016)	(0.017)
Church × *Capacity* × *Post*	0.000	0.000	0.000	0.000
	(0.002)	(0.001)	(0.001)	(0.001)
Geographic Controls × Year	Yes	Yes	Yes	Yes
Socioeconomic Controls × Year	No	Yes	Yes	Yes
City FEs	Yes	Yes	Yes	Yes
Province × Year FEs	Yes	Yes	Yes	Yes
Observations	13,612	13,612	9,960	10,537
R^2	0.431	0.494	0.534	0.501
Mean Dependent Var.	0.216	0.216	0.216	0.216

Note: The dependent variable $Y_{c,t}$ is the number of foreign technology adoptions in city c in year t; $Post_t$ equals one for years $\geq$ 1983; $Capacity_c$ is the number of industrial firms established before 1927; $Violence_c$ is an indicator of anti-missionary incidents; $Church_c$ is the number of historical churches. Column (1) reports results for the full sample with geographic controls interacted with year trends: latitude, longitude, distance to coast, terrain ruggedness. Column (2) adds socioeconomic controls (time-invariant variables are interacted with year trends): airport presence, SEZ status, provincial-city status, Jinshi density, treaty-port indicator, population, population density, college-enrollment share, industrial employment share, and industrial output per capita. Column (3) omits observations from the Cultural Revolution period (1966–1976). Column (4) restricts the sample to cities that adopted foreign technology at least once. City fixed effects and province-year fixed effects are included in all specifications. Standard errors, shown in parentheses, are two-way clustered by city and year. * p<0.1; ** p<0.05; *** p<0.01.

Table 16: Robustness Checks: Control for Cultural Revolution

Dependent Var.	Foreign Technology Adoption			
	(1)	(2)	(3)	(4)
$Violence \times Capacity \times Post$	-0.077***	-0.066***	-0.062***	-0.068***
	(0.018)	(0.016)	(0.015)	(0.016)
$CulturalRev \times Capacity \times Post$	0.007	-0.003	-0.007	-0.006
	(0.013)	(0.008)	(0.006)	(0.008)
Geographic Controls × Year	Yes	Yes	Yes	Yes
Socioeconomic Controls × Year	No	Yes	Yes	Yes
City FEs	Yes	Yes	Yes	Yes
Province × Year FEs	Yes	Yes	Yes	Yes
Observations	11,152	11,152	8,160	9,389
R^2	0.429	0.508	0.549	0.516
Mean Dependent Var.	0.216	0.216	0.216	0.216

Note: The dependent variable $Y_{c,t}$ is the number of foreign technology adoptions in city c in year t; $Post_t$ equals one for years $\geq$ 1983; $Capacity_c$ is the number of industrial firms established before 1927; $Violence_c$ is an indicator of anti-missionary incidents; $CulturalRev_c$ is the intensity of Cultural Revolution deaths. Column (1) reports results for the full sample with geographic controls interacted with year trends: latitude, longitude, distance to coast, terrain ruggedness. Column (2) adds socioeconomic controls (time-invariant variables are interacted with year trends): airport presence, SEZ status, provincial-city status, Jinshi density, treaty-port indicator, population, population density, college-enrollment share, industrial employment share, and industrial output per capita. Column (3) omits observations from the Cultural Revolution period (1966–1976). Column (4) restricts the sample to cities that adopted foreign technology at least once. City fixed effects and province-year fixed effects are included in all specifications. Standard errors, shown in parentheses, are two-way clustered by city and year. * p<0.1; ** p<0.05; *** p<0.01.

Table 17: Robustness Checks: Control for Japanese Occupation

Dependent Var.	Foreign Technology Adoption			
	(1)	(2)	(3)	(4)
$Violence \times Capacity \times Post$	-0.071***	-0.062***	-0.058***	-0.062***
	(0.018)	(0.017)	(0.016)	(0.016)
$JapanOcc. \times Capacity \times Post$	-0.059**	-0.045*	-0.041*	-0.043*
	(0.029)	(0.023)	(0.021)	(0.023)
Geographic Controls × Year	Yes	Yes	Yes	Yes
Socioeconomic Controls × Year	No	Yes	Yes	Yes
City FEs	Yes	Yes	Yes	Yes
Province × Year FEs	Yes	Yes	Yes	Yes
Observations	13,489	13,489	9,870	10,455
R^2	0.435	0.498	0.538	0.505
Mean Dependent Var.	0.216	0.216	0.216	0.216

Note: The dependent variable $Y_{c,t}$ is the number of foreign technology adoptions in city c in year t; $Post_t$ equals one for years $\geq$ 1983; $Capacity_c$ is the number of industrial firms established before 1927; $Violence_c$ is an indicator of anti-missionary incidents; $JapanOcc_c$ is an indicator of Japanese occupation during wartime. Column (1) reports results for the full sample with geographic controls interacted with year trends: latitude, longitude, distance to coast, terrain ruggedness. Column (2) adds socioeconomic controls (time-invariant variables are interacted with year trends): airport presence, SEZ status, provincial-city status, Jinshi density, treaty-port indicator, population, population density, college-enrollment share, industrial employment share, and industrial output per capita. Column (3) omits observations from the Cultural Revolution period (1966–1976). Column (4) restricts the sample to cities that adopted foreign technology at least once. City fixed effects and province-year fixed effects are included in all specifications. Standard errors, shown in parentheses, are two-way clustered by city and year. * p<0.1; ** p<0.05; *** p<0.01.

Table 18: Robustness Checks: Control for Domestic Rebellion

Dependent Var.	Foreign Technology Adoption			
	(1)	(2)	(3)	(4)
Violence × *Capacity* × *Post*	-0.060***	-0.054***	-0.052***	-0.055***
	(0.019)	(0.017)	(0.017)	(0.017)
Rebellion × *Capacity* × *Post*	-0.022	-0.016	-0.013	-0.016
	(0.014)	(0.010)	(0.009)	(0.010)
Geographic Controls × Year	Yes	Yes	Yes	Yes
Socioeconomic Controls × Year	No	Yes	Yes	Yes
City FEs	Yes	Yes	Yes	Yes
Province × Year FEs	Yes	Yes	Yes	Yes
Observations	13,612	13,612	9,960	10,537
R^2	0.430	0.495	0.535	0.502

Note: The dependent variable $Y_{c,t}$ is the number of foreign technology adoptions in city c in year t; $Post_t$ equals one for years $\geq$ 1983; $Capacity_c$ is the number of industrial firms established before 1927; $Violence_c$ is an indicator of anti-missionary incidents; $Rebellion_c$ is a binary indicator equal to 1 if the city experienced a domestic rebellion during the Qing dynasty and 0 otherwise. Column (1) reports results for the full sample with geographic controls interacted with year trends: latitude, longitude, distance to coast, terrain ruggedness. Column (2) adds socioeconomic controls (time-invariant variables are interacted with year trends): airport presence, SEZ status, provincial-city status, Jinshi density, treaty-port indicator, population, population density, college-enrollment share, industrial employment share, and industrial output per capita. Column (3) omits observations from the Cultural Revolution period (1966–1976). Column (4) restricts the sample to cities that adopted foreign technology at least once. City fixed effects and province-year fixed effects are included in all specifications. Standard errors, shown in parentheses, are two-way clustered by city and year. * p<0.1; ** p<0.05; *** p<0.01.

Table 19: Robustness Checks: Control for Potential Spatial Correlation in Error Terms

Dependent Var.	Foreign Technology Adoption		
	(1)	(2)	(3)
Panel A	Difference-in-Differences		
Capacity × *Post*	0.018***	0.018***	0.018***
	(0.003)	(0.003)	(0.003)
R^2	0.124	0.124	0.124
Panel B	Triple Differences		
Violence × *Capacity* × *Post*	-0.062***	-0.062***	-0.062***
	(0.022)	(0.019)	(0.015)
R^2	0.128	0.128	0.128
Geographic Controls ×Year	Yes	Yes	Yes
Socioeconomic Controls×Year	Yes	Yes	Yes
City FEs	Yes	Yes	Yes
Province×Year FEs	Yes	Yes	Yes
Cutoff Distance	100 km	300 km	500 km
Observations	13,612	13,612	13,612
Mean Dependent Var.	0.216	0.216	0.216

Note: The dependent variable $Y_{c,t}$ is the number of foreign technology adoptions in city c in year t; $Post_t$ equals one for years $\geq$ 1983; $Capacity_c$ is the number of industrial firms established before 1927; $Violence_c$ is an indicator of anti-missionary incidents. Columns (1), (2), and (3) report results with spatial-HAC standard errors using cutoff distances of 100 km, 300 km, and 500 km, respectively. All specifications control for geographic controls interacted with year trends: latitude, longitude, distance to coast, terrain ruggedness, and time-varying policy and socioeconomic covariates interacted with year trends: airport presence, SEZ status, provincial-city status, Jinshi density, treaty-port indicator, population, population density, college-enrollment share, industrial employment share, and industrial output per capita. City fixed effects and province-year fixed effects are included in all specifications. Standard errors, shown in parentheses, are spatial heteroskedasticity- and autocorrelation-consistent. * p<0.1; ** p<0.05; *** p<0.01.

Table 20: Robustness Checks: Use Binary Outcome

Dependent Var.	Foreign Technology Adoption Dummy			
	(1)	(2)	(3)	(4)
Violence $\times$ *Capacity* $\times$ *Post*	-0.017***	-0.014***	-0.013***	-0.012***
	(0.004)	(0.004)	(0.004)	(0.003)
Geographic Controls $\times$ Year	Yes	Yes	Yes	Yes
Socioeconomic Controls $\times$ Year	No	Yes	Yes	Yes
City FEs	Yes	Yes	Yes	Yes
Province $\times$ Year FEs	Yes	Yes	Yes	Yes
Observations	13,612	13,612	9,960	10,537
R^2	0.348	0.371	0.389	0.379
Mean Dependent Var.	0.096	0.096	0.096	0.096

Note: The dependent variable $Y_{c,t}$ is the indicator of foreign technology adoption in city c in year t; $Post_t$ equals one for years $\geq$ 1983; $Capacity_c$ is the number of industrial firms established before 1927; $Violence_c$ is an indicator of anti-missionary incidents. Column (1) reports results for the full sample with geographic controls interacted with year trends: latitude, longitude, distance to coast, terrain ruggedness. Column (2) adds socioeconomic controls (time-invariant variables are interacted with year trends): airport presence, SEZ status, provincial-city status, Jinshi density, treaty-port indicator, population, population density, college-enrollment share, industrial employment share, and industrial output per capita. Column (3) omits observations from the Cultural Revolution period (1966–1976). Column (4) restricts the sample to cities that adopted foreign technology at least once. City fixed effects and province-year fixed effects are included in all specifications. Standard errors, shown in parentheses, are two-way clustered by city and year. * p<0.1; ** p<0.05; *** p<0.01.

Table 21: Placebo Tests: Randomly Assign Religious Conflicts

Dependent Var.	Foreign Technology Adoption			
	(1)	(2)	(3)	(4)
$Violence \times Capacity \times Post$	-0.001	-0.001	0.000	-0.001
	(0.001)	(0.001)	(0.000)	(0.001)
Geographic Controls ×Year	Yes	Yes	Yes	Yes
Socioeconomic Controls×Year	Yes	Yes	Yes	Yes
City FEs	Yes	Yes	Yes	Yes
Province×Year FEs	Yes	Yes	Yes	Yes
Mean Dependent Var.	0.216	0.216	0.216	0.216

Note: The dependent variable $Y_{c,t}$ is the number of foreign technology adoptions in city c in year t; $Post_t$ equals one for years $\geq$ 1983; $Capacity_c$ is the number of industrial firms established before 1927; $Violence_c$ is an indicator of anti-missionary incidents. We randomly assign "violence" to 54% of cities, re-estimate the model 1,000 times, and report the mean and standard error of the key coefficients. Column (1) reports results for the full sample with geographic controls interacted with year trends: latitude, longitude, distance to coast, terrain ruggedness. Column (2) adds socioeconomic controls (time-invariant variables are interacted with year trends): airport presence, SEZ status, provincial-city status, Jinshi density, treaty-port indicator, population, population density, college-enrollment share, industrial employment share, and industrial output per capita. Column (3) omits observations from the Cultural Revolution period (1966–1976). Column (4) restricts the sample to cities that adopted foreign technology at least once. City fixed effects and province-year fixed effects are included in all specifications. Standard errors, shown in parentheses, are two-way clustered by city and year. * p<0.1; ** p<0.05; *** p<0.01.

Mechanism Analysis

Table 22: Mechanism Analysis: Establishment of Sister City Relationships

Dependent Var.	Sister City Relationships			
	(1)	(2)	(3)	(4)
$Violence \times Capacity \times Post$	-0.023***	-0.020***	-0.019***	-0.021***
	(0.007)	(0.006)	(0.007)	(0.007)
Geographic Controls × Year	No	Yes	Yes	Yes
Socioeconomic Controls × Year	No	Yes	Yes	Yes
City Fixed Effects	Yes	Yes	Yes	Yes
Province × Year Fixed Effects	Yes	Yes	Yes	Yes
Observations	13,612	13,612	9,960	10,537
R^2	0.460	0.539	0.575	0.552
Mean Dependent Variable	0.047	0.047	0.047	0.047

Note: The dependent variable $Y_{c,t}$ is the status of sister city relationships in city c in year t; $Post_t$ equals one for years $\geq$ 1983; $Capacity_c$ is the number of industrial firms established before 1927; $Violence_c$ is an indicator of anti-missionary incidents. Column (1) reports results for the full sample with geographic controls interacted with year trends: latitude, longitude, distance to coast, terrain ruggedness. Column (2) adds socioeconomic controls (time-invariant variables are interacted with year trends): airport presence, SEZ status, provincial-city status, Jinshi density, treaty-port indicator, population, population density, college-enrollment share, industrial employment share, and industrial output per capita. Column (3) omits observations from the Cultural Revolution period (1966–1976). Column (4) restricts the sample to cities that adopted foreign technology at least once. City fixed effects and province-year fixed effects are included in all specifications. Standard errors, shown in parentheses, are two-way clustered by city and year. * p<0.1; ** p<0.05; *** p<0.01.

Table 23: Mechanism Analysis: Foreign-, State-, and Private-Invested Enterprises

Dependent Var.	Newly Established Enterprise Share			
	(1)	(2)	(3)	(4)
Panel A	Foreign-Invested Enterprises			
Violence × *Capacity* × *Post*	-0.011**	-0.009*	-0.010*	-0.007
	(0.005)	(0.005)	(0.005)	(0.005)
Observations	13,612	13,612	9,960	10,537
R^2	0.368	0.388	0.394	0.415
Mean Dependent Variable	0.053	0.053	0.053	0.053
Panel B	State-Owned Enterprises			
Violence × *Capacity* × *Post*	1.188***	0.927**	0.852**	0.814*
	(0.422)	(0.401)	(0.390)	(0.428)
Observations	13,612	13,612	9,960	10,537
R^2	0.533	0.536	0.568	0.511
Mean Dependent Variable	39.558	39.558	39.558	39.558
Panel C	Private Enterprises			
Violence × *Capacity* × *Post*	0.131	0.115	0.099	0.214
	(0.236)	(0.225)	(0.239)	(0.250)
Observations	13,612	13,612	9,960	10,537
R^2	0.273	0.275	0.327	0.255
Mean Dependent Variable	3.436	3.436	3.436	3.436
Geographic Controls × Year	No	Yes	Yes	Yes
Socioeconomic Controls × Year	No	Yes	Yes	Yes
City Fixed Effects	Yes	Yes	Yes	Yes
Province × Year Fixed Effects	Yes	Yes	Yes	Yes

Note: The dependent variable $Y_{c,t}$ denotes, for city c in year t, the share of foreign-invested enterprises (Panel A), the share of state-owned enterprises (Panel B), and the share of private enterprises (Panel C); $Post_t$ equals one for years $\geq$ 1983; $Capacity_c$ is the number of industrial firms established before 1927; $Violence_c$ is an indicator of anti-missionary incidents. Column (1) reports results for the full sample with geographic controls interacted with year trends: latitude, longitude, distance to coast, terrain ruggedness. Column (2) adds socioeconomic controls (time-invariant variables are interacted with year trends): airport presence, SEZ status, provincial-city status, Jinshi density, treaty-port indicator, population, population density, college-enrollment share, industrial employment share, and industrial output per capita. Column (3) omits observations from the Cultural Revolution period (1966–1976). Column (4) restricts the sample to cities that adopted foreign technology at least once. City fixed effects and province-year fixed effects are included in all specifications. Standard errors, shown in parentheses, are two-way clustered by city and year. * p<0.1; ** p<0.05; *** p<0.01.

Table 24: Effects of Foreign Technology Adoption on Firm Productivity

Dependent Var.	Firm Productivity (ln)	
	Nearest Neighbour	Kernel
	(1)	(2)
ATT	0.158**	0.181***
	(0.065)	(0.058)
Matched Firms	1,381	24,904
Mean Dependent Var.	2.975	2.975

Note: The dependent variable Y_i is firm i's total factor productivity in 1995, constructed from a ln-Cobb-Douglas production function with inputs plus industry and city fixed effects; the treatment indicator equals one if the firm introduced at least one foreign technology by 1995. Column (1) presents the ATT from 3-nearest-neighbor matching, while Column (2) reports the ATT from Epanechnikov kernel matching. Standard errors, shown in parentheses, are heteroskedasticity-robust. * p<0.1; ** p<0.05; *** p<0.01.