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Omnia Juncta in Uno*: foreign powers and trademark protection in Shanghai's concession era

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Abstract
We investigate how firms and markets adapt to trademark protection, an extensively used but under-examined form of IP protection to address asymmetric information, by exploring a historical precedent: China's trademark law of 1923. Exploiting unique, newly digitized firm-employee and firm-agent datasets from Shanghai in 1872-1941, we show that the trademark law, established as an unanticipated and Western-disapproved response to end foreign privileges in China, shaped firm dynamics and relationships on all sides of trade-mark conflicts. Western firms with greater dependence on trademark protection grew and raised brand investment, while Japanese businesses, most frequently accused of counterfeiting, contracted despite attempts to build their own brands. The trademark law also fostered relationships with domestic intermediaries, both within and outside the boundaries of Western firms, and the growth of the Chinese intermediary sector. At the market level, the trademark law did not reduce competition or raise brand prices, leading to a coexistence of trademarks and competitive markets and ultimately gains in consumer welfare. A comparison with previous attempts by foreign powers—such as extraterritorial rights and bilateral treaties—shows that the alternative institutions were broadly unsuccessful.

*Omnia Juncta in Uno" ("All Joined in One") was the Latin motto on the municipal seal of the Shanghai International Settlement (1843-1941) and signified the joint governance of foreign powers in the settlement.

Key words: trademark, firm dynamics, intermediaries, competition, IP institutions
JEL: K11; D2; O1; O3; N4; F2

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1 Introduction

Trademarks, a form of intellectual property (IP) available to essentially any firm, are intended to identify the source of products and services.[1] Each year, trademark applications account for the majority of IP filings around the world (e.g., 69% of the 25 million IP filings in 2020); within IP-intensive sectors, trademark-intensive industries contribute most to employment (around 90% in the United States and 78% in Europe).[2] This economic importance stands in stark contrast to the academic literature and international policy debate, which have focused primarily on innovation-related IPs (namely, patent and copyright protection), with relatively little analysis exploring the effects of trademark institutions on firm and market dynamics.

This paper aims to fill the gap by investigating how firms and markets operating on different sides of trademark conflicts adapt to trademark protection. We address the question by exploiting an exogenous institutional shock provided by a historical precedent—the unanticipated, Western power-disapproved introduction of China's first trademark law in 1923 in the world's most contested market. We draw on a series of newly digitized micro-datasets covering Shanghai's Concession Era to examine how firms with distinct roles in trademark conflicts—authentic producers, counterfeiters, and intermediaries—and markets responded to the introduction of trademark institutions.

Unlike patents and copyrights, the economic rationale for trademarks is to solve an asymmetric-information problem that arises in settings where buyers are unable to observe intrinsic product characteristics at the point of purchase, e.g., product materials and ingredients that affect the quality, safety, or durability (e.g., Shapiro, 1982; Shapiro, 1983).[3] This problem is especially pronounced in international markets when sellers and buyers come from different nations and when intermediaries are often involved. One way to overcome

[1] According to Great Britain's 1875 *Trade Marks Registration Act*, one of the world's first trademark laws, a trademark is "a device, or mark, or name of an individual or firm printed in some particular and distinctive manner; or a written signature or copy of a written signature of an individual or firm; or a distinctive label or ticket." Similarly, the U.S. Patent and Trademark Office (USPTO) defines a trademark as "a word, phrase, symbol, or design, or a combination thereof, that identifies and distinguishes the source of the goods and services of one party from those of others."

[2] See USPTO (2016) and EPO and EUIPO (2019).

[3] As defined by the USPTO, a patent is a "limited duration property right relating to an invention in exchange for public disclosure of the invention." It protects "the right to exclude others from making, using, offering for sale, or selling an invention." A copyright protects "original works of authorship" in literature, music, art, architecture, and software. Patents and copyrights address market failures associated with the public-good nature of knowledge and aim to provide incentives for innovation and knowledge creation.

this information-asymmetry problem is for sellers to use trademarks to disseminate information and signal the identity of the producer to the consumer (Grossman and Shapiro, 1988a), enabling firms to build reputation and benefit from reputation over time. However, trademark infringements by counterfeiters undermine the function and value of this firm-specific asset.[4] Trademark protection—protection of a firm's exclusive right to use a specific mark—is therefore needed to ensure trademarks' effectiveness at resolving the underlying information-asymmetry problem. Because of the distinct rationale and the specific rights protected, the impacts of trademark protection on firm decisions and market competition may differ significantly from those of patent and copyright protection.

The establishment of trademark law can affect firm and industry dynamics in complex ways. First, trademark protection can lead to a direct market reallocation within brand-specific segments from counterfeiters to authentic producers. Second, by raising consumers' confidence in receiving authentic products at the point of purchase, trademark protection may increase overall demand for brand products. Third, unlike patents and copyrights, trademarks protect the right to use a mark rather than the right to make or sell (sometimes similar) products with different marks and thus do not necessarily diminish market competition. Finally, trademark law can affect the distribution modes of authentic firms: if trademark protection is weak, authentic producers may seek to control distribution to final consumers to avoid the risk that intermediaries dilute the brand by mixing counterfeits with authentic products. Trademark law can mitigate these concerns and thus foster new linkages with, and resulting growth of, the intermediary sector.

A key challenge in assessing the effects of trademark protection is the scarcity of large and exogenous variations in the degree of trademark protection, especially after a trademark law is introduced and put into effect. Even when a law undergoes revisions, the incremental changes are often driven by domestic demand from interest groups. We address this challenge by exploiting the birth of China's 1923 trademark law, a policy experiment by the Chinese Republican government motivated *not* by domestic economic incentives, but rather the

[4]The literature distinguishes between two types of counterfeiting. In *deceptive* counterfeiting, the authentic and counterfeited products are similar in design and packaging; unaware consumers inadvertently purchase (potentially lower-quality) counterfeited goods (such as cigarettes, drugs, and cosmetics) (Grossman and Shapiro, 1988a). In *non-deceptive* counterfeiting, consumers can distinguish between authentic and counterfeit products but knowingly purchase the latter (such as counterfeits of luxury goods) (Grossman and Shapiro, 1988b). In this paper's historical setting, deceptive counterfeiting is the main relevant form as reflected in the counterfeiting cases and trademark disputes (Section 2.5).

desire to end long-standing privileges (such as extraterritoriality) enjoyed by foreign powers due to a series of "Unequal Treaties" signed in the previous century. The law, established to move a step closer to the abolition of foreign privileges, offers an exogenous fundamental trademark institution shock that is unusual in the history of trademark laws.

The timing of China's 1923 trademark law was also unanticipated. After the Opium Wars in the mid-19th century, British businesses had attained early dominance in the Chinese market, but Japan challenged this status after the Treaty of Shimonoseki in 1895. Japanese counterfeits of Western trademarks rose rapidly, leading to a large volume of trademark disputes between Western nations and Japan (Motono, 2011, 2013). Within a decade, the prevalence of Japanese counterfeits had emerged as a major concern for Western powers (Patent and Trade Mark Review, 1907; Heuser, 1975). These disputes, which often involved Chinese intermediaries, spanned products from tobacco and textiles to food and cosmetics. In response to the trademark disputes, foreign countries attempted to introduce trademark protection in China in the early 1900s; however, because Great Britain and Japan both tried to export their trademark laws with contradictory filing principles, their disagreements led to an indefinite postponement of a domestic trademark law. In May 1923, completely unanticipated by the foreign community, the Chinese government announced its first trademark law and informed foreign governments only *after* the law was passed and put into force. Western treaty nations expressed objections and refused to recognize the law fearing to lose long-standing treaty privileges, only later to be overtaken by reality as Japanese, Chinese, and other non-treaty firms raced to register trademarks.

Another key advantage of our historical setting is the availability of a series of novel micro-level datasets from one of the world's most sought-after markets in the early 20th century: Shanghai, the leading commercial center of East Asia and China's most economically important city that accounted for over half of China's trade and two-thirds of its inward FDI in manufacturing (Ma, 2008). We manually digitized and assembled a rich annual business-employee and agent-client panel dataset covering the universe of firms operating in Shanghai's concession areas from the period 1872 to 1941. For each company, we recorded its name, address, industry, products, importer/exporter status, ownership nationality, as well as detailed information of its non-production employees including their names, nationalities, job titles, and levels in the firm's hierarchy. To measure firms' brand investments, we merged the data with firms' advertisements in the leading Chinese daily newspaper in Shanghai, *Shen*

Bao (申报), during 1920-1926. In addition, we collected comprehensive agent-client information for each intermediary firm in Shanghai, the largest sector at the time, including its lists of client names and nationalities. We further complemented the data with a monthly brand-level price panel dataset from the *Shanghai Market Prices Report*. The richness of the available information enables us to provide rare insights into firm operations in one of the most contested markets for trademark protection and how firms adapted to the introduction of a modern trademark institution, both within and outside the boundary of the firm.

To estimate how the trademark law affected firms on all sides of the conflict, we implement difference-in-differences (DD) baseline specifications for three sets of firms: Western firms, which according to the trademark disputes published by the *Trademark Gazette (Shangbiao Gongbao*, 商标公报), court cases, and various other historical archives had suffered most from trademark infringements, and Japanese and Chinese firms, which had been most frequently accused of counterfeiting or collaborating with counterfeiters. Within each of these sets of firms, the DD analysis compares firms that sold trademark-intensive products to less trademark-dependent peers, both before and after the establishment of the trademark law. We construct a firm-specific measure of trademark intensity based on each firm's initial product composition and the pre-1922 distribution of trademark registrations across product categories in foreign countries that already had trademark laws. Measuring products' intrinsic dependence on trademark protection using pre-1923 trademark data outside China enables us to mitigate the potential bias arising from firms' endogenous decisions and abilities to obtain trademarks in China after the 1923 trademark law. Given that foreign powers neither anticipated nor approved the introduction of the Chinese trademark law, we also expect the timing of the law to be exogenous to the growth dynamics of trademark-intensive firms, an assumption that we can test and confirm in a pre-trend analysis.

Our analysis suggests that the trademark law significantly reshaped firm dynamics on all three sides of trademark conflicts. Employment at Western firms with average trademark intensity grew by 5%; Japanese businesses, in contrast, experienced an average reduction in employment of 18%. Western firms increased their recruitment of engineers, signaling a transition from wholesale to domestic manufacturing; meanwhile, Japanese firms significantly cut their sales employees. After the enactment of the law, Western firms were less likely to exit the market or drop trademark-intensive products and more likely to invest in

advertising.[5] Interestingly, Japanese firms also became more likely to advertise and offer trademark-intensive products, suggesting an effort to build up their own brands.[6]

We also directly identify and compare a list of authentic firms and counterfeiters by digitizing issues of the *Trademark Gazette* published by the Chinese Bureau of Trademark and recording detailed information on firms' trademark applications, trademark approvals, and involvements in trademark disputes. Consistent with the baseline results, authentic firms, i.e., firms that were granted trademarks based on the length of their market presence, were found to experience significant growth, while the counterfeiters, i.e., firms that were denied trademarks, witnessed a contraction.[7]

The trademark law also transformed the relationships between Western businesses and Chinese intermediaries. It led to greater domestic integration, both within and outside the boundary of Western firms. Trademark-intensive Western firms became more inclined to promote Chinese employees and recruit Chinese individuals for managerial positions. Western manufacturers also began to pursue additional linkages with Chinese intermediaries and utilize Chinese agents to expand market access. These new linkages subsequently fostered growth of Chinese intermediaries, in contrast to the decline in other Chinese businesses.

As the implications of IP institutional reforms for market competition are a subject of longstanding concerns, we aggregate our data to the product-market level to examine the effect of the trademark law on within-industry competition. We find that the trademark law, in contrast to existing evidence on patent protection, did not reduce the extent of market competition and, in fact, led to both net growth in total employment and a higher likelihood of new trademark-intensive products being offered. This result is echoed when we examine price responses to trademark registrations using a sample—manually matched based on brand

[5]Meanwhile, there was a dramatic decline in advertisements intended to warn consumers against brand imitations (Section 2.5), suggesting authentic firms' reduced need after the trademark law to use alternative means to protect trademarks presumably because the trademark law had been effective in addressing counterfeiting.

[6]The differential impacts are broadly robust when we consider various alternative specifications, including using different measures of trademark intensity, accounting for industry-specific factors and macroeconomic shocks such as domestic demand shocks (due to, for example, consumer boycotts against foreign goods) and foreign supply shocks, and ruling out the influence of specific countries and industries.

[7]Our collection of trademark disputes and court cases sheds light on the mechanisms underlying the estimated effects. First, a review of the outcomes of trademark disputes at the Trademark Bureau reveals that Japanese businesses consistently failed to register counterfeited trademarks and obtain favored outcomes in disputes (Section 2.3). Second, examining the court cases published in the North China Herald shows that the trademark law not only provided a legal basis for adjudication but also imposed substantial financial penalties and prison sentences on convicted counterfeiters.

names and trademark images—of detailed monthly brand-level price series from *the Shanghai Market Prices Report* and trademark-registration dates and find that Western brands did not increase prices after registering their trademarks.

Given that the trademark law was preceded by alternative institutional attempts by foreign powers in the early 1900s, we also compare the effect of the 1923 law to prior arrangements, including: (1) extraterritoriality leading to the direct application of foreign laws and the establishment of foreign courts in China; (2) bilateral commercial treaties in which China promised to provide trademark protection; and (3) a draft of a trademark law influenced by the Japanese government that was never put into effect. We find that none of the alternative arrangements exerted a significant effect on firm growth, further underlining the importance of domestic institutional reform.

The findings of our paper highlight the distinct role of domestic trademark institutions in industrial growth and welfare improvement. Most of the controversy surrounding IP institutions has centered on their implications for market competition and consumer welfare and, in the context of less-developed countries, rent transfer to IP owners in the industrial world. However, in contrast to innovation-type IP protection like patent and copyright which expressly grants monopoly power, trademark protection, as we show in the paper, can foster both industrial growth and consumer gains that do not necessarily compromise market competitiveness. Based on our empirical results and a stylized sufficient statistic from quantitative trade models (e.g., Arkolakis, Costinot, and Rodríguez-Clare 2012; Costinot and Rodríguez-Clare 2014), we estimate a 4.4% increase in consumer welfare from China's 1923 trademark law, with the magnitude of the gains increasing with the industry's dependence on trademark protection. The role of domestic trademark reforms in improving economic efficiency through reduced information asymmetry is particularly salient in international markets where asymmetric information problems are more pervasive among producers, intermediaries, and consumers from different countries and institutions.

Related Literature. An extensive literature on IP institutions assesses the effects of patent laws and, to a lesser extent, copyright protection, on economic growth.[8] In contrast, there are relatively few studies examining the economic effects of trademark protection. The main

[8]See, for example, Moser (2013) for a comprehensive review of patent institutions, and Biasi and Moser (2021), Giorcelli and Moser (2020), Oberholzer-Gee and Strumpf (2007), and Li, MacGarvie, and Moser (2018) for recent studies of copyright.

theoretical work on the topic is Grossman and Shapiro (1988a,b), who analyze the positive and normative effects of counterfeit trade on consumers, firms, and welfare, and the implications of policies designed to combat counterfeiting. Recent work by Heath and Mace (2019) offers empirical evidence on the firm profit effects of increased trademark protection via the 1996 Federal Trademark Dilution Act, which enhanced legal protection to selected trademarks. Qian (2008), examining counterfeiting by Chinese shoe companies, finds that a loosening of trademark protection enforcement led authentic producers to pursue alternative strategies to differentiate their products from counterfeits. Exploring Chinese tire exports to Africa, Kuroishi (2020) finds the quality of exports to increase after African countries joined the Madrid Protocol, a move that simplified the international trademark-registration process.

Our paper contributes to the existing literature by examining the economic impact of a fundamental, rather than an incremental, change in trademark protection: the introduction of trademark law in one of the world's most contested markets. The arguably exogenous timing of China's 1923 trademark law, as a policy experiment disapproved by foreign powers to end foreign privileges, allows us to establish its causal effect on firm and market dynamics. Further, instead of focusing on authentic firms' responses to trademark protection in a particular industry as in previous studies, we exploit rich firm-employee and agent-client data across industries and nationalities to investigate how firms on various sides of trademark conflicts, including counterfeiters and domestic intermediaries, adapt to trademark protection through either competition or cooperation. Our analysis also offers novel evidence on the effect of the trademark law on international firm organization and the formation of domestic linkages. Finally, by investigating price and market responses to the trademark law, we highlight a unique co-existence between trademark protection and market competition and the distinct effects on consumer well-being.

Finally, our paper builds on an emerging literature that assesses the historical patterns and roles of Chinese trade during the treaty-port era. Jia (2014) examines the long-term development paths of treaty ports and their neighbors, and the roles of migration and sector-wise growth. Keller, Li, and Shiue (2013) and Keller and Shiue (2020) document the historical patterns in China's trade and foreign investment while Keller and Shiue (2021) examine Western influence on Chinese economy after the Opium War.

The rest of the paper is organized as follows. Section 2 describes the historical background of China's first trademark law, how the law changed the legal situation for trademark

protection, and a first test of the law's impact. Section 3 discusses the mechanisms through which the law could affect firms, market competition and consumer well-being. Section 4 documents the construction of the micro-level datasets, including (i) firm-employee and agent-client panel data, (ii) firm-specific measure of trademark intensity, (iii) monthly brand-level price series manually matched with registration dates of brands, and (iv) records of Chinese trademark applications, approvals, and disputes. Section 5 presents empirical evidence on firm and market adaptations to the trademark law across different sides of trademark conflicts in terms of demand, reallocation, and domestic integration as well as the overall implications for market competition and consumer welfare. Section 6 compares the effects of alternative institutional arrangements, and Section 7 concludes.

2 Historical Background

China's use of trademarks can be traced to the Northern Zhou Dynasty (556-580 A.D.) when merchants began to use distinctive marks to differentiate their products and craftsmanship (Chang, 2014).[9] In contrast to the long history of trademark use, formal institutions to protect trademarks have a much shorter and more complex timeline in China. This section describes the circumstances under which the 1923 trademark law was introduced.[10]

2.1 The Appearance of Japanese Counterfeits

Early in the 20th century, China emerged as one of the world's most important markets (Heuser, 1975). With a quarter of the world's population, China offered an alluring "promise of a market of four hundred million customers" (Alford, 1995, p. 35) to manufacturers and merchants worldwide. Foreign firms had gained access to Chinese markets via 'treaty ports' after Qing China was forced to sign a series of 'Unequal Treaties' as a result of the Opium Wars in the mid-19th century.[11] These treaties granted foreigners important privileges, including extraterritorial rights (ET; i.e., the use of foreign laws and establishment of foreign courts in China) and political governance in areas designated as 'concessions.'

British firms were among the first to enter the market, followed by counterparts from the US and other Western European countries. When Japan challenged Western dominance

[9] Porcelain and ceramics are among the oldest industries in which such marks were used (Heuser, 1975).

[10] See Motono (2011, 2013) for a comprehensive account of the history behind the trademark system.

[11] The first treaty ports—established by the British at the end of the First Opium War in the 1842 Treaty of Nanking—included Shanghai, Canton, Ningpo, Fuchow, and Amoy.

after the end of the first Sino-Japanese War in 1894–95, Japanese firms lagged behind their Western rivals technologically and resorted to counterfeiting Western goods (Motono, 2011). Chinese merchants were also often involved, sometimes as willing partners of Japanese manufacturers while other times as unaware distribution channels that were themselves deceived by Japanese manufacturers (Bryan, 1919). At the same time, there were also infringements by Chinese firms of brands by Western or even Japanese manufacturers (Motono, 2011).

Overall, the majority of infringements consisted of infringements of Western brands by Japanese firms. The Patent and Trade Mark Review (1907) asserted in 1907 that "Japanese trade in China consists largely of Japanese imitations," spanning products ranging from tobacco and textile to food and cosmetics. Bryan (1919) called Japanese firms "the worst trademark pirates in the Orient" and quantified "at least fifty percent of the infringements in China are of Japanese origin." As the *Manchester Guardian* warned in 1904,

> "Perhaps for no market in the world is it more necessary that the trademarks upon our productions should be jealously safeguarded." (cited in Heuser, 1975)

2.2 Bilateral Commercial Treaties and Failed Negotiations

While Western trademarks had usually been registered in their respective home countries, national trademark laws could not extend the protection of their trademarks to other countries unless countries signed bilateral treaties to recognize each other's trademarks or had signed the *International Convention for the Protection of Industrial Property* in Paris in 1883. Neither was the case in China (Higgins, 2012).

Attempting to obtain trademark protection, Great Britain asked British firms to register trademarks at their consulates in China; registrations would then be transmitted to the Imperial Maritime Customs Service. Unsurprisingly, this measure proved inadequate because neither the consulate nor the Customs Service had legal basis for enforcing compliance.

Between 1902 and 1903, Great Britain, the United States, and Japan each proceeded to sign a commercial treaty with China in which the Chinese government promised to protect foreign trademarks and to establish offices to register trademarks. In return, the foreign powers would abolish extraterritorial rights once China 'modernized' its legal systems.[12] As noted by Alford (1995), "trademark protection was the centerpiece of the intellectual prop-

[12] See Article VII of the 1902 treaty between the United Kingdom and China and Article IX of the 1903 treaty between the United States and China.

erty issues addressed" in these commercial agreements. The Qing government responded by asking the Japanese government for help drafting a trademark law in 1905 (Motono, 2011, p.11). Japan suggested China's adoption of its first-to-file principle, which would allow Japanese companies to continue counterfeiting Western products as long as they filed the trademarks first. Predictably, Western governments opposed it fiercely, and the opposition led the Qing government to cease implementation.

After the 1911 Xinhai Revolution, China's new government attempted to introduce its own regulations in April 1914. Again, the draft failed to satisfy foreign powers and revisions were postponed. The *North China Herald* expressed the continuing frustrations in 1919:

> "[Reforms], it must be confessed, after many years' weary agitation seem as far off as ever." (The North China Herald, 1919)

2.3 China's First Trademark Law of 1923

Neither Great Britain nor Japan anticipated the Chinese government to introduce a trademark law on its own. However, on May 9, 1923, the Chinese Congress surprised the international community by passing a law, putting it into effect, and only then informing foreign diplomats of the *fait accompli*. The Chinese had opted to implement a compromise between the first-to-file principle (favored by the Japanese) and the first-to-use principle (favored by the British): the first-to-file principle would be adopted (after a public-notice period) unless the filing encountered disputes, in which case the first-to-use principle would apply.

Because neither Great Britain nor Japan was satisfied by this compromise and, beyond this, feared the trademark law would mark a precedent towards the slow erosion of their extraterritorial rights, all foreign governments strongly opposed the law (Motono, 2011; Patent and Trade Mark Review, 1923). However, the Western diplomats and businesses were soon overtaken by reality when Japanese and Chinese businesses and businesses from non-treaty nations began applying for trademarks, fearing that rivals would do so first. Between 1923 and 1927, 13,736 trademarks were registered with the Chinese trademark bureau as documented in our trademark registration data (and similarly reported in Motono, 2011, Table 3).[13] British firms owned the largest share of trademarks (32%), followed by firms from Japan (20%), China (16%), Germany (15%), and the United States (12%). As Figure

[13]The fee to register a trademark, as announced in the Trademark Gazette, was 40 silver dollars (银元). As a reference point, the price of a dozen beers was around 2 silver dollars in 1923.

1 shows, trademarks were most frequently registered in textiles (cotton textiles, clothing, woolen products, cotton yarns), chemicals (paints, medication, soap, cosmetics), and tobacco.[14] With this widespread use, it had become evident that the law's implementation had become irreversible.

Why did China introduce a trademark law in 1923? As discussed earlier in the section, foreign countries including Great Britain, the United States, and Japan had signed treaties at the beginning of the 1900s in which they promised to abolish extraterritorial rights once China had 'modernized' its legal systems (Heuser, 1975). For example, the 1903 treaty between the US and China stated that the foreign powers might be "prepared to relinquish extra-territoriality when satisfied that the state of the Chinese law, the arrangements for their administration and other considerations warrant" (cited in Alford 1995, p. 36). While the trademark law was only part of the Chinese legal system, its establishment signified China's first step towards satisfying this condition and bringing the country closer towards its long-term goal of abolishing the Unequal Treaties and regaining sovereignty over its territory.

The effectiveness of the trademark law became evident after its introduction. Our digitization of the trademark disputes published in China's Trademark Gazette between 1924 and 1927 shows that while some Japanese counterfeiters attempted to register other businesses' trademarks, such attempts were soon disputed and unsuccessful. The records indicate the majority of disputed trademarks were originally filed by Japanese firms (63.4% as shown in Figure 2(a)) and firms that filed complaints were mostly from Western countries (Figure 2(b)). A review of the dispute outcomes suggests that Japanese firms lost 72% of the disputes filed against them by Western counterparts.

For example, as documented in the Trademark Gazette, the Japanese firm *Tokyo Ink Co., Ltd.,* applied to register a trademark that showed a lion with wings putting its paws on a globe (Figure 3a). However, the German dye producer *Farbenfabriken vorm. Friedr. Bayer & Co.* was able to prove that they had been using a stylized version of the lion since 1912 in China (Figure 3b). The Trademark Bureau forced *Tokyo Ink* to withdraw their application as it was deemed a counterfeit, arguing "the drawings are identical except for an unimportant small part [...] the confusion is more than accidentally similar". Sometimes, Japanese firms even managed to register their counterfeit trademarks first but subsequently lost the registrations.

[14] After the Chinese civil war broke out in 1927, the Nationalist government retained the 1923 trademark law but reportedly offered less effective protection for foreign businesses against Chinese counterfeiters.

For example, the Japanese firm *Takisada Co., Ltd.,* managed to register the trademark "年年如意" ("good luck every year") for its cotton products (Figure 3c), but seven months later lost the trademark to the British firm *Probst, Hanbury & Co., Ltd.,* whose trademark had a slightly different name, "万年如意" ("good luck for ten thousand years"), but an almost identical image (Figure 3d). *Probst, Hanbury & Co.* was able to prove that they had used the trademark since 1899. The Trademark Bureau subsequently revoked the Japanese trademark, indicating that "although the defendant argues that they accidentally used a similar trademark because, in Asian culture, it is customary and auspicious to use the characters "如意", it is not convincing, since the color and the design of the picture are identical. Thus the trademark is deemed counterfeit, and the defendant is not of good will."

2.4 How the Trademark Law Altered the Legal Trademark Situation

The trademark law significantly affected the legal situation for trademark protection by providing a legal basis for adjudicating infringement cases and setting severe penalties.

Before 1923, the key difficulty for settling trademark disputes, especially those involving businesses from different countries, was the absence of a domestic legal basis. Because of extraterritoriality brought by the Unequal Treaties, defendants of different nationalities were tried under different laws in different courts. For example, cases in which foreign companies with ET were defendants were tried at the defendants' respective Consular Courts, following the laws of their home countries; the other cases were tried in a "Mixed Court" under the Provisional Criminal Code, which only protected the *buyers* of counterfeits in the case they were intentionally deceived, but not the *producer* of the authentic trademark.[15]

This changed dramatically when the trademark law was introduced. First, the cases would now be adjudicated under the Chinese trademark law rather than the defendant's home-country law (e.g., Japan's trademark law in the case of Japanese defendants) or the Provisional Criminal Code that only offered limited protection to deceived consumers. Second, the law, for the first time, allowed the authentic producer to seek damages to compensate for the loss of reputation. For example, a verdict made by a British Assessor under the new

[15]Furthermore, counterfeiting manufacturers could sell through distributors in order not to be charged, while the latter could claim that they had been deceived themselves (The North China Herald, 1919). Court cases were often dismissed or settled with the mere promise of not counterfeiting again. What was absent was neither the court system nor the execution of court orders but a consistent legal basis on which all cases would be adjudicated. As written in The North China Herald (1919), "the only means at present open to merchants whose trademarks are being infringed of asserting their rights are hopelessly inadequate."

trademark law stated: "When a merchant or a company sells an article of good quality for a course of years, he or the company acquires thereby a reputation. That reputation is as much the property of the merchant or company as any other form of asset. What you have done is attempt to steal the reputation of the complainant company [...]. You are no better than a common thief" (The North China Herald, 1925). In addition to the damages, the law also imposed penalties on adjudicated counterfeiters, including up to a $500 fine and jail time.

To examine whether these legal provisions affected the verdicts, we collected the trademark cases reported in the *North China Herald*, the leading English-language newspaper in China at the time, and summarized them in Figure 4. While these case reports are not comprehensive, the case verdicts illustrate that the punishments for counterfeiters became more severe. For example, before 1923, 40% of the cases were dismissed, compared to less than 10% after 1923. Plaintiffs won 40% of cases before 1923, but instead of a punishment, the counterfeiter just had to promise not to counterfeit again. In contrast, after 1923, the cases in which the plaintiff won were never settled without a fine or prison sentence. Before the law, the maximum possible fine under the Provisional Criminal Code was $100, but the reported case only charged 3 defendants with fines between $50 and $75 (with an average of $58). The new trademark law raised fines up to $500, and the average fine across reported cases was $200. Notably, the trademark law also included prison sentences, which were imposed in about 20% of the reported cases, with an average prison sentence of 5 weeks.[16]

Prison time became a major punishment, especially when counterfeiters used intermediaries. Because counterfeiting was so profitable, Japanese producers had even reimbursed any court fines to their Chinese distributors before the trademark law was introduced. This would not have worked with prison time, as the The North China Herald (1919) lamented: "But the very salutary effect of a few sentences of imprisonment would nullify all the guarantees that Japanese or any other manufacturer of goods under false trade marks might give."[17] Overall, the trademark law provided a domestic legal basis for lawsuits and severe punishments against counterfeiting activities, which in conjunction with the existing law enforcement capacity were essential for the implementation of trademark protection.

[16]The law allowed for 1 year maximum prison time, even though in one case the verdict was $500 or 500 days of prison time; see Articles 39 and 40 of the Trademark Law, published in English in The China Weekly Review (1923a) and The China Weekly Review (1923b).

[17]In addition to these fines and prison sentences, the law allowed for the payment of damages to the authentic producer. This was sometimes part of the verdict, but no specific amounts were reported in the newspapers.

2.5 A First Test: The Decline in Advertisements Warning against Counterfeits

Next, we conduct a first test on the effectiveness of the trademark law by examining how the law affected brand producers' uses of an alternative strategy—advertising—to protect their brands and markets against counterfeits.

In the context of our study, counterfeits were designed to deceive consumers into believing they were purchasing the authentic brand. In the words of the *North China Herald*: "Such an imitation when it has been intended to be and has been the means of inducing persons to part with their money, in the belief that they were buying one thing when in fact they were buying another, is sufficient to support a conviction on an indictment for obtaining money by false pretenses."[18] To address the problem of counterfeits in the absence of formal trademark protection, many brand producers turned to advertising to warn consumers against brand imitations. For example, Lea & Perrins educated its consumers: "To distinguish the original and genuine Worcestershire Sauce from the many imitations, see that the signature of LEA & PERRINS appears in *White* across the *Red* label on every bottle," next to a photo of the product.[19]

A first test to see whether the trademark law was effective is thus to check whether the number of these types of advertisements decreased upon adoption of the trademark law. To this purpose, we collected all advertisements printed in the *North China Herald* and classified as anti-imitation advertisements those that included phrases referencing "imitation".[20]

Figure 5 shows that the share of advertisements that included warnings against trademark infringements declined sharply after 1923, from 6% of all advertisements before 1923 to virtually zero by 1925. This pattern suggests that firms saw significantly less need after 1923 to warn consumers about counterfeits, presumably because the trademark law effectively deterred counterfeiting.

3 Mechanisms: Trademark Institution, Firms, and Markets

Before turning to formal empirical analysis, we discuss in this section the various mechanisms through which the trademark law may have shaped firm and market dynamics and the resulting hypotheses on firm growth, organization, and brand investment decisions.

[18] North China Herald, 'A Cotton Fraud: Need of Criminal Law', May 8, 1920.

[19] In an advertisement published in the *North China Herald* on July 31, 1920.

[20] We used keywords like *imitation* in our search of the *North China Herald* and manually checked such advertisements to make sure that they did, in fact, warn against imitations.

Consider a setting in which authentic producers sell differentiated varieties of a given product, and consumers are unable to observe all of the product's characteristics at the time of purchase. The consumer, however, derives utility from these product characteristics upon consumption; examples are product materials and ingredients that affect the quality, safety, or durability (e.g., Shapiro, 1982; Shapiro, 1983). Nelson (1970) termed such products *experience* goods—that is, products that must be consumed in order to learn about their characteristics.[21] This information asymmetry is particularly severe when buyers and sellers come from different countries and face greater communication costs.

Authentic producers can attempt to resolve the information asymmetry by labeling the product with a 'trademark' and over time consumers may learn to associate the trademark with the unobserved product characteristics.[22]

If trademarks are not protected, however, consumers may mistake counterfeits for authentic goods and become discouraged by the risk of buying counterfeits and receiving less utility. The presence of counterfeits will therefore not only dilute authentic producers' market share but also become a negative demand shifter in the consumer demand function. When authentic producers rely on intermediaries to reach more final consumers, they face the additional risk that intermediaries may mix counterfeits with authentic products.[23] In this case, authentic producers may opt to shun intermediaries and sell directly to consumers (even if doing so entails more limited market access and higher distribution costs).

In such a context, the introduction of trademark protection, by strengthening the role of trademarks in solving information asymmetry surrounding the identity and product attributes of the producer, could affect firm dynamics in three main channels: (i) reallocation, (ii) demand, and (iii) intermediary risk.

Reallocation. Without trademark protection, both authentic and counterfeiting firms sell their products (with potentially dissimilar unobserved characteristics) under the same brand name; consumers in turn are unable to discern the seller's true identity. The introduction of trademark protection, which ensures authentic firms' exclusive rights to use their brands, can

[21] Nelson (1970) distinguishes experience goods from search goods, whose characteristics information can be obtained by consumers at a cost. We are grateful to Kyle Bagwell for pointing us to this literature.

[22] This role of trademarks differs from that of patents and copyrights, as trademark aim to disseminate information while patents and copyrights aim to incentivize innovation.

[23] During the period of study, foreign firms often turned to domestic intermediaries for expanded market access to overcome language barriers and inland market restrictions. As Section 4.1 shows, the intermediary sector accounted for more than half of the businesses.

lead to a direct market reallocation within brand-specific market segments from counterfeiters to authentic producers. Because a trademark law protects the right to use a given mark, rather than the right to make a specific product, counterfeiters can either exit the market or obtain new marks for their products.

Demand. By lowering the risk of consumers receiving counterfeits at the point of purchase, a trademark law reduces the information frictions that consumers face when attempting to match trademarks to sellers' true identities. As Grossman and Shapiro (1988a) note, lessening information frictions via trademarks can increase consumers' confidence in receiving authentic goods and thus their willingness to pay, expanding aggregate market demand. Grossman and Shapiro (1988a) point out that this mechanism also enhances the value of authentic brands and enables firms to appropriate returns from their brands and reputations, potentially increasing brand investment incentives.

Intermediary risk. As the level of information asymmetry surrounding the producer's identity increases when the producers involve intermediaries, trademark protection can also affect authentic firms' organization decisions and, consequently, market access. By mitigating the risk that intermediaries would dilute the trademark, trademark protection can increase authentic firms' willingness to collaborate with domestic intermediaries within and outside the firm's boundary. The new linkages between authentic firms and domestic intermediaries can both expand authentic firms' market access and lower their distribution costs while offering intermediaries growth opportunities.

These three mechanisms jointly lead to a range of potential implications for firm dynamics. First, trademark protection, via reallocation, aggregate demand shift, and reduced intermediary risk, may spur growth of authentic firms and a likely contraction of counterfeiters. However, since trademark protection does not prevent counterfeiters from re-branding their products, it may not necessarily force them to exit. Second, by protecting the value of a brand as a firm-specific asset, trademark protection can increase firms' incentives to invest in their brands. Third, trademark protection can foster authentic firms' use of intermediaries; this, in turn, may provide growth opportunities to both authentic firms and the domestic intermediary sector.[24]

[24]In addition to the above hypotheses, trademark protection may also shape other firm outcomes. For example, due to reallocation and aggregate demand changes, trademark protection may change authentic firms'

At the market level, the mechanisms may produce ambiguous effects on market competition. Unlike patent and copyright protection, trademark protection, by allowing counterfeiters to re-brand and remain in the market, does not necessarily reduce market competition and raise prices.[25] On the one hand, competition may fall and prices might rise if authentic producers gain market power via market reallocation, increased consumer demand, and intermediary linkages; prices may also further increase when authentic firms exhibit stronger incentives to innovate and upgrade quality. On the other hand, prices may also fall when authentic producers achieve greater economies of scale, or more entry occurs thanks to expanded markets, or when authentic producers lower product quality due to less need to distinguish themselves from counterfeiters.

Finally, trademark protection offers an important source of consumer welfare improvement that is distinctively different from patent and copyright protection. In contrast to the latter two forms of IP protection, which address the gap between the social and private values of innovation, the key friction resolved by trademark protection is the information asymmetry that consumers face when assessing product characteristics and origin at the point of purchase. The effect of trademark protection on consumer well-being hence arises from the magnitude of the reduced information friction and the resulting net changes in market competition and consumer prices.

In Section 5, we empirically examine the above predictions and explore how firms–with varying roles in trademark conflicts–and markets adapted to the 1923 trademark law. In Section A.1 of the Online Appendix, we use a stylized sufficient statistic from quantitative trade models (e.g., Arkolakis et al. 2012; Costinot and Rodríguez-Clare 2014) to provide an estimate of consumer gains from the trademark law. In the section below, we first describe the construction of the firm-employee, intermediary, and trademark data.

innovation incentives. It is worth noting, however, since trademarks alone do not prevent imitations of products or technologies as long as the imitations are sold under different brand names, the effect of trademark protection on innovation can differ from that of patent and copyright protection. While our historical data do not have direct measures of RD or product quality, we attempted to provide some suggestive evidence by exploring the textual composition of business advertisements in Section A.8 of the Online Appendix and found no significant changes after the law.

[25]This point has also been highlighted in Fink and Javorcik (2002) who note that "a closely related difference between the two forms of IPRs is that patents and copyright expressly grant monopolies—albeit limited in scope—whereas trademarks can, in theory, coexist with perfectly competitive markets."

4 Data: Firms during Shanghai's Concession Era

To examine the hypotheses outlined in the above section and assess firm-level adjustments to the trademark law, we digitized and assembled a rich array of micro-level datasets, including a firm-employee panel dataset covering the universe of firms that operated in Shanghai's concession areas in 1872-1941, an agent-client panel dataset for Shanghai's intermediary sector, monthly brand-product level price panel data manually matched with brand registration dates, and a database of foreign and Chinese trademarks.

4.1 Firm-Employee, Agent and Brand Price Data

Often called "the Paris of the East," Shanghai had by 1930 become one of the world's largest cities and the commercial center of East Asia, boasting over 3 million inhabitants, vibrant manufacturing and service sectors, and remarkable openness to trade, investment, and immigrants (Osterhammel, 1989). The preceding decades marked one of the most transformative as well as turbulent periods in Shanghai's history as Shanghai grew from an unknown fishing village to the world's major industrial and financial centers (Brandt, Ma, and Rawski, 2014).

Between 1865 and 1930, trade passing through the port of Shanghai increased fourteenfold, eventually accounting for more than half of China's foreign trade, which in turn exceeded 2% of global trade flows, a level not regained until the 1990s (Lardy, 1994). By the 1930s, Shanghai also accounted for 67% of China's inbound FDI in manufacturing, while China's total inbound FDI amounted to 8.4% of the world's total (Hou, 1965). During this period of rapid industrial growth, the population grew from 77,000 to 3.7 million, making Shanghai the world's seventh-largest city (Ma, 2008). The city consisted of three areas: the International Settlement (or Public Concession), the French Concession, and the Chinese portion of the city. The two concessions, where most foreign businesses were located, were governed by city councils independent of the Chinese government.

We have digitized and assembled an annual business-employee-level panel dataset covering the universe of firms that operated in Shanghai's concession areas in 1872-1941 based on the *North-China Hong List*, a business-and-residential directory that provided comprehensive information on firms operating in the leading port cities of northern China.[26] This annual series was published by the *North-China Daily News*, an English-language newspaper based in Shanghai that was widely regarded as the most influential foreign newspaper of

[26]The Hong Lists from 1873, 1885, 1898, and 1900 are missing and not included in the dataset.

its time. The Hong Lists provide detailed information on all firms operating in the Public and French concessions.[27] For each company listed in a given year, we recorded, among other things, its name, address, products, and importer/exporter status. We also digitized the names, job titles, and hierarchy levels of each firm's non-production employees. Figure C.2 in the Online Appendix shows a representative page from the 1927 Hong list.

We identified each firm's nationality using several sources such as directories of China's importers and exporters, directories of foreign businesses, and documents from the Japanese Chamber of Commerce.[28] For the remaining unmatched businesses, we manually collected nationality information or assigned a nationality based on the country reference in the firm's name (if unambiguous).[29]

We also collected comprehensive information on each firm operating as an intermediary (labeled agent) in Shanghai, including its product composition, address, and nationality, as well as the name and nationality of each client. This agent-client information enables us to identify firm linkages and measure how they evolved before and after the trademark law.

To measure firms' brand-investment decisions, we downloaded all business advertisements published in the leading Chinese daily newspaper *Shen Bao* (申报) in 1920-1926 and matched the advertisements to firms in our sample based on information on advertisement holders. We also obtained detailed, monthly brand-level price panel data from issues of *the Shanghai Market Prices Report*, published by the Ministry of Finance, Bureau of Markets, to investigate how receiving trademark protection may have affected price decisions.

Using data from each edition of the Hong List and matching firms over time, we constructed firm-level and firm-employee-level panel datasets covering nearly the entire 1872-1941 period. The information assembled provides a unique tool for analyzing firm dynamics in one of the world's most competitive markets. The key firm variables are defined below:

[27] In the international concession, the aggregate foreign employment based on the Hong List is equivalent to about 80% of the foreign adult-male population counted by the census, which offers a useful cross-check on the coverage of the data. See Section A.2
for more details on the validation of the dataset.

[28] The sources used to identify firm nationality include the "China Importers and Exporters Directory," published in 1936 by the Bureau of Foreign Trade, Ministry of Industry, Shanghai; "The Universal Dictionary of Foreign Business in Modern China," which includes a detailed description of each firm's ownership, history, and products; the "History of Foreign Firms," published by the Shanghai Academy of Social Science in 1932; the "Shanghai Dollar Dictionary 1943," published by the Dollar Dictionary Company; and several documents from the Japanese Chamber of Commerce.

[29] Our measure of a firm's nationality is time-invariant; we have no information about changes in the nationality of firms over time, but the nationality of ownership tended to be persistent in this time period.

- firm name: the name of the firm in English, traditional Chinese, and Wade-Giles
- year and address: the year of operation and the firm's address
- firm activity: the firm's activity, as matched to one of eight industry categories: agriculture/mining, construction, manufacturing, transportation, wholesale, retail, finance/ insurance/real estate, other services)
- products: description of produced or sold by the firm (merged from the Appendix of the Hong Lists and subsequently matched to the Nice classification (NCL) categories used in the trademark data described in Section 4.2)
- nationality: the ownership nationality of the firm assigned as described above
- a list of non-production employees, including name, title, and position in the hierarchy (a count of a firm's non-production employees is used as a proxy of employment)
- export/import status: an indicator of the firm's status as an exporter, importer, or both
- hierarchical layers: the number of indentations in the list of employees (used in the Hong List to denote hierarchical layers)
- Chinese nationality of employees: a count of employees with Chinese last names[30]
- job titles: we classify job titles as lawyers (titles such as barrister, solicitor, attorney, lawyer, etc.), sales-related (titles such as sales, salesman, marketing, representative, advertising, and publicity), engineering-related (engineer, engineering, technical, machinery, draughtsman, mechanic, mechanician, and technician)
- clients: the list of clients of each agent business in Shanghai including its nationality
- advertising: whether the firm advertised in the leading Chinese daily newspaper, *Shen Bao* (申报), and the frequency of advertising

Several stylized facts on the time trends and distributions of firms emerge from the data. Consistent with historical accounts, the data reveal a significant transformation in both the volume and composition of businesses in Shanghai during the early decades of the 1900s. As Figure 6 shows, the number of businesses grew rapidly beginning in the 1920s and rose from 771 to 1,624 in 1920-1930 alone. Total employment also increased over time from about 5,000 in 1920 to 13,000 in 1930. Some notable examples of foreign corporations operating in Shanghai at the time include British American Tobacco (BAT), Standard Oil, Andersen,

[30]We use the corpus of Chinese names specified in https://github.com/wainshine/Chinese-Names-Corpus.

Meyer & Co, and Mitsui Trading Company. As Figure C.3 of the Online Appendix shows, BAT (formerly British Cigarettes), a Western company involved in numerous trademark disputes, consisted in 1906 of about 25 main employees and a relatively simple organizational structure; two decades later, BAT's operations in Shanghai had expanded to over 100 main employees and 9 departments.

Transformations were also evident in the industrial composition of Shanghai's economy. Throughout the concession era, wholesale constituted the dominant sector in Shanghai, accounting for 40-50% of businesses and employment. The dominance of the wholesale sector, led by domestic intermediaries, was driven by Shanghai's status as a major port. At the same time, Shanghai's economy was also experiencing gradual growth in industrial activities during the same period and a transition to a more diverse economic landscape. As Figure 7 shows, the manufacturing sector grew from only 6.2% of the economy (measured in non-production employment) to 20% by 1930 as more foreign businesses set up factories.

The array of nationalities represented by Shanghai businesses also varied significantly over time. As Figure 8 shows, Great Britain initially accounted for 50.5% of the businesses in the data; its share fell significantly over time, reaching 20% by 1930. Meanwhile, the shares of Japanese and Chinese companies grew from 2.1% to 10.4% and from 3.3% to over 20% respectively by 1930. Other nationalities well represented in Shanghai were the United States, France, Germany, and Russia, which accounted for 18.3%, 5.7%, 4.7%, and 2.1% of businesses, respectively, by 1930.

4.2 Measuring Trademark Dependence

As discussed in Section 3, trademarks solve an asymmetric-information problem that arises when buyers are unable to observe products' characteristics at the point of purchase (Grossman and Shapiro, 1988a). Given the role of trademarks in reducing information asymmetry surrounding product attributes, the demand for trademarks is expected to be greater for experience goods, in which the asymmetric information problem is greater.

To measure the pre-existing demand for trademark protection, we construct a firm-specific trademark intensity by exploring trademarks issued across detailed product categories before 1922 in countries where trademark registration was possible and computing a firm-specific measure of trademark dependence based on the share of trademarks granted in a given product category and the firm's pre-1922 product composition. This approach, by measuring

each product's intrinsic dependence on trademark protection with pre-1923 trademark data in countries outside China, mitigates the potential bias arising from firms' endogenous decisions and abilities to obtain trademarks in China after its 1923 trademark law.[31]

We obtained historical trademark data from the IP Portal of the World Intellectual Property Organization (WIPO). After eliminating countries whose use of trademarks in the late 19th and early 20th centuries was very sparse or nonexistent, we ended up with trademark data for eight countries: Britain, Germany, the United States, Japan, Australia, Canada, Denmark, and Spain.[32] The dataset lists the name of the trademark, the trademark holder, the ID number of the trademark, its application date, and its product group(s). Product groups are defined according to the international Nice classification (NCL) scheme, established by the Nice Agreement in 1957.[33]

For each country, we calculated the cumulative sum of all trademarks registered between 1872, when the trademark data started, and 1922, the year before the enactment of the trademark law.[34] We then aggregated the trademarks of the eight countries, yielding a total of 50,050 registered trademarks by 1922. For each NCL product category p, we calculated its share of the total, which we labeled $TrademarkInt_p$.[35]

As Table 1 shows, the product categories with the highest trademark intensity were pharmaceuticals, cosmetics, food, alcoholic beverages, chemical products, paper and cardboard, and tobacco. Among the goods with the lowest trademark intensities were firearms, canvas products, musical instruments, leather products, and dressmakers' articles. Our measure of trademark intensity corroborates the distinction of experience versus search goods described in Nelson (1970) while providing more variation in the degree of dependence on trademark. As anticipated, experience goods classified by Nelson (1970) exhibit significantly greater trademark intensity than search goods.

We then constructed the firm-specific measure of trademark intensity based on each

[31] We also consider a variety of ways to measure trademark intensity in Section A.3 of the Online Appendix, including country-specific trademark intensity and trademark intensity normalized by industry employment, among others.

[32] We dropped New Zealand, whose product-classification system is inconsistent with the NCL system used by other countries.

[33] For details, see https://www.wipo.int/classifications/nice/en/ (accessed 1/20/2021).

[34] Before 1872, only a handful of trademarks were reported on 01/01/1801. We exclude these from the data.

[35] Services were generally not covered in trademark laws in this time period. Nevertheless, some service trademarks appeared in the data; we dropped them and assigned a value of 0 for services listed in the Hong List data. We also performed robustness checks by excluding services from the analysis, see Section A.4.

firm's product composition before the adoption of the trademark law. Specifically, we calculate the maximum trademark intensity across a firm's products offered before 1923:

$$TrademarkInt_i \coloneqq \max_{p \in P_i} (TrademarkInt_p)$$

where P_i denotes the set of products that the firm offered in the period 1920 to 1922.This firm-specific trademark intensity enables us to explore cross-firm variation in pre-existing demand for trademark protection within each industry and country group and compare how firms selling more trademark-intensive products adjusted to the 1923 Trademark Law relative to firms selling less trademark-intensive products.

In addition to the pre-1922 trademark data outside China, we also collected data on Chinese trademark applications, registrations, and disputes after the 1923 Trademark Law by digitizing all issues of the Trademark Gazette published by the Chinese Bureau of Trademark from September of 1923 to December of 1927.

For each trademark registration, we collected trademark ID, name, issue date, trademark owner name, city and country, and trademark product code. Two types of trademarks were issued. Type I, labeled as "甲", consisted of trademarks that had been on the market for over 5 years and thus were granted directly based on Provision 4 of the 1923 Trademark Law without going through six months of public notice. Type II, labeled as "乙", included trademarks that had been on the market for less than 5 years and were granted after an application process and 6 months of public notice (and in case of a dispute, an investigation).

The dataset recorded in total 5,491 type-I and 8,229 type-II trademark registrations by the end of 1927. As mentioned before, Figure 1 shows trademarks were most frequently registered in fabrics, paints, tobacco, cosmetics, pharmaceuticals, foodstuffs, and clothing, all of which also appeared in the top 15 most trademark-intensive products based on the pre-1922 foreign trademark data.

We adopt the pre-existing trademark intensity measure in the main empirical analysis to mitigate concerns of endogeneity bias in trademark application and approval, and utilize the Chinese trademark registration data to offer supplementary evidence on firm and price responses to trademark protection.

5 Empirical Evidence

In this section, we empirically examine how firms on differing sides of trademark conflicts adapted to the trademark law. We first assess how the trademark law shaped growth dynamics and linkages between foreign firms and domestic intermediaries. To assess the implications for competition and price, we then examine the effect of the trademark law on within-industry competition and price responses to trademark registrations. Incorporating the empirical results into a stylized sufficient statistic, we finally estimate the consumer effect of the trademark law.

5.1 Empirical Specification

One attractive feature of our historical experiment is that the probability of being an authentic producer or a counterfeiter differed systematically across firms of different nationalities: Western firms, filing most of trademark disputes, had suffered most from trademark infringements; Japanese and Chinese firms, the targets of nearly 90% trademark complaints (Section 2.1; Motono 2011), were more likely to be or to collaborate with, counterfeiters. This pattern enables us to evaluate firm reactions to trademark protection from all sides of the trademark conflict. In Section A.7 of the Online Appendix, we explore how the trademark law affected individual authentic firms and counterfeiters identified based on trademark applications, registrations and disputes.

In the main analysis, we implement separate difference-in-differences (DD) specifications for each of the three sides of the trademark conflict. Each of these DD specifications compares firms selling more trademark-intensive products to firms with less trademark-intensive products, before and after the trademark law of 1923, within a given nationality group r, $r \in \{\text{Western, Chinese, Japanese}\}$. We estimate the three DDs together in a pooled specification by estimating:

$$y_{it} = \sum_{r} \beta_r \times D_r \times TrademarkInt_i \times Post1923_t + FE_i + FE_{ct} + FE_{rjt} + \epsilon_{it} \quad (1)$$

with firm i in year t from home country c operating in broad industry j. $TrademarkInt_i$ is the firm-specific trademark intensity based on products that the firm offered in 1920-1922. D_r are dummy variables indicating whether a firm is Western, Chinese, or Japanese.

To study firm-specific outcomes such as employment, product portfolio, and advertising, we restrict the sample to the set of pre-existing firms in Shanghai (i.e., firms that we observe in at least one of the years 1920-1922). In order to study firms' entry and exit, we run the same specification on the fully balanced sample of firms. When we estimate aggregate effects, we run equivalent regressions on the dataset aggregated to the product level.

We use firm fixed effects FE_i to control for time-invariant firm characteristics; country-year specific fixed effects FE_{ct} to absorb potential macroeconomic shocks from the firms' home countries or domestic shocks specific to firms of particular nationalities; and broad industry-year specific fixed effects FE_{rjt} to account for industry-specific shocks in Shanghai that are allowed to be different for each country group r. Standard errors are two-way clustered by product category and country-year. Our baseline regressions center on the period 1920-1926 in order to compare firm outcomes within a focused time window and mitigate the effects of other historical shocks, such as the civil war that broke out in 1927 and the subsequent establishment of the Nationalist government.[36] In Section 6, we expand the time period to 1872-1936 to provide a robustness check and to compare the effect of the trademark law with alternative institution attempts.

For our identification strategy to work, it is important to ascertain that trademark-intensive firms would not have grown in the absence of the trademark law—that is, that there were no pre-trends. To ensure that, we also implement pooled event-study specifications for each group r:

$$y_{it} = \sum_{r} \sum_{t=1920}^{1926} \beta_{rt} \times D_r \times TrademarkInt_i \times D_t + FE_i + FE_{ct} + FE_{jt} + \epsilon_{it} \quad (2)$$

Examining the elasticity of trademark intensity before and after 1923 will help detect the presence of pre-trends in our data.

5.2 Firm Dynamics on Opposite Sides of Trademark Conflicts

We begin by examining how the trademark law shaped firm growth dynamics. As noted in Section 3, Western firms—the main complainants about trademark infringements—could be expected to benefit, at both the intensive and extensive margins, from reallocation within their own market segments and increased aggregate demand due to lower information fric-

[36] Table B.1 in the Online Appendix presents the summary statistics for this regression sample.

tions. Western firms could also choose to invest more in their brands via, for example, advertising, as trademark protection raises the value of their brands. Japanese and, to a lesser extent, Chinese firms, which had been the main group accused of counterfeiting, would be expected to contract in size but might opt to re-brand their products and adapt their product composition to remain in the market. This subsection presents evidence on these hypotheses by looking at firm adaptations in the spheres of employment, firm and product entry and exit, and brand investment.

5.2.1 Firm Employment

Table 2 shows that the trademark law exerted a net positive effect on the growth of trademark-intensive Western firms. Column (1) includes year fixed effect, and column (2) allows for country-specific year fixed effect. Column (3) reports our preferred baseline specification which also allows for region specific industry-year fixed effect. Based on the estimates, employment at Western firms with mean trademark intensity grew by 4.7% after enactment of the law. This implies, on average, adding 1/2 employee at the mean employment of 11.2 individuals. However, for the firms that sold the ten most trademark-intensive products listed in Table 1, employment growth ranged from 7.5% to 18.3% (an increase of 0.8-2.1 employees to the mean firm size). In contrast, the firms that sold the ten least trademark-intensive products listed in Table 1 saw employment growth of only 1-2.7%.[37]

In contrast to the growth of Western firms, Japanese firms selling trademark-intensive products experienced a significant contraction in employment after 1923. In terms of magnitude, employment at Japanese firms with mean trademark intensity decreased by 18% after the establishment of the law. The effect on Chinese firms was also negative, but its magnitude was smaller and mostly statistically insignificant. As we show in Section 5.3, the insignificant average effect on Chinese firms masks substantial heterogeneity: Chinese firms that acted as distributors for Western companies grew significantly while the remaining Chinese firms experienced contraction.

Section A.3 in the Online Appendix shows that these effects are robust to different ways of measuring trademark intensity, including measures excluding Japanese trademarks,

[37] As shown in Figure C.4 of the Online Appendix, the effect of the trademark law was not uniform across firms of different sizes; its effects were concentrated in large and medium-sized businesses. This could be related to the fact that only medium-sized and large companies were able to cover the fixed cost required to design and set up a trademark.

country-specific trademark intensity, and trademark intensity normalized by industry employment, and limiting the analysis to goods only. Our main analysis, in columns (1) to (3) of Table 2, focuses on the period prior to 1927. In 1927 the civil war broke out and when the Nationalist government came into power, the 1923 trademark law remained in place but may subsequently have provided less effective protection for foreign businesses against counterfeiters. Column (4) extends the sample to 1930 to determine whether the effectiveness of the trademark law changed; the results remain similar.[38]

To ensure that our results are not driven by pre-trends, we estimate equation (2) for the three types of firms. As Figure 9 shows, no pre-trends are apparent for Western firms: the estimated employment elasticities of trademark intensity before 1923 are not significantly different from zero; the effect appears partially in 1923 and fully in 1924 and thereafter. Figure 10 shows the corresponding event study for Japanese and Chinese firms, confirming the absence of pre-trends and the negative effect of the trademark law.[39] These results suggest that, after years of Anglo-Japanese trademark conflicts, the enactment of China's first trademark law enabled Western firms to grow their trademark-intensive operations in China while disadvantaging Japanese and Chinese businesses competing in the same industry.

Next we examine whether the positive effect of the trademark law on Western firm employment indeed reflects ex-ante variation in firms' dependence on trademark protection, rather than other attributes of firms or products. To do so, we interact the post-law dummy with other firm- or product-specific characteristics. For example, firms with trademark-intensive products may also have been innovation-intensive. For this reason, we control for an interaction of the post-law dummy with a firm-specific measure of patent intensity in column (2) of Table 3. We calculate the patent intensity of each product as the share of patents in each product category, using data on the stock of U.S. patents in 1922 from the historical U.S. PTO database.[40] We find trademark and patent intensity to be only weakly correlated; our employment effects are not explained by patent intensity.

In Table 3, columns (3)-(4), we examine whether the estimated effect on trademark-intensive industries instead reflects an effect on large industries as the trademark law may

[38] In Section 6, we expand the time period to 1936, the year before Japan's occupation of Shanghai in 1937.

[39] We combine Chinese and Japanese firms in the event study. Figure C.7 in the Online Appendix reports the event study for Japanese firms only; it shows a similar decline in employment (albeit noisier due to the much smaller sample).

[40] See https://www.uspto.gov/learning-and-resources/electronic-data-products/historical-patent-data-files. As in the case of trademark intensity, we use the maximum patent intensity across products for each firm.

have been particularly relevant to large (or small) industries. To test this, we interact the post-law dummy with the number of firms or the total employment across all firms in the NCL product category of the firm's most trademark-intensive product.[41] In column (5), we check whether the competitiveness in the product category drives our result by controlling for the interaction with the Herfindahl-Index across firms (by employment) in the NCL product category of the firm's most trademark-intensive product. In column (6), we check whether the firm's size rather than the product's trademark intensity explains our effects by adding interaction terms with the firm's average employment before the trademark law was implemented. Overall, none of these measures explain the employment effects of trademark intensity.[42] Finally, in addition to the country-year fixed effect which controls for country-specific demand and supply shocks, we show in column (7) that the estimated effects of the trademark law are not due to the heterogeneous effect of macroeconomic shocks, measured by home-country GDP, that could have affected trademark-intensive firms differentially.[43]

In Section A.7 of the Online Appendix, we conduct an alternative exercise and examine the responses to the trademark law by identifying a list of authentic firms and likely counterfeiters based on trademark application approval and denial records and involvements in trademark disputes reported in the matched firm-trademark datasets described in Section 4.2. When comparing firm employment before and after the trademark law, we find, consistent with the baseline results, that authentic firms, i.e., firms that were granted trademarks based on either the length of their market presence or application/dispute reviews, experienced significant growth. In contrast, the likely counterfeiters, i.e., firms whose trademark applications were denied or trademark registrations were revoked, witnessed a contraction.

[41] We use the number of unique firms (or their main employees) that offered the product in at least one year between 1920 and 1922.

[42] Section A.5 of the Online Appendix goes further and shows that neither a specific product group nor a specific country drives the results which suggest that it is unlikely for the findings to reflect individual industry or country's macroeconomic trends.

[43] An example of country-specific shocks is Japan's earthquake in 1923. While Japan's earthquake could perceivably cause supply shocks for Japanese firms' operations in China, our result on the interaction between trademark intensity and country GDP suggests the effect of Japan's earthquake, if present in China, did not vary significantly with firms' trademark dependence. Another potential concern is that consumer boycotts may have affected the result. In the early 20th century, the Chinese organized consumer boycotts to protest against foreign influence and invasion. The US experienced the first of these boycotts in 1905, while later boycotts affected British and Japanese products (League of Nations, 1932; Orchard, 1930; Zumoto, 1932). While the archives suggest that the boycotts targeted all products (Orchard, 1930, p.254 and p.256), we perform several robustness analyses in Section A.6 of the Online Appendix to account for the potential role of boycotts that is not already absorbed by a country-year fixed effect. The results show similar effects of the trademark law.

One may also expect trademark protection to be more important for final goods than intermediate inputs, as consumers of the former are more likely to be deceived due to a lack of expertise and infrequent interactions with retailers. Figure 11 estimates the effects of the trademark law by subdividing the NCL product categories into intermediate and final goods. In line with our hypothesis, reallocation from Japanese and Chinese firms to Western firms after adopting the trademark law is only evident for final goods; the effects on intermediate inputs are close to zero and insignificant for all three groups.

5.2.2 Within-Firm Organization

We next explore how firms grew or shrank in response to the trademark law by adapting their organization and hierarchy. This allows us to understand, for example, whether the growth of Western firms was more mechanically driven by hiring more lawyers in anticipation of lawsuits or by a general expansion of the business operation.

We take advantage of the information on employee names, job titles, and hierarchy levels and assess how the composition of the positions may have been adjusted after the trademark law. Column (1) of Table 4 reports the baseline analysis on the subsample of firms with available information to confirm that the trademark law had the same employment effect on this sample. Columns (2)-(4) examine firms' decisions to employ lawyers, sales staff, and engineers, respectively. After the trademark law, Western firms were more likely to fill all these positions, but the effect is only statistically significant for engineers.

Though only suggestive, this finding could indicate that Western firms that entered the Chinese market by importing goods produced in their home countries became more likely to undertake their own manufacturing activities in Shanghai after the trademark law—a trend that was also visible in the aggregate statistics in Figure 7. In contrast, Japanese and Chinese firms reduced employment in most hiring categories but particularly among sales staff.

5.2.3 Entry, Exit, and Product Composition

Thus far, we have studied the intensive margin, i.e., whether the trademark law affected the growth of existing firms. Next, we examine the extensive margin by extending the sample from firms that existed in 1920-1922 to include all firms that came into existence between 1920 and 1926. We fully balance the sample and define an entry dummy as 1 during and after the year a firm entered and an exit dummy variable as 1 in and after the year a firm exited. This allows us to examine how the law affected firms' entry and exit rates. In columns (1)

and (2) of Table 5, we see that the trademark law had an insignificant effect on the entry of Western firms but exerted a negative and significant effect on their exits. Column (3) shows that the trademark law had a positive but insignificant effect on firm existence, suggesting that it protected incumbent firms but did not necessarily promote increased entry.

The trademark law could also have affected firms' product composition, especially the likelihood of adding or dropping trademark-intensive products. To examine this hypothesis, in columns (4) and (5) of Table 5, we revert to the sample of firms that existed in 1920-1922 and create a dummy variable to indicate whether firms added or dropped a trademark-intensive product in a given year.[44] The results are similar to those on firm entry and exit, suggesting that Western firms were significantly less likely to drop products with above-median trademark intensity after 1923 but not more likely to add such products.

Turning to the extensive margin for Japanese and Chinese firms, we see that Japanese firms were less likely to enter and Chinese firms were less likely to exit after the establishment of the trademark law. Japanese firms were also significantly more likely to add trademark-intensive products, implying an adjustment in product portfolio to take advantage of the trademark law.

5.2.4 Brand Investment

If the trademark law helped incumbent Western firms grow their trademark-intensive products, we would also expect to see increased investment in brand promotion as such firms experienced larger returns. Before the trademark law, advertising faced a free-rider problem: any increase in market demand in response to brand-promotion efforts would be shared with counterfeiters. This externality would suppress brand producers' incentives to invest in advertising. The free-rider problem would be mitigated after the enactment of the trademark law; with fewer counterfeits in the market, brand producers would be more motivated to pay for brand promotion. At the same time, the need for advertising to educate consumers on distinguishing the authentic brand from counterfeits would decrease with strengthened trademark protection, as discussed in Section 2.5.

To examine the effect of the trademark law on brand-investment incentives, we collected all advertisements run by firms in our sample in the leading Chinese daily newspaper *Shen Bao* (申报) in 1920-1926, excluding those that warned consumers about counterfeits (whose

[44] Trademark-intensive products here are defined as products with above-median trademark intensity.

volume was shown to have declined significantly in Section 2.5 after the trademark law). Table 6 reports that, though the increase in the likelihood of advertising was not statistically significant for Western firms (column 1), the number of Western firms' advertising days rose significantly after 1923 (columns 2 and 3). Interestingly, we also find a higher probability of advertisements for Japanese firms (column 1). This result offers suggestive evidence that Japanese firms reacted to the trademark law by trying to build up their own brands and investing in brand promotion.[45]

5.3 Domestic Integration

Apart from authentic firms and accused counterfeiters, another key role involved in trademark conflicts is that of domestic intermediaries, the essential connection between foreign businesses and Chinese markets. As Section 3 points out, the level of information asymmetry surrounding the producer's identity can increase when the distribution involves intermediaries. Before the trademark law, many Chinese agents worked with both Western and Japanese clients, including accused counterfeiters of Western clients. As a result, Western firms often feared that Chinese agents would mix their branded products with counterfeits, undermining their brand value (Motono, 2011). The trademark law can reduce such risks and thereby provide authentic foreign firms greater incentives to collaborate with local middlemen, agents and employees. In this subsection, we examine whether and how the trademark law affected Western firms' decisions to work with domestic intermediaries and staff, both within and outside the boundary of the firm, and the resulting effect on the domestic intermediary sector.

We begin by first looking within the boundary of Western firms and constructing variables to capture Chinese employees' roles within firm hierarchies. We distinguish Chinese employees from foreign employees using the names reported in the Hong List and iden-

[45]Incentives to invest in product quality can also change with trademark protection. On the one hand, by reducing the free-rider problem and raising the return from quality upgrading, the trademark law could motivate authentic firms to invest in quality upgrading. On the other hand, stronger trademark protection could weaken the need for authentic firms to raise quality as a means to signal their identity and differentiate their products from counterfeits. Thus the net effect on product quality of trademark protection can be ambiguous. While we do not have direct, time-varying measures of brand quality (except for proxies such as unit price, which we examine in Section 5.4.2 of the Online Appendix), we explore in Section A.8 whether trademark protection affected firms' emphasis on quality and innovation in advertising. We do not find significant changes. However, note that, as discussed in Section 3, trademark protection can generate welfare effects even without changing product quality–by reducing the information asymmetry surrounding the source and attributes of the product.

tify the positions of Chinese employees in the organizational hierarchy by examining the employee directory reported in the Hong List, where lower-level employees were separated from their superiors with an indentation. Specifically, we determine whether Chinese employees' positions were managerial (i.e., appeared in the top rank) and calculate the average rank of Chinese employees in Western companies' employment hierarchy.

Table 7 reports the results. We find that Western firms with trademark-intensive products expanded employment after the trademark law by hiring Chinese employees (columns 2 and 3). Chinese employees were also more likely to appear in the managerial layer (column 4) and, in general, move up in the organizational hierarchy (column 5; a negative sign signifies a higher layer, as the layers are numbered from 1 (highest) to 3 (lowest)). These results suggest that Western businesses became more inclined to promote Chinese employees after the enactment of the trademark law, especially in the managerial realms. In contrast, Chinese firms were less likely to hire Chinese managers (column 4) or promote Chinese employees (column 5). Japanese firms constricted employment by reducing the numbers of their non-Chinese employees (column 2); they were also less likely to employ Chinese in more prominent positions (columns 4 and 5), though not statistically significantly so.

In addition to within-firm domestic integration, the trademark law may also shape Western firms' relationships with domestic intermediary businesses. We test this hypothesis by exploiting the client directory of agents in the Hong List. Columns (1)-(3) of Table 8 show that Chinese firms selling trademark-intensive products were more likely to act as agents for foreign firms after the trademark law and that their rosters of clients grew significantly. Columns (4)-(6) show that this is driven by non-Japanese clients, suggesting Western firms' increased willingness to partner with domestic intermediaries. In contrast, Western and Japanese agent firms did not experience significant changes in their numbers of clients; if anything, their number of non-Japanese clients fell.

This pattern suggests heterogeneity in the effect of the trademark law on Chinese firms: those that acted as intermediaries for foreign firms had grown while others shrank. We examine this possibility in Table 9 by estimating whether Chinese firms that acted as intermediaries for Western firms experienced differential effects from the trademark law. Indeed, the insignificant average effect of the trademark law on Chinese firms reported in Table 2 masks heterogeneous responses: though Chinese firms contracted, on average, Chinese intermediaries serving trademark-intensive products exhibited strong growth. Further, trademark-

intensive product categories witnessed more entry by domestic intermediary firms after the trademark law.

5.4 Market Competition and Price

After investigating firm-level responses from different sides of trademark conflicts, we now examine the aggregate implications and address a longstanding concern about IP institutional reforms: the implications of stronger IP protection for market competition and price. As discussed in Section 3, trademark protection is likely to exert an ambiguous net effect on market competition and prices since trademark protection does not prevent authentic firms from rebranding and remaining in the market. In this subsection, we assess the net effects of the trademark law on industry-level competition and brand prices.

5.4.1 Industry-level Competition

To explore the impact on industry-level competition, we aggregate the data at the product-year level in Table 10. Because many firms offer several products, columns (1) and (2) allocate total firm employment to the product with the maximum trademark intensity, while columns (3) and (4) distribute firm employment equally across products. Columns (1) and (3) show positive effects at the intensive margin: total industry employment increased by 7 percent at the mean level of trademark intensity and more than doubled for more trademark-intensive products. Columns (2) and (4) show even stronger effects at the extensive margin, where firms begin to enter new product categories, especially trademark-intensive categories. This pattern is also evident in columns (5) and (6), which use the number of firms in a given product category as outcomes, and in column (7), which uses a dummy variable indicating whether a given firm offers a specific product. The trademark law led not only to more employment in trademark-intensive product categories but also to new product categories.[46] Column (8) uses the Herfindahl Index based on employment computed across each product category as an outcome and shows that the trademark law also leads to more intense competition in trademark-intensive product categories; however, the effect is not significant.

These results suggest that the impact of the trademark law went beyond a simple reallocation from counterfeiting to authentic firms. The law did not reduce overall market

[46] It is noteworthy that an increase in the probability of having active firms in a given product category does not reflect the rebranding of counterfeiting firms, as the data encompass both authentic and counterfeiting firms present in each product category before and after the trademark law. Instead, the result reflects a combination of reduced exits and new entry, as discussed in Section 5.2.3.

competition; instead, it entailed an expansion in total employment and the number of product categories offered. This finding, in line with the firm-level results reported in Section 5.2.3, again highlights the distinct role of trademark protection: contrary to the widespread worry that greater IP protection will increase market power and reduce competition, trademark protection may increase an industry's employment and number of products without reducing competition.[47]

5.4.2 Prices

Another important outcome for assessing the competition and consumer effect of IP institutions is prices. As noted in Section 3, in contrast to patent and copyright protection which enable protected firms to exercise monopoly power and monopoly pricing, trademark protection does not guarantee market power and may exert an ambiguous effect on prices.

We explicitly examine this prediction by obtaining detailed, monthly brand-level price panel data from issues of *the Shanghai Market Prices Report*, published by the Ministry of Finance, Bureau of Markets.[48] Specifically, we extracted two complementary data samples from this publication: 1) a smaller sample of products that cover all industries, and 2) a large sample of products in the largest industry, textile. Both datasets cover monthly prices between January 1923 (the first available issue) and December 1929. Sample 1 contains 39 products that cover eight product categories (cereals, other food products, textiles, metals, fuels, building materials, industrial materials, and sundries) that were reported in tables labelled *Wholesale Prices of Commodities at Shanghai* (earlier issues) or *The Table of Wholesale Prices in Shanghai* (later issues). Sample 2 consists of 1,164 products reported in the product category 'textiles' of the main table labelled *Wholesale Prices of Foreign Goods at Shanghai*.

As the price series start only a few months before the trademark law was implemented, we change our identification strategy and use an diff-in-diff event study design with staggered adoption before versus after the month a specific trademark got registered. In order to implement this specification, we manually searched all the brands listed in the price reports in China's Trademark Gazette based on the texts or images of the trademarks.

[47] Section A.9 of the Online Appendix shows that these effects were mirrored in Chinese imports: the trademark law led to increased Chinese imports and new trade relationships with Western countries in trademark-intensive products. In contrast, imports from Japan fell, though the effect is not statistically significant.

[48] Each product was "affixed with its trademark, brand and, in some cases, the name of the company" (*Shanghai Market Prices Report*, April-June 1924, p.2).

Table B.8 presents the estimated average effect on the treated (ATT) using the method presented in Callaway and Sant'Anna (2020). Columns (1) and (2) report estimates on the small sample, columns (3) and (4) use the large textile sample. Columns (1) and (3) drop the products whose brands never got registered (never treated), while the other columns use all products. Overall, there are no significant effects of trademark registration on prices. If anything, most estimates are slightly negative.

To ensure our estimates are not driven by pre-trends, Figure C.10 shows that prices were stable in the months before a trademark was registered in both samples. We also formally tested for pre-trends using the method described by (Callaway and Sant'Anna, 2020) and found no evidence for them.

Implications for Consumer Welfare. Overall, we find no evidence that authentic producers raised prices after trademark registrations; if anything, prices fell. This result, together with our earlier findings that aggregate employment and the number of product categories both rose, suggests that the trademark law did not lead to reduced market competition or higher prices for consumers, constituting a sharp contrast to the adverse effects documented for patent and copyright protection. In Section A.1 of the Online Appendix, we use a stylized sufficient statistic from quantitative trade models (e.g., Arkolakis et al. 2012; Costinot and Rodríguez-Clare 2014) to provide an estimate of consumer gains from the trademark law. The analysis documents a 4.4% increase in consumer welfare through reduced information asymmetry, with the magnitude of the gains increasing with the industry's dependence on trademark protection.

6 Comparing Alternative Institutional Attempts

As Section 2 recounted, the 1923 trademark law was preceded by a series of alternative institutional approaches exploited by foreign powers to address ongoing trademark disputes: extraterritoriality, leading to direct importation of foreign legal institutions into China; bilateral commercial treaties with specific trademark provisions; and a legal trademark code in 1905 that was never put into effect. The long time horizon of our data enables us to compare the effect of the 1923 trademark law to the effects of these prior attempts.

In this section, we construct three variables to represent each of these earlier undertakings. First, we construct a firm-year specific measure of extraterritorial rights based on a

firm's nationality and that nation's extraterritorial status in a given year. For geopolitical reasons, such as the outbreak and end of World War I, that were arguably orthogonal to the Chinese economy, countries were added to or deleted from the list of nations that enjoyed extraterritorial status.[49] These shifts in extraterritorial power caused changes to firms' legal status. In legal disputes, when the defendants' home countries had extraterritorial status, their home laws would apply, and the cases would be tried at their consular courts. Differences in countries' legal systems could lead to unresolved disputes and jurisdiction evasion.

Second, we use dummy variables to denote China's commercial treaties with Great Britain (1902) and the United States (1903). These bilateral treaties, which required China to establish its own legal trademark system, among other demands, embodied conflicting interests; both Western nations and Japan attempted to export their respective trademark laws to China, leading to an indefinite postponement in the establishment of domestic law.

Finally, we include a dummy variable to denote China's first attempt to establish a domestic trademark code after the 1902-1903 bilateral treaties. The 1905 code, largely modeled on Japan's trademark system and first-to-file principle, eventually went unenforced due to fierce protests from Western governments.

The estimation results that compare the effects of the three alternative institutions to the 1923 trademark law are reported in Table 11, where each institutional measure interacted with firm-specific trademark intensity.[50] The results in column (6) show that, when taking into account all measures and controlling for country-year dummies, neither extraterritoriality nor bilateral treaty exerted significant positive effects on firm employment. As anticipated, the unenforced 1905 trademark code also appears to have had no effects. The 1923 trademark law is the only measure shown to have played a positive role in the growth of trademark-intensive firms. Earlier attempts involving direct imports of foreign institutions and bilateral treaties appear to have been unsuccessful as means of trademark protection; a positive effect was not achieved until a domestic trademark law was established.

[49]The nations that lost extraterritorial status were Australia (1901), Austria (1917), Czechoslovakia (1917), Germany (1917), Finland (1924), Hungary (1917), Latvia (1924), the Philippines (1898), and Russia (1917). Those that gained extraterritorial status were Switzerland (1918) and Japan (1896).

[50]For this analysis, the sample period is extended to 1872-1936 to incorporate the earlier institutions. The appendix to the Hong List, which enumerates which firms offered which types of products or services, is only available for 1920-1930. To identify firms' offerings across the entire period of 1872-1936 for measuring firm-specific trademark intensity, we used the textual description of firms' activities in the Hong List to assign products to firms manually.

7 Conclusion

In this paper, we investigate how firms from different sides of trademark conflicts, country origins, and institutions adapt to the introduction of trademark institution in one of the world's most contested markets by exploiting a historical precedent–the establishment of China's first trademark law of 1923.

Our empirical evidence, based on a series of micro-level datasets, shows that the trademark law exerted complex and sharply different effects on Western, Japanese, and Chinese firms. The trademark law spurred growth and brand investment among trademark-intensive Western firms. In contrast, Japanese businesses, most accused of counterfeiting, experienced employment contractions while attempting to build their own brands after adopting the law. The trademark law also led to new relationships with domestic intermediaries, both within and outside the boundary of Western firms, as the latter became more inclined to recruit and promote Chinese employees and to work with Chinese agents. The Chinese intermediaries, in turn, experienced growth in both employment and the volume of foreign clients.

At the aggregate level, despite widespread concerns over reduced market competition after IP reforms, we did not find the trademark law to reduce the level of competition or raise prices. It led to net growth in both total employment and the number of product categories in trademark-intensive industries. These findings underscore the distinct roles of trademark institutions compared to other forms of IP and the prospect of enforcing trademark protection and reducing consumer-information frictions while sustaining market competition, fostering domestic sectors, and producing consumer gains.

Our exploration of historical archives, including trademark disputes and court cases, sheds light on the mechanisms underlying the documented impact of the 1923 trademark law and the role of legal infrastructure. The effects of the law could be attributed to the failures of counterfeiters after the trademark law to register infringed trademarks and settle trademark disputes with minimal legal consequences; the trademark law not only provided a legal basis for trademark protection but also substantially raised legal penalties for counterfeiting activity that were enforced by the existing law infrastructure. The paper also highlights the challenges in addressing international trademark disputes and the importance of domestic institutional reforms, which continue to be vital to today's global markets and policy debates.

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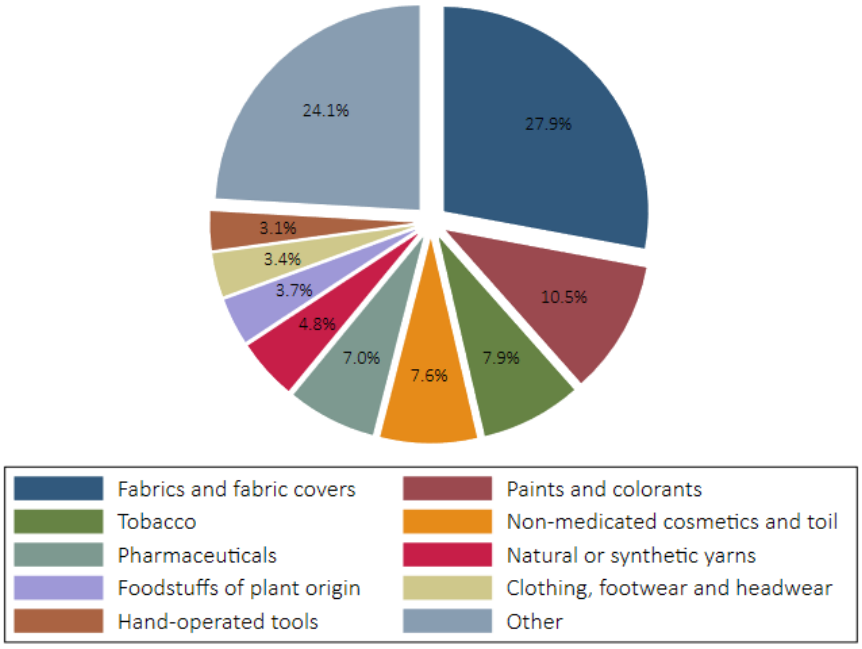


Figure 1: Chinese Trademark Registrations: Product Categories, 1924-1927

Notes: The statistics are based on our own digitization of Chinese Trademark Gazette (*Shangbiao Gongbao* (商标公报)) between 1924 and 1927.

(a) By disputed region (b) By filing region

Figure 2: Disputed Trademark Applications and Registrations, 1924-1927

Notes: The statistics are based on our digitization of Chinese Trademark Gazette *(Shangbiao Gongbao* (商标公报)) between 1924 and 1927.

(a) Lion: Japanese counterfeit

(b) Lion: German authentic producer

(c) Good luck: Japanese counterfeit

(d) Good luck: British authentic producer

Figure 3: Examples of Authentic and Counterfeit Trademarks

Sources: Images are taken from the Chinese Trademark Gazette *(Shangbiao Gongbao* (商标公报)), volumes 9 and 29 of applications, and volumes 15 and 29 of registrations.

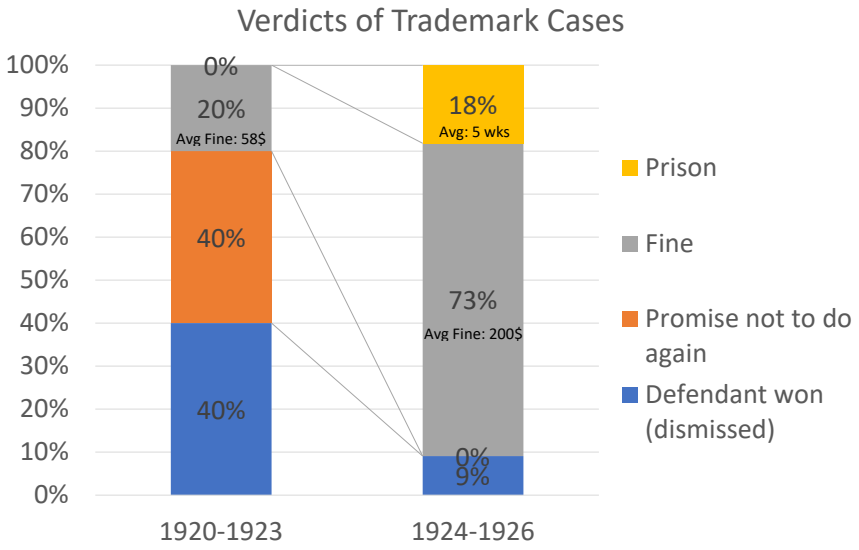
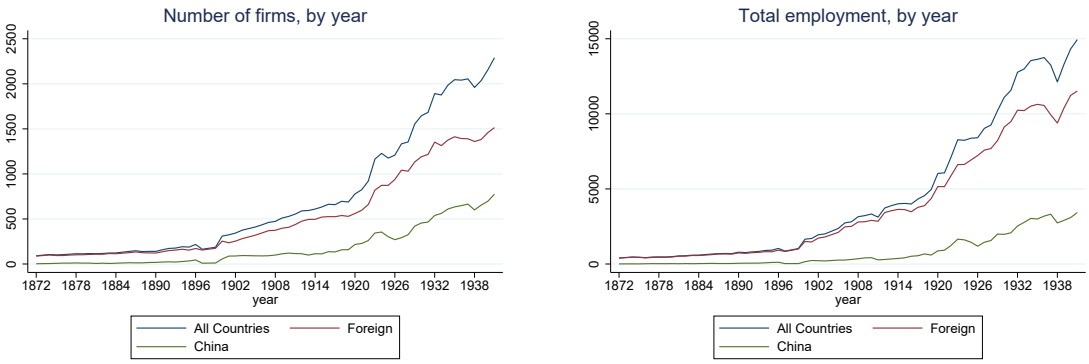


Figure 4: Verdicts of Trademark Cases, Before and After 1923

Source: Mixed Court case reports, as published in the *North China Herald*, 1920-1927.

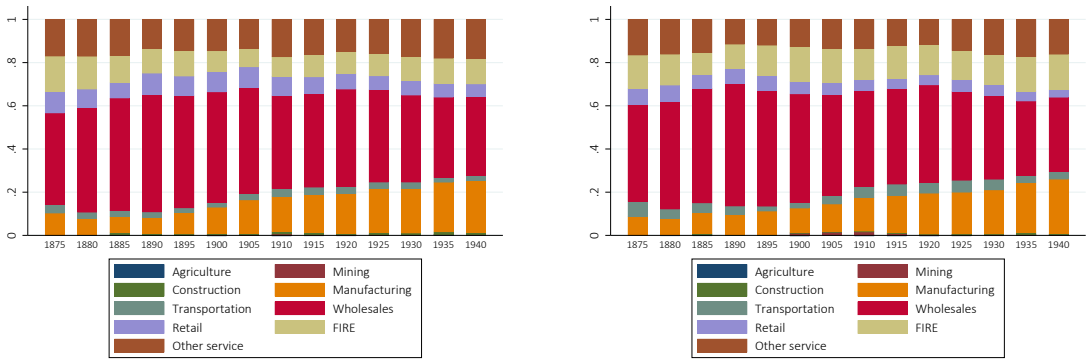
Figure 5: Anti-Imitation Advertisements as a Share of All Advertisements, *North China Herald*, 1920–1929



(a) Number of firms

(b) Total employment

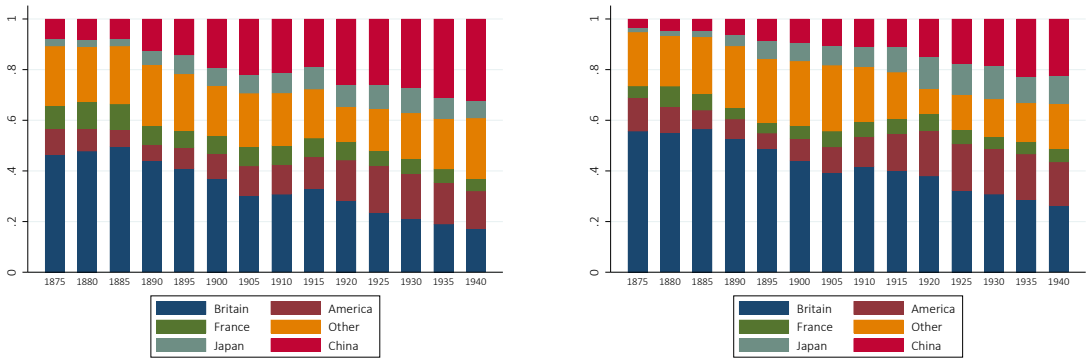
Figure 6: Trends in Firms and Employment in the Shanghai Concessions, 1872-1938



(a) By number of firms

(b) By employment

Figure 7: Composition of Firms in Shanghai's Concessions by Industry, 1875-1941



(a) By number of firms

(b) By employment

Figure 8: Composition of Firms in Shanghai's Concessions by Nationality, 1875-1941

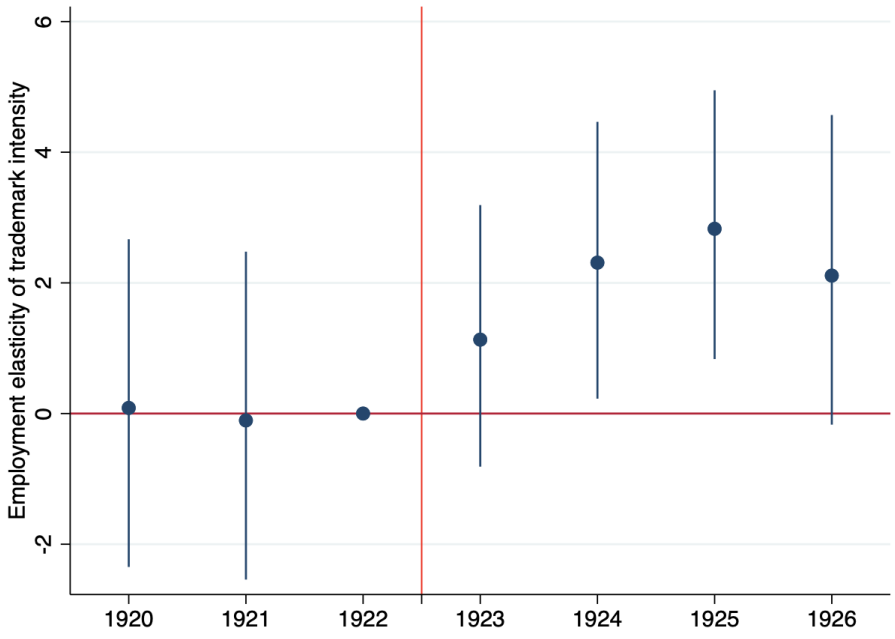


Figure 9: Effect of the 1923 Trademark Law on Employment at Western Firms: Event Study

Notes: The figure estimates equation (2) for Western firms. Confidence intervals are computed using wild cluster bootstrap with clusters at the product category and country-year levels (Roodman, Ørregaard Nielsen, MacKinnon, and Webb, 2019).

Figure 10: Effect of the 1923 Trademark Law on Employment at Chinese and Japanese Firms, 1920-1926: Event Study

Notes: The figure estimates equation (2) for Chinese and Japanese firms. Confidence intervals are computed using wild cluster bootstrap with clusters at the product category and country-year levels (Roodman et al., 2019).

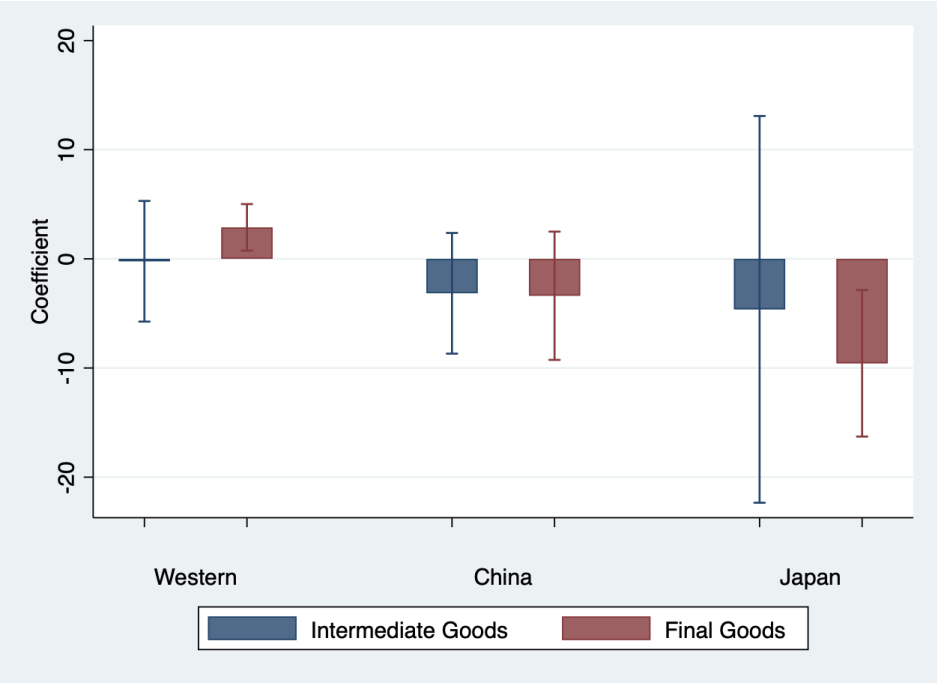


Figure 11: Effect of the 1923 Trademark Law on Intermediate and Final Goods

Notes: This figure reports the estimated employment effects of the trademark law on final goods versus intermediate goods. The effects are estimated based on an extended version of equation (1): we add interaction terms for intermediate and final goods, depending on the NCL product classification of the most trademark intensive product that a given firm sells.

Table 1: Trademark Intensity across Product Categories

NCL product category	Trademark intensity	NCL product category	Trademark intensity
Pharmaceuticals	.088	Toys, games, sports equipment	.016
Non-medicated cosmetics and toiletry	.076	Precious metals, jewellery, clocks, watches	.013
Foodstuffs of plant origin	.073	Medical equipment	.013
Foodstuffs of animal origin	.048	Furniture	.013
Alcoholic beverages	.047	Natural or synthetic yarns	.012
Chemical products	.046	Dressmakers' articles	.012
Paper, cardboard and office goods	.045	Leather and leather goods	.01
Tobacco	.041	Musical instruments	.008
Non-alcoholic beverages; beer	.04	Canvas and other materials	.008
Machines, motors and engines	.036	Firearms	.006
Hand-operated tools	.035	Carpets, rugs, mats	.005
Paints and colorants	.034	Construction services; mining and drilling	0
Scient. instruments and audio equip.	.034	Education, entertainment, sports	0
Metals	.031	Telecommunications services	0
Clothing, footwear and headwear	.03	Transport; packaging and storage of goods	0
Industrial oils and fuels	.029	Business services	0
Household utensils	.026	Food and drink services	0
Live animals and plants	.024	Scientific and technological services	0
Environmental apparatus	.024	Medical and veterinary services	0
Vehicles	.021	Legal, security, and personal services	0
Electrical, thermal, acoustic insulating material	.021	Treatment and recycling	0
Materials, not of metal	.018	Insurance, financial and real estate services	0
Fabrics and fabric covers	.016		

Notes: Trademark intensity is measured using each product category's share of total pre-1923 trademarks in eight countries (Britain, Germany, the United States, Japan, Australia, Canada, Denmark, and Spain), recorded at the historical trademark database of the World Intellectual Property Organization (WIPO).

Table 2: Effects of the 1923 Trademark Law on Firm-Level Employment

	(1) ln(empl)	(2) ln(empl)	(3) ln(empl)	(4) ln(empl)
Post 1923 * trademark intensity				
– Western firms	1.352*	1.686**	2.076*	2.257**
	(0.766)	(0.744)	(1.022)	(1.068)
– Chinese firms	-1.709	-1.679	-2.951	-3.757
	(1.614)	(1.641)	(2.393)	(2.281)
– Japanese firms	-0.952	-0.619	-8.853**	-11.555***
	(2.750)	(3.164)	(3.440)	(3.427)
Observations	3,180	3,144	3,006	4,472
R-squared	0.906	0.908	0.913	0.890
Firm FE	Yes	Yes	Yes	Yes
Year FE	Yes			
Ctry*Year FE		Yes	Yes	Yes
Ind*Year FE			Yes	Yes
Sample until	1926	1926	1926	1930

Notes: This table reports the effects of the trademark law on the employment of Western, Japanese, and Chinese firms. The sample includes Western, Japanese and Chinese firms located in Shanghai's concessions with employment and activity information between 1920-1926. The dependent variable is the natural log of a firm's employment in a given year between 1920 and 1926. *Post 1923* is a dummy denoting the period after adoption of the trademark law in 1923. *Trademark intensity* is a firm-specific measure of trademark dependence, based on each firm's pre-1923 product mix and product-level trademark intensity, calculated using each product's share in total pre-1923 trademarks. Column (1) includes interactions of the China dummy with a post-1923 dummy, as well as the interaction of the Japan dummy with the post-1923 dummy (coefficients not shown). Standard errors are clustered by product category and country-year. *** $p<0.01$, ** $p<0.05$, * $p<0.1$.

Table 3: Controlling for Alternative Product and Country Attributes

	(1) ln(empl)	(2) ln(empl)	(3) ln(empl)	(4) ln(empl)	(5) ln(empl)	(6) ln(empl)	(7) ln(empl)
Post 1923 * trademark int.							
– Western firms	2.076*	1.970*	2.090*	2.071*	2.035*	1.684*	2.898***
	(1.022)	(1.036)	(1.054)	(1.071)	(1.048)	(0.925)	(0.989)
– Chinese firms	-2.951	-2.950	-2.949	-2.901	-3.087	-2.435	-2.860
	(2.393)	(2.336)	(2.416)	(2.436)	(2.334)	(2.173)	(2.379)
– Japanese firms	-8.853**	-8.710**	-7.801	-8.817**	-8.792**	-9.048**	-8.294**
	(3.440)	(3.623)	(4.689)	(4.165)	(4.033)	(3.428)	(3.376)
Post 1923 * control							
– Western firms		0.437	-0.003	-0.003	0.038	-0.089***	
		(0.560)	(0.015)	(0.008)	(0.133)	(0.022)	
– Chinese firms		0.342	0.001	0.022	0.283	-0.070*	
		(0.495)	(0.044)	(0.038)	(0.219)	(0.039)	
– Japanese firms		0.532	0.057	0.002	-0.020	0.048	
		(1.595)	(0.071)	(0.029)	(0.409)	(0.091)	
Trademark int. * ln(real GDP)							-5.888
							(5.210)
Control		patent intensity	ln(number of firms)	ln(total empl)	Herfindahl-Index	ln(avg empl 20-22)	
Observations	3,006	3,006	2999	2999	3,006	3,006	3,006
R-squared	0.913	0.913	0.913	0.913	0.913	0.914	0.913
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Ctry*Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Ind*Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Notes: This table reports the estimated effect of the 1923 trademark law on the employment of Western firms when controlling for other product, industry, or country attributes. The dependent variable is the natural log of a firm's employment in a given year. *Post 1923* is a dummy denoting the period after adoption of the trademark law in 1923. *Trademark intensity* is a firm-specific measure of trademark dependence, based on each firm's pre-1923 product mix and product-level trademark intensity, calculated using each product's share in total pre-1923 trademarks. *Patent intensity* is a similar firm-specific measure, based on each firm's pre-1923 product mix and product-level patent intensity, calculated using each product's share in total pre-1923 patents. *Number of firms* and *total employment* are the number of firms and the total number of employees in a product category. *Herfindahl-Index* is calculated across all firms in a product category, using employment of firms. *ln(real GDP)* is the real GDP of the firm's home country, from the *Maddison Project Database*, interpolating data for missing years. See Bolt, Inklaar, de Jong, and van Zanden (2018) and Fouquin and Hugot (2016). All regressions include firm, industry-year, and country-year fixed effects. Standard errors are two-way clustered by product category and country-year. *** p<0.01, ** p<0.05, * p<0.1.

Table 4: How Did Firms Grow or Shrink? Effect of the Trademark Law on the Probability of Hiring in Certain Positions

	(1)	(2)	(3)	(4)
		Dummy if firm has:		
	ln(empl)	Lawyers	Sales staff	Engineers
Post 1923 * trademark intensity				
– Western firms	3.422**	0.775	0.623	0.744*
	(1.270)	(0.527)	(1.199)	(0.408)
– Chinese firms	-4.974	0.429	-1.495	-0.173
	(3.086)	(0.642)	(1.120)	(0.198)
– Japanese firms	-12.439***	-0.065	-4.779**	-0.396
	(3.424)	(2.178)	(2.049)	(1.988)
Observations	2,344	2,344	2,344	2,344
R-squared	0.913	0.824	0.710	0.785
Firm FE	Yes	Yes	Yes	Yes
Ctry*Year FE	Yes	Yes	Yes	Yes
Ind*Year FE	Yes	Yes	Yes	Yes

Notes: This table reports the estimated effect of the 1923 trademark law on firms' probability of hiring lawyers, sales staff, and engineers. The dependent variables in columns (2)-(4) are dummies denoting whether a firm had lawyers, sales staff, and engineers among its employees. *Post 1923* is a dummy denoting the period after adoption of the trademark law in 1923. *Trademark intensity* is a firm-specific measure of trademark dependence, based on each firm's pre-1923 product mix and product-level trademark intensity, calculated using each product's share in total pre-1923 trademarks. All regressions include firm, country-times-year, and industry-times-year fixed effects. Standard errors are two-way clustered by product category and country-year. *** p<0.01, ** p<0.05, * p<0.1.

Table 5: Entry, Exit, and Product Composition

	(1)	(2)	(3)	(4)	(5)
	Extensive margin			Product scope	
	Firm entry	Firm exit	Firm exist	Adding tm-int product	Dropping tm-int product
Post 1923 * trademark intensity					
– Western firms	-0.282	-0.797**	0.515	-0.550	-0.771***
	(0.648)	(0.321)	(0.771)	(0.698)	(0.240)
– Chinese firms	-0.302	-1.403**	1.100	-0.859	-0.341
	(0.720)	(0.585)	(0.841)	(0.823)	(0.427)
– Japanese firms	-1.719*	-0.027	-1.692	2.406***	-3.167
	(0.935)	(0.717)	(1.373)	(0.188)	(2.585)
Observations	7,645	7,645	7,645	2,782	2,782
R-squared	0.667	0.572	0.556	0.322	0.341
Firm FE	Yes	Yes	Yes	Yes	Yes
Ctry*Year FE	Yes	Yes	Yes	Yes	Yes
Ind*Year FE	Yes	Yes	Yes	Yes	Yes

Notes: This table reports the estimated effect of the 1923 trademark law on firms' probability of entry, exit, being active, and adding or dropping trademark-intensive products. The dependent variables are dummies denoting whether a firm enters, exits, is active, or adds/drops a trademark-intensive product. *Post 1923* is a dummy denoting the period after adoption of the trademark law in 1923. *Trademark intensity* is a firm-specific measure of trademark dependence, based on each firm's pre-1923 product mix and product-level trademark intensity, calculated using each product's share in total pre-1923 trademarks. The data in columns (1)-(3) consist of a balanced sample of firms that existed in all or part of 1920-1926. The data in columns (4)-(5) consist of firms that existed in all or part of 1920-1922. All regressions include firm, country-times-year, and industry-times-year fixed effects. Standard errors are two-way clustered by product category and country-year. *** p<0.01, ** p<0.05, * p<0.1.

Table 6: Advertising Investments

	(1) Advertising dummy	(2) ln(advertising days+1)	(3) $\sinh^{-1}$(ad-) vertising)
Post 1923 * trademark intensity			
– Western firms	0.527	3.442*	3.485*
	(0.878)	(1.966)	(2.030)
– Chinese firms	-0.288	0.646	0.574
	(0.583)	(2.162)	(2.247)
– Japanese firms	3.270**	2.490	3.070
	(1.526)	(1.747)	(2.012)
Observations	3,098	3,098	3,098
R-squared	0.696	0.809	0.805
Firm FE	Yes	Yes	Yes
Ctry*Year FE	Yes	Yes	Yes
Ind*Year FE	Yes	Yes	Yes

Notes: This table reports the estimated effects of the trademark law on advertising in *Shen Bao*. The sample consists of firms located in Shanghai's concessions for which we have data on employment and activity in 1920-1926. The dependent variables are a dummy of running advertisements in *Shen Bao* in a specific year, logged numbers of advertising days, and the inverse sine of advertising days, respectively. *Post 1923* is a dummy denoting the period after adoption of the trademark law in 1923. *Trademark intensity* is a firm-specific measure of trademark dependence, based on each firm's pre-1923 product mix and product-level trademark intensity, calculated using each product's share in total pre-1923 trademarks. All regressions include firm, country-times-year, and industry-times-year fixed effects. Standard errors are two-way clustered by product category and country-year. *** p<0.01, ** p<0.05, * p<0.1.

Table 7: Domestic Integration within the Boundary of the Firm

	(1)	(2)	(3)	(4)	(5)
				Hierarchy	
	ln(empl)	ln(foreign empl)	Dummy Chinese empl	Dummy Chinese mgr	Avg layer of Chinese empl
Post 1923 * trademark int.					
– Western firms	2.076*	1.542	2.013**	0.554***	-0.536**
	(1.022)	(0.998)	(0.793)	(0.141)	(0.245)
– Chinese firms	-2.951	-1.640	0.164	-0.458***	0.203***
	(2.393)	(1.464)	(0.222)	(0.019)	(0.006)
– Japanese firms	-8.853**	-9.534***	-3.397*	-1.516*	3.382*
	(3.440)	(3.142)	(1.968)	(0.882)	(1.906)
Observations	3,006	3,006	3,006	3,006	1,607
R-squared	0.913	0.948	0.809	0.656	0.592
Firm FE	Yes	Yes	Yes	Yes	Yes
Ctry*Year FE	Yes	Yes	Yes	Yes	Yes
Ind*Year FE	Yes	Yes	Yes	Yes	Yes

Notes: This table reports the estimated effects of the trademark law on the hierarchical structure of firms and their decisions to recruit and promote Chinese employees. The dependent variables are the presence of Chinese employees and managers, and Chinese employees' average rank/layer in the management hierarchy, respectively. Column (5) uses the sample of firms that have at least one Chinese employee. *Post 1923* is a dummy denoting the period after adoption of the trademark law in 1923. *Trademark intensity* is a firm-specific measure of trademark dependence, based on each firm's pre-1923 product mix and product-level trademark intensity, calculated using each product's share in total pre-1923 trademarks. Standard errors are two-way clustered by product category and country-year. *** p<0.01, ** p<0.05, * p<0.1.

Table 8: Client Growth at Chinese Intermediary Firms

	(1) Dummy having clients	(2) ln(num clients)	(3) ln(num clients+1)	(4) Dummy having non-Jap clients	(5) ln(num non-Jap clients)	(6) ln(num non-Jap clients+1)
Post 1923 * trademark intensity						
– Western firms	0.097	-7.304	-1.012	0.097	-7.340	-1.014
	(0.558)	(6.716)	(2.288)	(0.558)	(6.665)	(2.285)
– Chinese firms	1.598***	16.229***	2.662***	1.598***	16.229***	2.662***
	(0.462)	(5.095)	(0.601)	(0.462)	(5.069)	(0.602)
– Japanese firms	0.420	-17.385**	-3.363	-1.039	-31.529***	-4.030
	(0.876)	(6.384)	(2.623)	(1.174)	(8.001)	(2.995)
Observations	3,006	455	3,006	3,006	442	3,006
R-squared	0.767	0.904	0.783	0.758	0.903	0.779
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Ctry*Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Ind*Year FE	Yes	Yes	Yes	Yes	Yes	Yes

Notes: This table reports the estimated effects of the trademark law on the growth of intermediary firms' client rosters. The dependent variables are a dummy for whether a business served as an agent for business clients and the number of such clients for which it served as an agent. *Post 1923* is a dummy denoting the period after adoption of the trademark law in 1923. *Trademark intensity* is a firm-specific measure of trademark dependence, based on each firm's pre-1923 product mix and product-level trademark intensity, calculated using each product's share in total pre-1923 trademarks. Columns (4) to (6) drop Japanese clients. All regressions include firm, country-times-year, and industry-times-year fixed effects. Standard errors are two-way clustered by product category and country-year. *** $p<0.01$, ** $p<0.05$, * $p<0.1$.

Table 9: Employment Growth at Chinese Intermediary Firms

	(1) ln(empl)	(2) Firm entry	(3) Firm exit
Post 1923 * trademark intensity	-3.483	-0.653	-1.191*
	(2.416)	(0.848)	(0.606)
Post 1923 * trademark intensity * agent dummy	14.513*	7.289*	-3.404
	(7.191)	(3.162)	(2.254)
Post 1923 * agent dummy	-0.370**	-0.506***	0.123
	(0.116)	(0.116)	(0.104)
Observations	875	2,330	2,330
R-squared	0.881	0.666	0.555
Firm FE	Yes	Yes	Yes
Ind*Year FE	Yes	Yes	Yes

Notes: This table reports the estimated effects of the trademark law on the employment, entry, and exit of Chinese firms, and in particular of Chinese intermediaries. The dependent variables are the number of employees and dummies denoting entry and exit of the firm. Column (1) uses the sample of firms that existed before 1923; columns (2) and (3) use a fully balanced panel dataset to study entry and exit. The agent dummy denotes firms that acted as agents between 1920 and 1922. *Post 1923* is a dummy denoting the period after adoption of the trademark law in 1923. *Trademark intensity* is a firm-specific measure of trademark dependence, based on each firm's pre-1923 product mix and product-level trademark intensity, calculated using each product's share of total pre-1923 trademarks. All regressions include firm, country-times-year, and industry-times-year fixed effects. Standard errors are two-way clustered by product category and country-year. *** p<0.01, ** p<0.05, * p<0.1.

Table 10: The Effects of the Trademark Law on Aggregate Employment and Competition

	(1) ln(empl)	(2) ln(empl+1)	(3) ln(empl)	(4) ln(empl+1)	(5) ln(# firms)	(6) ln(# firms+1)	(7) Firm dummy	(8) Herf. index
Post 1923*trademark int.	3.677*	8.641***	1.667	8.011**	0.801	5.623*	2.150*	-0.252
	(2.010)	(3.073)	(1.450)	(3.696)	(2.242)	(3.084)	(1.137)	(0.777)
Observations	548	1,274	575	1,274	582	1,274	1,274	582
R-squared	0.848	0.757	0.875	0.738	0.904	0.744	0.626	0.744
Product FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Notes: This table reports the estimated effects of the trademark law on product-level employment and competition. In columns (1) and (2), firm-level employment of multi-product firms is allocated to the product with the highest trademark intensity; in columns (3) and (4), firm-level employment is allocated equally to all products. The firm dummy is 1 if the product-year includes at least one firm for which the product has the highest trademark intensity, and 0 otherwise. *Post 1923* is a dummy denoting the period after adoption of the trademark law in 1923. *Trademark intensity* is product-specific trademark intensity, calculated using each product's share in total pre-1923 trademarks. All regressions include product and year fixed effects. Standard errors are clustered at the product level. *** p<0.01, ** p<0.05, * p<0.1.

Table 11: Comparing Alternative Institutions

	(1) ln(empl)	(2) ln(empl)	(3) ln(empl)	(4) ln(empl)	(5) ln(empl)	(6) ln(empl)
Part I: ET						
ET	0.115*	0.190**	0.223***	0.222***	0.165*	
	(0.060)	(0.074)	(0.080)	(0.080)	(0.084)	
ET*trademark intensity		-2.607	-3.662*	-3.643*	-2.239	-4.160
		(1.875)	(1.863)	(1.864)	(2.264)	(3.362)
Part II: Bilateral Treaties						
Treaties			-0.153**	-0.153**	-0.142**	
			(0.064)	(0.064)	(0.064)	
Post 1902*trademark intensity			-5.394***	-5.430***	-5.290***	-7.440***
			(0.846)	(0.846)	(0.803)	(1.748)
Post 1903*trademark intensity			0.489	-0.674	-0.622	-0.440
			(1.212)	(0.908)	(0.797)	(0.512)
Treaties*trademark intensity			-0.152	-0.176	-0.494	1.508
			(1.835)	(1.842)	(1.877)	(2.699)
Part III: Provisional Trademark Code						
Post draft (1905)*trademark intensity				1.295	0.287	0.748
				(1.400)	(1.255)	(0.841)
Part IV: 1923 Trademark Law						
(Post 1923)*trademark intensity					3.114***	3.516***
					(1.027)	(1.106)
(Post 1923)*trademark intensity*# mixed court assessors						
Observations	19,390	19,390	19,390	19,390	19,390	19,114
R-squared	0.769	0.769	0.770	0.770	0.770	0.780
Country-year controls	Yes	Yes	Yes	Yes	Yes	No
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Ctry*Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Ind*Year FE	Yes	Yes	Yes	Yes	Yes	Yes

Notes: This table compares the effect of the trademark law to that of earlier initiatives, including extraterritoriality, bilateral treaties, and the 1905 trademark code. The sample consists of Western firms located in Shanghai's concessions for which we have data on employment and activity in the period 1872-1936. The dependent variable is the natural log of a firm's employment in a given year. *ET* is a firm-specific dummy denoting a firm's extraterritoriality status in a given year. *Treaty* is a country-year-specific dummy denoting China's treaties with Great Britain (1902) and the United States (1903), respectively. *Post draft (1905)* is a dummy denoting a trademark code proposed in 1905 but not enforced (Motono, 2011, p.11). *Post 1923* is a dummy denoting the trademark law established in 1923. *Trademark intensity* is a firm-specific measure of trademark dependence, based on each firm's product mix as described in the annual Hong List; *trademark intensity* is calculated using each product's share in total pre-1923 trademarks. Column (7) includes an interaction with the number of mixed court assessors that a country employs at its consulates (taken from the Hong Lists). Controls are dummy variables indicating the treaties that China entered into with Germany and Austria in the 1920s, ln(GDP/capita), ln(population). All regressions include firm, country-times-year, and industry-times-year fixed effects. Standard errors are two-way clustered by product category and country-year. *** p<0.01, ** p<0.05, * p<0.1.

ONLINE APPENDIX

A Additional Analysis

A.1 Estimating the Consumer Welfare Effect with a Sufficient Statistic

In this subsection, we seek to offer a quantitative estimate of the magnitude by which the trademark law may have affected consumer welfare by reducing information friction surrounding the identity of the producers. To illustrate that, we follow the well-established quantitative trade models (e.g., Arkolakis et al. 2012; Costinot and Rodríguez-Clare 2014) and use a sufficient statistic to quantify the effect on consumer welfare.

We start with the case in which the economy has no trademark protection. Firms comprise two types, authentic producers and counterfeiters. Each authentic producer sells a variety j of a differentiated product. The true source of the product variety is known to the producer, but consumers are unable to verify the source upon purchase. In the absence of trademark protection, consumers are assumed to have a probability of s to receive authentic goods upon purchase (and a probability of $1-s$ to encounter counterfeits).

Consumers have a utility function with a constant elasticity of substitution (CES) ($\sigma > 1$) over a set of varieties Ω. The counterfeits are inferior to the authentic product; for simplicity, the consumers are assumed to receive zero utility when deceived by counterfeits.[1] The consumer's expected utility is hence given by:

$$E(U) = s\left(\int_{j\in\Omega} q_j^{\frac{\sigma-1}{\sigma}} dj\right)^{\frac{\sigma}{\sigma-1}} \tag{3}$$

where q_j denotes the quantity of variety j consumed.

Maximizing the utility function subject to the budget constraint $\int p_j q_j dj \leq I$ yields the demand function for each variety j:

$$q_j = \left(\frac{p_j}{P}\right)^{-\sigma} Q \tag{4}$$

where p_j is the price of variety j, $P \equiv \left(\int_{j\in\Omega} p_j^{1-\sigma} dj\right)^{\frac{1}{1-\sigma}}$ is the aggregate price index, and Q is aggregate demand with $I = QP$.

Each authentic firm takes into account the demand function and chooses a price that maximizes the following profit function:

$$\pi_j^a = (p_j - c_j)\, q_j^a - f \tag{5}$$

where $q_j^a = sq_j$, c_j is the marginal cost of production, and f is the fixed cost of production.

[1] This simplifying assumption can be relaxed by assuming instead a quality discount from counterfeit goods. The alternative assumption (and the additional parameter) would not affect the sufficient statistics or the welfare estimate derived below.

Profit maximization leads to the following optimal price:[2]

$$p_j^a = \frac{\sigma}{\sigma - 1} c_j. \tag{6}$$

Given the optimal price, each authentic producer's output is

$$q_j^a = sQ^{1-\sigma} I \left(\frac{\sigma c_j}{\sigma - 1} \right)^{-\sigma}, \tag{7}$$

and her revenue and profit are given by:

$$r_j^a = sQ^{1-\sigma} I \left(\frac{\sigma c_j}{\sigma - 1} \right)^{1-\sigma}; \pi_j^a = r_j^a/\sigma - f. \tag{8}$$

Now consider the case of trademark protection which reduces (and, in the case of fully enforced trademark protection, eliminates) the probability of consumers receiving counterfeits, $1-s$. The welfare under trademark protection relative to the welfare without trademark protection can be written as:

$$\frac{E(U(s'))}{E(U(s))} = \frac{s'}{s} \frac{Q(s')}{Q(s)}, \tag{9}$$

where s' > s. An increase in trademark protection will affect welfare by reducing the utility discount s due to the presence of information friction and counterfeits and changing aggregate consumption.

To obtain an estimate of Q(s')/Q(s) and changes in s, we can explore (i) the change in the employment of authentic producers and (ii) the change in the employment of a given variety:

$$\frac{empl_j^a(s')}{empl_j^a(s)} = \frac{s' q_j(s')}{s q_j(s)} = \frac{s'}{s} \left(\frac{Q(s')}{Q(s)} \right)^{1-\sigma} \tag{10}$$

$$\frac{empl_j(s')}{empl_j(s)} = \frac{q_j(s')}{q_j(s)} = \left(\frac{Q(s')}{Q(s)} \right)^{1-\sigma} \tag{11}$$

The results reported in column (3) of Table 2 yield an estimate of 1.05 for $empl_j^a(s')/empl_j^a(s)$ and an estimate of 1.002 for $empl_j(s')/empl_j(s)$ for industries with mean trademark intensity. Assuming $\sigma = 4$ as often in the literature (e.g., Bernard, Eaton, Jensen, and Kortum, 2003), we obtain Q(s')/Q(s) = 0.999 and s'/s = 1.045. Applying the above estimates to equation (9) suggests that the trademark law increased consumer welfare in industries with mean trademark intensity by 4.4%, with the gains increasing with the industry's dependence on trademark protection. Equivalent calculations yield over 7% consumer welfare gains for

[2]Because of monopolistic competition, the authentic producer price exhibits a constant markup and is independent of the level of counterfeiting activity. This feature of the model is motivated by the empirical result in Section 5.4.2, which shows trademark registrations led to insignificant changes in brand prices.

industries with the 10 greatest trademark intensities, and 1-2.6% consumer welfare gains for industries with the 10 smallest trademark intensities.

A.2 Data Validation: the Hong List

The Hong List, published by the *North-China Daily News*, was a directory of businesses that operated in Shanghai's concessions (i.e., the international concession and the French concession). To cross-check the coverage of the Hong List, we compared the aggregate non-production foreign employment of foreign firms with the size of the foreign population (including both adults and children) in Shanghai reported in the Census for the years in which there are overlapping data: 5-year intervals between 1900 and 1935. The comparison suggests that the employees in our data accounted for 26% to 41% of the foreign population in Shanghai (see Figure 1(a) in the Online Appendix). The Census reported the population of the international concession separately for male adults, female adults, and children. Figure 1(b) shows that aggregate (predominantly male) employment in the Hong List accounts for about 80% of the foreign adult male population in the international concession census; we believe this finding confirms the thoroughness of the Hong List's coverage.

A.3 Robustness to Alternative Measures of Trademark Intensity

Table B.5 uses alternative measures of trademark intensity. Column (2) computes the mean trademark intensity across all the firm's products (instead of the maximum, as in our baseline specification). In column (3), we return to our baseline measure of trademark shares but exclude Japan's trademark intensity from the aggregate measure and assign it to Japan only. That is, Western countries and China are assigned the trademark intensity of all countries excluding Japan, and Japan is assigned the trademark intensity of Japan alone. Column (4) goes one step further, using the trademark intensity of each firm's home country (and the aggregate measure if we do not have trademark-registration data for a given country) rather than the aggregate trademark share as in our baseline specification. Though these measures may be susceptible to endogeneity concerns and are, therefore, not our preferred measure, the results are robust.

In column (5), we normalize trademark intensity by the industry's size. Table 3 has already shown that our results are robust to controlling for the size of a given industry in Shanghai. Still, the size of the corresponding industry may differ in the foreign countries for which we have trademark data. We obtained detailed industry-specific employment data that enabled us to match employment to NCL product categories for the United States; thus, we divide U.S. trademark numbers by the size of the product group, as measured by its total U.S. employment.[3] Though doing so rescales the trademark-intensity variable using employment; we continue to find significantly positive effects only for Western firms. On the other hand, Chinese firms are estimated to have experienced significant employment losses.[4]

[3] We are grateful to Dave Donaldson, James Lee, and Rick Hornbeck for sharing digitized U.S. census data. Employment data detailed enough to match NCL product categories are only available for the United States. Notice that the U.S. manufacturing census does not include the service sector; normalized trademark intensity is therefore not defined for the service sector, which explains the reduced sample size.

[4] In addition to these alternative measures, we also used a dummy variable that subdivides products into

A.4 Restricting the Analysis to Goods Only

Both goods and services sectors are included in the main analysis. Here, we examine the robustness of our results when restricting the analysis to goods alone. Because many of the firms in our sample sold both goods and services, this analysis drops only firms that sold services exclusively. The results are reported in Table B.3. We find the estimated effect of the trademark law to increase in magnitude when considering goods alone and to be statistically significant in most specifications.

A.5 Dropping a Country or Product

Next, we examine whether the estimated employment effects of the trademark law are attributable to a particular country or product. Figures C.5 and C.6 show that neither a specific country nor a specific product group drives the results. The results are very similar in magnitude, and are mostly significant when we drop a single country or product group at a time.

A.6 Controlling for Chinese boycotts against foreign goods

In the early 20th century, the Chinese organized consumer boycotts to protest against foreign influence in China. The US experienced the first of these boycotts in 1905, and subsequent boycotts, which typically lasted several months, affected British and Japanese products (League of Nations, 1932; Orchard, 1930; Zumoto, 1932). Could these boycotts, especially those targeting Japanese goods, have driven our empirical results? First, notice that for this to be the case, the boycotts would have to affect trademark-intensive products differentially, or our country-year fixed effects would absorb them. While the archives suggest that boycotts tended to cover all products (Orchard, 1930, p.254 and p.256), it is possible that consumers found it easier to figure out the origin of a trademarked product (unless, of course, the trademarks themselves were counterfeited).

In columns (1) to (3) of Table B.4, we, therefore, control for dummy variables indicating whether a foreign country experienced consumer boycotts in a specific year and the interactions between boycotts and trademark intensity. As historical sources are inconsistent concerning the number of boycotts reported, we use three alternative sources to date the boycotts (League of Nations, 1932; Orchard, 1930; Zumoto, 1932). However, not even the most comprehensive source for boycotts in column (3) explains away the trademark law's effect; our estimated effects are also not sensitive to the specific boycotts we control for.

Next, we refine this measure in two ways. First, it may be plausible that product categories dominated by a foreign country were more affected by the boycotts. In columns (4) to (6), we, therefore, interact the country-specific boycott indicator by the ratio of that country's trademarks over world trademarks (excluding the country) — this measure is larger than 1 if a country dominates the product category. Again, this boycott measure does not impact the estimated effects of the trademark law.

Finally, in columns (7) to (9), we refine the boycott dummy to capture the intensity of a

experience goods and search goods, a distinction that we borrow from Nelson (1970). Note that Nelson (1970)'s classification is incomplete in that it covers only about 70% of the trademarks in our database. However, it is reassuring that we continue to find similar effects even though this measure offers much less variation.

boycott. This is based on the idea that without a boycott or a general demand shock, we may expect a country's exports to China to exhibit similar trends as its exports to the rest of the world. Therefore, if a country's exports to China fall relative to its exports to the world, this could reflect negative demand shocks in China, including the intensity of boycotts. Notice that this measure is conservative, as some of this change in the trade may be driven by the trademark law itself. In column (7), we begin by only allowing Japanese firms to be affected by boycotts as measured by the ratio of Japan's exports to China over Japan's exports to the world. In column (8), we expand this idea to all 21 countries in our data for which we have export data. Finally, in column (9), we allow the boycotts to affect the growth of Japanese vs. Western firms differentially. Overall, none of these different ways to control consumer boycotts affect the estimated effect of the trademark law.

A.7 Identifying Individual Authentic Firms vs. Counterfeiters

So far, our analysis has explored a feature of our historical experiment–as documented in the trademark dispute data (Figure 2), the probability of being an authentic producer or a counterfeiter differed systematically across firms of different nationalities: Western firms were more likely to be authentic producers; Japanese and Chinese firms were more likely to be, or to collaborate with, counterfeiters (e.g., Motono 2011). In this subsection, we adopt a different approach and seek to identify individual authentic firms and counterfeiters by exploring in detail the matched dataset of trademark applications, registrations, and disputes described in Section 4.2.

Specifically, we classify firms in the matched dataset into four different groups: (i) firms that were granted type-I trademarks based on their over 5 years of existence in the market; (ii) firms whose trademark applications were all approved; (iii) firms that received significantly fewer trademark approvals than applications and/or lost trademark disputes and are hence considered likely counterfeiters; (iv) firms that did not apply for nor receive any trademarks. The first two groups of firms are viewed as authentic firms, while group (iii) is considered as likely counterfeiters. Note that since trademark protection does not prevent counterfeiters from re-branding their products, group (ii) may also include former counterfeiters that decided to introduce their own trademarks.

As shown in Table B.9, when comparing firm employment before and after the trademark law, we find firms of groups (i) and (ii) both experienced growth while those in group (iii), the likely counterfeiters, witnessed a contraction. This result echoes our findings in Section 5 and offers supplementary evidence on how firms from different sides of trademark conflicts responded to the trademark law.

A.8 The Effect of the Trademark Law on Quality Ads

The previous literature has suggested that trademark protection might exert mixed effects on product quality. On the one hand, firms might improve product quality by capturing a larger market share, charging higher prices, and/or experiencing greater demand as consumers worry less about counterfeits. On the other hand, a lack of trademark protection might incentivize authentic producers to offer higher quality without trademark protection to make it easier for consumers to differentiate between authentic goods and counterfeits.

While we do not have direct, time-varying measures of brand quality (except for proxies such as unit price which we examine in Section 5.4.2), we explore whether trademark protection might affect firms' emphasis on quality in their advertising decisions. We classify a subset of advertisements as "quality ads" if their text stresses the quality of the product, using words such as 质 (quality), 特效 (effective), 功效 (efficacy), or 功用 (effect). In Table B.9, columns (1) to (3), we find an insignificant increase in such advertising.[5]

A.9 The Effect of the Trademark Law on Chinese Imports

While our main analysis has focused on foreign and domestic firms located in Shanghai, we would also expect the trademark law to have affected China's imports of trademark-intensive products.

To investigate this hypothesis, we compile bilateral product-level data on imports to China from the rest of the world for the period 1920-1928.[6] The source of the data is the annual series "Foreign Trade of China," published by the *Statistical Department of the Inspectorate General of Customs*. For each source country and year, the data report the quantity and value of imports of a given product.

We harmonize countries and products over time, resulting in data for 40 countries and 246 harmonized product categories for the years 1920-1928. Harmonizing products over time is challenging; the product-classification system changed significantly in 1925. We verify our matches using a 1925 publication that applies the new classification system to data for the preceding two years. Overall, we match 91% of trade data (in terms of import value in 1924) either exactly (35%) or closely (56%), with deviations of less than 1% of trade value in either product classification in both 1923 and 1924).[7] Our analysis focuses on the products we can match exactly over time; robustness checks include the remaining product categories.

We use bilateral product-specific import data and estimate the following equation:

$$\ln(imports_{pct}) = \beta_0 + \beta_1 * TrademarkInt_p * Post1923_t + FE_{pc} + FE_{ct} + \epsilon_{pct} \quad (12)$$

where $imports_{pct}$ are China's import values in product category p from country c in year t, $TrademarkInt_p$ is the trademark share of product p as defined in Section 4.2, $Post1923_t$ is a dummy that equals 1 if the year is equal to or after 1923, FE_{pc} are product-country-specific fixed effects, and FE_{ct} are country-year-specific fixed effects. Because different product categories can be of different sizes, we use the average import value in 1920-1922 of the product category in each country as a weight in the regression. We cluster standard errors by product category p, in line with Bertrand, Duflo, and Mullainathan (2004). We run the regression on the sample of all countries except Japan; we will discuss Japan separately

[5] Similarly, we identify advertisementS with key words related to "invention" (发明), "innovation" (创新/革新), or "new product" (新品), and do not find an significant change after the trademark law.

[6] We are grateful to Robert Bickers, Hans van den Ven, and their team for sharing digitized data covering a large share of the final trade dataset.

[7] Because errors in trade data from previous years are sometimes updated in later publications, it is not entirely clear whether mismatches are due to mistakes in product assignment or to correction of previous mistakes in the official trade data.

below. We also exclude rice from the list of products because rice imports were unusually low in 1919 and 1920 due to poor harvests (Kratoska, 1990).[8]

Table B.7 presents the results. Column (1) shows that imports of trademark-intensive products increased significantly after adoption of the trademark law. Column (2) shows that the result is similar when using country-year fixed effects instead of year-specific fixed effects, our preferred specification. The magnitude of the effect is sizeable: imports of the most trademark-intensive products in the trade data (tea and coffee, with a trademark intensity of 0.073) increased by 1.2%; imports of the product category with mean trademark intensity (chinaware, with a trademark intensity of 0.026) increased by 0.4%.

Table B.7's columns (1) and (2) explore the effect of the trademark law on the intensive margin of imports by using as the dependent variable the log of imports, which by definition excludes observations with zero trade (70% of observations). Columns (3) to (5) explore the inclusion of the extensive margin in a variety of ways. Column (3) uses log (imports + 1) as the dependent variable; column (4) uses the inverse hyperbolic sine transformation of imports. The effect of the trademark law remains positive and significant when including the extensive margin. Column (5) uses the simple import dummy and confirms that the trademark law also led to new trade relationships in trademark-intensive products.

For our identification strategy to work, it is important to rule out pre-trends indicating that imports of trademark-intensive goods might have grown even in the absence of the trademark law. We estimate a full event-study version of equation (12) by estimating:

$$\ln(imports_{pct}) = \beta_0 + \sum_{t=1920}^{1928} \beta_t * TrademarkInt_p + FE_{pc} + FE_{ct} + \epsilon_{pct} \qquad (13)$$

Figure C.8 shows the estimation results. There is no evidence of pre-trends: coefficients before 1923 are smaller by order of magnitude and insignificantly different from zero; coefficients after 1923 are consistently large and mostly significantly different from zero. However, the effect of the trademark law appears to decline slightly over time.

Next, we consider the effect of the trademark law on China's imports from Japan. If a large share of China's imports from Japan were counterfeits, we would expect the trademark law to have a smaller effect on imports from Japan than those from other countries. The results in Table B.7 confirm what we saw in the analysis of employment growth: imports from Japan fell, though the effect is not significant. The full event study for Japan is reported in Figure C.9; though the event study is noisier than the one for Western imports in general, it does not find imports to have grown after the trademark law.

[8]The recovery of rice imports from the rice crisis appeared as a pre-trend in our data, which would overestimate our effect.

B Online Appendix — Tables

Table B.1: Summary Statistics

	(1) Observations	(2) Mean	(3) Std.dev.	(4) Min	(5) Max
Number of employees	3220	10.213	20.864	1	387
Chinese employees as share of total employees	3220	0.298	0.382	0	1
Number of products	3220	1.637	1.225	1	11
Trademark intensity	3220	0.022	0.024	0	0.088
Western firm dummy	3220	0.64	0.48	0	1
Chinese firm dummy	3220	0.281	0.450	0	1
Japanese firm dummy	3220	0.081	0.269	0	1

Notes: Summary statistics are provided for the sample used in Table 2's column (3), the baseline regression. (The regression drops some singletons.)

Table B.2: Robustness to Alternative Measures of Trademark Intensity

Dependent variable: ln(empl)	(1)	(2)	(3)	(4)	(5)
TM intensity measure:	baseline	mean	excl. Japan	country-specific	US normalized
Post 1923 * trademark intensity					
– Western firms	2.076*	2.883***	2.203**	1.603	13.112**
	(1.022)	(1.028)	(1.001)	(0.973)	(5.963)
– Chinese firms	-2.951	-3.003	-3.034	-2.951	-23.913**
	(2.393)	(2.622)	(2.398)	(2.371)	(11.524)
– Japanese firms	-8.853**	-10.591**	-4.528***	-4.528***	-2.003
	(3.440)	(4.427)	(1.283)	(1.275)	(30.924)
Observations	3,006	3,006	3,006	3,006	2,037
R-squared	0.913	0.913	0.913	0.913	0.912
Firm FE	Yes	Yes	Yes	Yes	Yes
Ctry*Year FE	Yes	Yes	Yes	Yes	Yes
Ind*Year FE	Yes	Yes	Yes	Yes	Yes

Notes: This table reports the estimated effect of the 1923 trademark law on Western firms' employment, using alternative measures of trademark intensity described in section A.3. The dependent variable is the natural log of a firm's employment in a given year. *Post 1923* is a dummy denoting the period after adoption of the trademark law in 1923. All regressions include firm, country-times-year, and industry-times-year fixed effects. Standard errors are clustered by product category and country-year. *** p<0.01, ** p<0.05, * p<0.1.

Table B.3: Effect of the 1923 Trademark Law on Employment at Western Firms: Goods only

	(1) ln(empl)	(2) ln(empl)	(3) ln(empl)	(4) ln(empl)
Post 1923*trademark intensity	2.531**	2.423*	2.489	2.550*
	(1.079)	(1.265)	(1.543)	(1.378)
Observations	855	842	808	1,209
R-squared	0.905	0.912	0.909	0.896
Firm FE	Yes	Yes	Yes	Yes
Year FE	Yes			
Ctry*Year FE		Yes	Yes	Yes
Ind*Year FE			Yes	Yes
Sample until	1926	1926	1926	1930

Notes: The trademark-intensity measure used here considers only products, not services; firms that sold only services are therefore dropped. Standard errors are clustered by product category. *** p<0.01, ** p<0.05, * p<0.1.

Table B.4: Controlling for Chinese consumer boycotts against foreign products

VARIABLES	(1) ln(empl)	(2) ln(empl)	(3) ln(empl)	(4) ln(empl)	(5) ln(empl)	(6) ln(empl)	(7) ln(empl)	(8) ln(empl)	(9) ln(empl)
Foreign*post trademark law*trademark intensity	1.905*	1.913*	1.858*	2.088*	2.088*	2.094*	2.076*	1.753*	1.878*
	(0.965)	(0.941)	(0.926)	(1.030)	(1.027)	(1.029)	(1.087)	(0.872)	(0.982)
China*post trademark law*trademark intensity	-2.951	-2.951	-2.951	-2.951	-2.951	-2.951			
	(2.393)	(2.393)	(2.394)	(2.393)	(2.393)	(2.393)			
Japan*post trademark law*trademark intensity	-9.503***	-9.721***	-8.951**	-8.585**	-8.476**	-8.808**	-8.331**	-8.466**	-8.331**
	(2.998)	(2.790)	(3.379)	(3.360)	(3.347)	(3.412)	(3.555)	(3.492)	(3.728)
Boycotts (League of Nations, 1932)*TM intensity	1.223								
	(0.824)								
Boycotts (Zumoto, 1932)*TM intensity		1.162							
		(0.925)							
Boycotts (Orchard, 1930)*TM intensity			0.796						
			(1.298)						
Boycotts (League of Nations, 1932)*product dominance				-0.078					
				(0.056)					
Boycotts (Zumoto, 1932)*product dominance					-0.074				
					(0.054)				
Boycotts (Orchard, 1930)*product dominance						-0.070			
						(0.067)			
Japan*export ratio*trademark intensity							-60.311*		-60.311*
							(31.663)		(31.639)
Country-specific export ratio*trademark intensity								-44.698	
								(46.188)	
Western*export ratio*trademark intensity									-24.067
									(105.557)
Observations	3,006	3,006	3,006	3,006	3,006	3,006	3,006	2,067	2,067
R-squared	0.913	0.913	0.913	0.913	0.913	0.913	0.913	0.916	0.916
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Ind*Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Ctry*Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Notes: Columns (1) and (4) control for a 1925 boycott against the UK and 1923 and 1925 boycotts against Japan, as in League of Nations (1932). Columns (2) and (5) add 1923 and 1926 boycotts to Japan, as in Zumoto (1932). Columns (3) and (6) add 1920 and 1921 boycotts to Japan, and extend the boycott against the UK to 1926, as in Orchard (1930). Columns (4) to (6) interact the boycott measure with the ratio of the trademarks of the boycotted country divided by world trademarks excluding the boycotted country (labeled 'product dominance'). Column (7) controls for Japanese exports to China divided by Japanese exports to the world, interacted with a Japan dummy. Column (8) controls for each country's exports to China divided by the country's exports to the world, using export data for 21 countries from Statistical Office of the United Nations (1962) and Òscar Jordà, Schularick, and Taylor (2016). Column (9) interacts this measure with separate dummy variables for Japanese as well as Western firms. *** p<0.01, ** p<0.05, * p<0.1.

Table B.5: Robustness to Alternative Measures of Trademark Intensity

Dependent variable: ln(empl)	(1)	(2)	(3)	(4)	(5)
TM intensity measure:	baseline	mean	excl. Japan	country-specific	US normalized
Post 1923 * trademark intensity					
– Western firms	2.177**	3.194***	2.310**	1.717*	13.877**
	(1.058)	(1.159)	(1.041)	(0.944)	(6.014)
– Chinese firms	-3.096	-3.404	-2.826	-2.826	-24.185**
	(2.395)	(2.745)	(2.365)	(2.365)	(11.305)
– Japanese firms	-6.849***	-10.234***	-3.432***	-3.432***	15.779
	(1.840)	(3.422)	(0.148)	(0.148)	(21.359)
Observations	3,006	3,006	3,006	3,006	2,037
R-squared	0.913	0.913	0.913	0.913	0.912
Firm FE	Yes	Yes	Yes	Yes	Yes
Ind*Year FE	Yes	Yes	Yes	Yes	Yes
Ctry*Year FE	Yes	Yes	Yes	Yes	Yes

Notes: This table reports the estimated effect of the 1923 trademark law on Western firms' employment, using alternative measures of trademark intensity described in section A.3. The dependent variable is the natural log of a firm's employment in a given year. *Post 1923* is a dummy denoting the period after adoption of the trademark law in 1923. All regressions include firm, country-times-year, and industry-times-year fixed effects. Standard errors are clustered by product category and country-year. *** p<0.01, ** p<0.05, * p<0.1.

Table B.6: Effect of the Trademark Law on Quality Advertisements in *Shen Bao*

	(1) Quality adv. dummy	(2) ln(quality advertising days+1)	(3) $\sinh^{-1}$(quality advertising)
Post 1923 * trademark intensity			
– Western firms	0.026	0.755	0.753
	(0.442)	(0.801)	(0.867)
– Chinese firms	-0.348	0.013	-0.101
	(0.270)	(0.664)	(0.697)
– Japanese firms	n/a	n/a	n/a
Observations	3,098	3,098	3,098
R-squared	0.585	0.671	0.669
Firm FE	Yes	Yes	Yes
Ind*Year FE	Yes	Yes	Yes
Ctry*Year FE	Yes	Yes	Yes

Notes: This table reports the estimated effects of the trademark law on quality advertising in *Shen Bao*. The sample consists of firms located in Shanghai's concessions, for which we have information on employment and activity for the period 1920-1926. The dependent variables are the dummy for running quality advertisements in *Shen Bao* in a specific year, logged numbers of days when quality advertisements ran, and the inverse sine of days when quality advertisements ran. *Post 1923* is a dummy denoting the trademark law established in 1923. *Trademark intensity* is a firm-specific measure of trademark dependence based on each firm's pre-1923 product mix and product-level trademark intensity, calculated using each product's share of total pre-1923 trademarks. No effect is estimated for Japanese firms because our sample includes no Japanese advertisements highlighting quality. All regressions include firm, country-times-year, and industry-times-year fixed effects. Standard errors are clustered by product category and country-year. *** p<0.01, ** p<0.05, * p<0.1.

Table B.7: Trademark Law and Import Growth, Western Countries versus Japan

VARIABLES	(1) ln(imports)	(2) ln(imports+1)	(3) $\sinh^{-1}$(imports)	(4) Import dummy
Trademark intensity * (Post $\geq$ 1923) * All countries excl. Japan	16.263**	22.591**	23.029**	0.637**
	(7.415)	(9.194)	(9.337)	(0.290)
Trademark intensity * (Post $\geq$ 1923) * Japan	-2.433	-7.967	-8.299	-0.476
	(11.321)	(12.705)	(12.896)	(0.517)
Observations	11,071	14,958	14,958	14,958
R-squared	0.906	0.863	0.858	0.583
Country-year FEs	yes	yes	yes	yes
Country-prod FEs	yes	yes	yes	yes

Notes: This table reports the estimated effects of the trademark law on China's imports, first from all countries excluding Japan and then from Japan. The sample consists of products that can be matched exactly across different product-classification schemes over time; it excludes rice. The dependent variables are the natural log of the import value, the natural log of the import value plus 1, the inverse sine of the import value, and a dummy for the existence of imports, respectively. *Post 1923* is a dummy denoting the period after adoption of the trademark law in 1923. *Trademark intensity* represents a product-level trademark intensity, calculated using each product's share of total pre-1923 trademarks. All regressions are weighted by the import value of the product by country averaged over 1920-1922. Standard errors are clustered by product category. *** p<0.01, ** p<0.05, * p<0.1.

Table B.8: Effect of Trademark Registrations on Prices

	(1)	(2)	(3)	(4)
	Small sample		Large textile sample	
	ln(price)	ln(price)	ln(price)	ln(price)
Post trademark registration	-0.010	0.001	-0.024	-0.022
	(0.034)	(0.039)	(0.152)	(0.148)
Observations	2,184	3,042	10,819	23,029
# products in TG	28	28	458	458
# products in CG		11		706
Control group	not yet treated	never treated	not yet treated	never treated

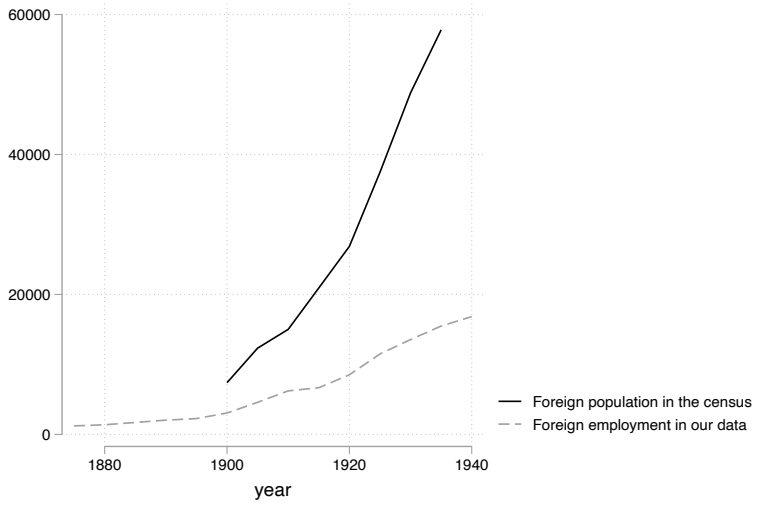
Notes: This table reports the estimated effect of trademark registrations on prices. All columns compute the average treatment effect based on the method of Callaway and Sant'Anna (2020), which is appropriate for staggered differences-in-differences settings, and implicitly allows for product and time fixed effects. Columns (1) and (3) drop never treated products from the analysis. *** p<0.01, ** p<0.05, * p<0.1.

Table B.9: Effect of the Trademark Law on Authentic vs. Counterfeiting Firms

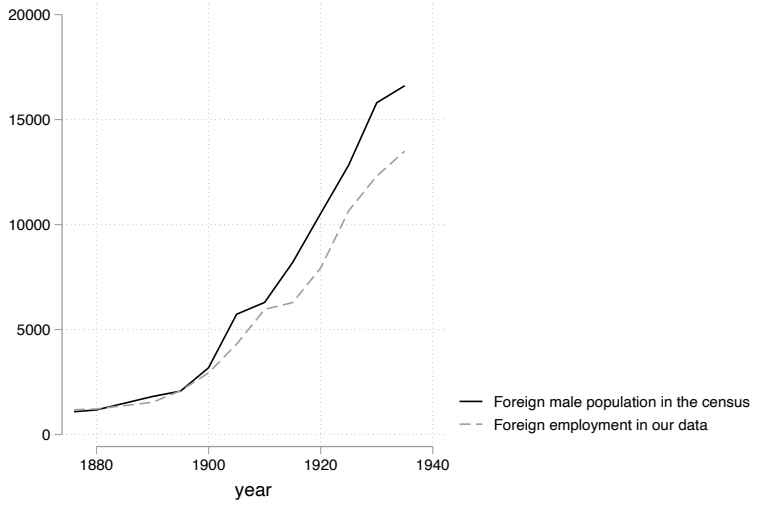
	(1) ln(empl)	(2) ln(empl)	(3) ln(empl)
Post 1923 *			
– Authentic (type I trademarks)	0.090*	0.093**	
	(0.024)	(0.023)	
– Authentic (type II trademarks)		0.076**	
		(0.023)	
– Authentic (combined)			0.091**
			(0.020)
– Counterfeiter (denied applicants)	-0.058*	-0.054**	-0.054**
	(0.015)	(0.014)	(0.013)
Observations	9,557	9,683	9,683
R-squared	0.893	0.894	0.894
Firm FE	Yes	Yes	Yes
Ind*Year FE	Yes	Yes	Yes
Ctry*Year FE	Yes	Yes	Yes

Notes: This table reports the estimated effects of the trademark law on the employment of identified authentic firms and counterfeiters. The sample consists of firms located in Shanghai's concessions for which we have information on employment and activity for the period 1920-1926. The dependent variable is the natural log of a firm's employment in a given year. *Post 1923* is a dummy denoting the period after adoption of the trademark law in 1923. All regressions include firm, country-times-year, and industry-times-year fixed effects. Standard errors are clustered by product category and country-year. *** p<0.01, ** p<0.05, * p<0.1.

C Online Appendix — Figures

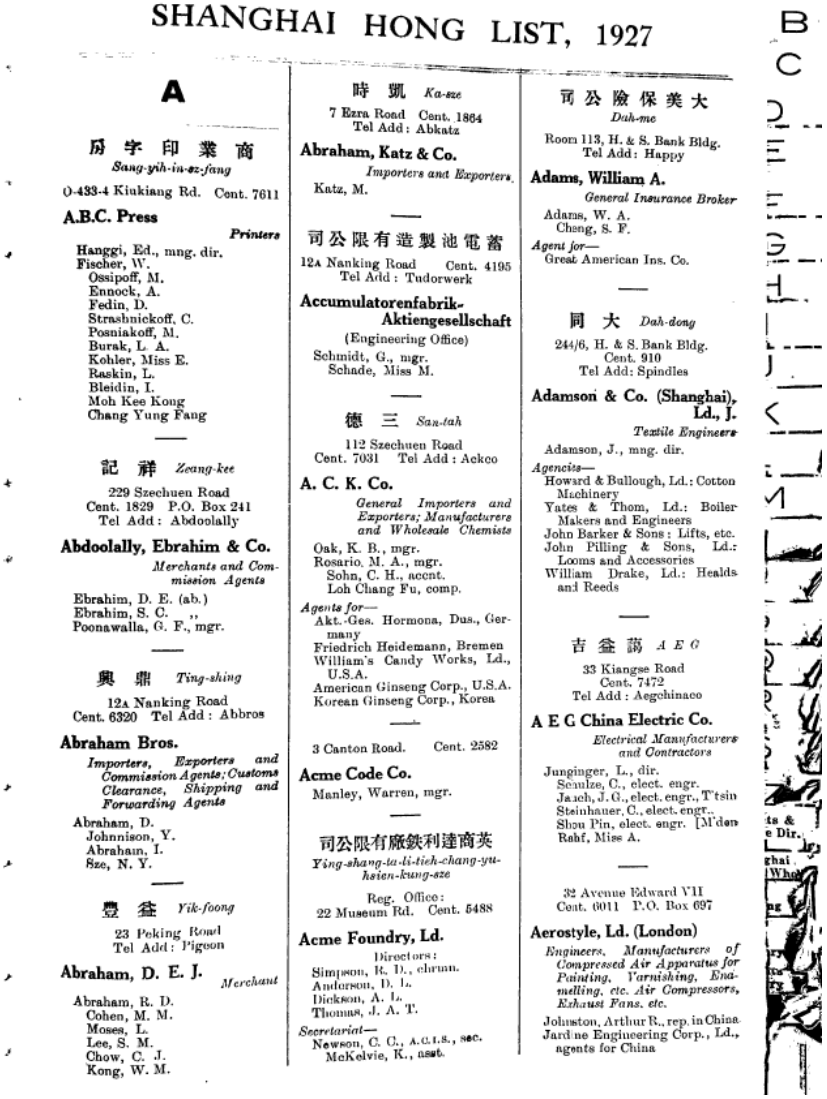


(a) All concessions



(b) International concession

Figure C.1: Data Validation



SHANGHAI HONG LIST, 1927

A

商業印刷所 *Sang-yih-in-sz-fang*

0-433-4 Kiukiang Rd. Cent. 7611

A.B.C. Press

Printers

Hanggi, Ed., mng. dir.
Fischer, W.
Ossipoff, M.
Ennock, A.
Fedin, D.
Strashnickoff, C.
Posniakoff, M.
Burak, L. A.
Kohler, Miss E.
Raskin, L.
Bleidin, I.
Moh Kee Kong
Chang Yung Fang

記祥 *Zeang-kee*

229 Szechuen Road
Cent. 1829 P.O. Box 241
Tel Add: Abdoolally

Abdoolally, Ebrahim & Co.

Merchants and Commission Agents

Ebrahim, D. E. (ab.)
Ebrahim, S. C. ,,
Poonawalla, G. F., mgr.

奧鼎 *Ting-shing*

12A Nanking Road
Cent. 6320 Tel Add: Abbros

Abraham Bros.

Importers, Exporters and Commission Agents; Customs Clearance, Shipping and Forwarding Agents

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Johnnison, Y.
Abrahan, I.
Sze, N. Y.

豐益 *Yik-foong*

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Abraham, D. E. J. *Merchant*

Abraham, R. D.
Cohen, M. M.
Moses, L.
Lee, S. M.
Chow, C. J.
Kong, W. M.

時凱 *Ka-sze*

7 Ezra Road Cent. 1864
Tel Add: Abkatz

Abraham, Katz & Co.

Importers and Exporters

Katz, M.

司公限有造製池電蓄

12A Nanking Road Cent. 4195
Tel Add: Tudorwerk

Accumulatorenfabrik-Aktiengesellschaft

(Engineering Office)

Schmidt, G., mgr.
Schade, Miss M.

德三 *San-tah*

112 Szechuen Road
Cent. 7031 Tel Add: Ackco

A. C. K. Co.

General Importers and Exporters; Manufacturers and Wholesale Chemists

Oak, K. B., mgr.
Rosario, M. A., mgr.
Sohn, C. H., accnt.
Loh Chang Fu, comp.

Agents for—
Akt.-Ges. Hormona, Dus., Germany
Friedrich Heidemann, Bremen
William's Candy Works, Ld., U.S.A.
American Ginseng Corp., U.S.A.
Korean Ginseng Corp., Korea

3 Canton Road. Cent. 2582

Acme Code Co.

Manley, Warren, mgr.

司公限有廠鉄利達商英

Ying-shang-ta-li-tieh-chang-yu-hsien-kung-sze

Reg. Office:
22 Museum Rd. Cent. 5488

Acme Foundry, Ld.

Directors:
Simpson, R. D., chrmn.
Anderson, D. L.
Dickson, A. L.
Thomas, J. A. T.

Secretariat—
Newson, C. C., A.C.I.S., sec.
McKelvie, K., asst.

司公險保美大

Dah-me

Room 113, H. & S. Bank Bldg.
Tel Add: Happy

Adams, William A.

General Insurance Broker

Adams, W. A.
Chang, S. F.

Agent for—
Great American Ins. Co.

同大 *Dah-dong*

244/6, H. & S. Bank Bldg.
Cent. 910
Tel Add: Spindles

Adamson & Co. (Shanghai), Ld., J.

Textile Engineers

Adamson, J., mng. dir.

Agencies—
Howard & Bullough, Ld.: Cotton Machinery
Yates & Thom, Ld.: Boiler Makers and Engineers
John Barker & Sons: Lifts, etc.
John Pilling & Sons, Ld.: Looms and Accessories
William Drake, Ld.: Healds and Reeds

吉益萬 *A E G*

33 Kiangse Road
Cent. 7472
Tel Add: Aegchinaco

A E G China Electric Co.

Electrical Manufacturers and Contractors

Junginger, L., dir.
Scaulze, C., elect. engr.
Jauch, J. G., elect. engr., Tsin
Steinhauer, C., elect. engr.
Shou Pin, elect. engr. [M'den
Rahf, Miss A.

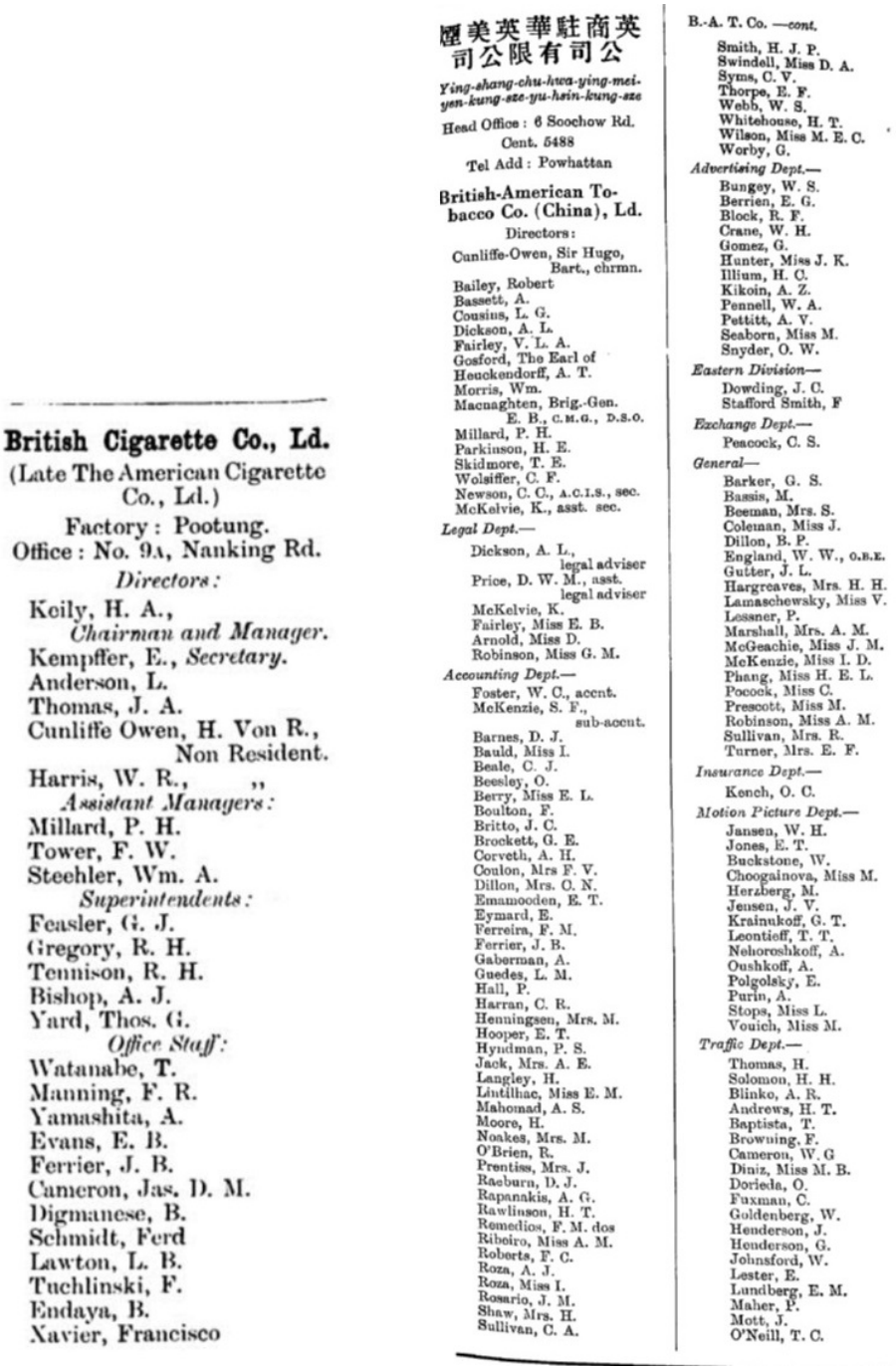
32 Avenue Edward VII
Cent. 6011 P.O. Box 697

Aerostyle, Ld. (London)

Engineers. Manufacturers of Compressed Air Apparatus for Painting, Varnishing, Enamelling, etc. Air Compressors, Exhaust Fans, etc.

Johnston, Arthur R., rep. in China
Jardine Engineering Corp., Ld., agents for China

Figure C.2: Representative page from the Hong List, 1927



British Cigarette Co., Ld.

(Late The American Cigarette Co., Ld.)

Factory: Pootung.

Office: No. 9A, Nanking Rd.

Directors:

Keily, H. A.,
Chairman and Manager.
Kempffer, E., *Secretary.*
Anderson, L.
Thomas, J. A.
Cunliffe Owen, H. Von R., Non Resident.
Harris, W. R., ,,

Assistant Managers:

Millard, P. H.
Tower, F. W.
Steehler, Wm. A.

Superintendents:

Feasler, G. J.
Gregory, R. H.
Tennison, R. H.
Bishop, A. J.
Yard, Thos. G.

Office Staff:

Watanabe, T.
Manning, F. R.
Yamashita, A.
Evans, E. B.
Ferrier, J. B.
Cameron, Jas. D. M.
Digmanese, B.
Schmidt, Ferd
Lawton, L. B.
Tuchlinski, F.
Endaya, B.
Xavier, Francisco

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有限公司

Ying-shang-chu-hwa-ying-mei-yen-kung-sze-yu-hsin-kung-sze

Head Office: 6 Soochow Rd.
Cent. 5488
Tel Add: Powhattan

British-American Tobacco Co. (China), Ld.

Directors:

Cunliffe-Owen, Sir Hugo, Bart., chrmn.
Bailey, Robert
Bassett, A.
Cousins, L. G.
Dickson, A. L.
Fairley, V. L. A.
Gosford, The Earl of
Houckendorff, A. T.
Morris, Wm.
Macnaghten, Brig.-Gen. E. B., C.M.G., D.S.O.
Millard, P. H.
Parkinson, H. E.
Skidmore, T. E.
Wolsiffer, C. F.
Newson, C. C., A.C.I.S., sec.
McKelvie, K., asst. sec.

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Dickson, A. L., legal adviser
Price, D. W. M., asst. legal adviser
McKelvie, K.
Fairley, Miss E. B.
Arnold, Miss D.
Robinson, Miss G. M.

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McKenzie, S. F., sub-accnt.
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Bauld, Miss I.
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Beesley, O.
Berry, Miss E. L.
Boulton, F.
Britto, J. C.
Brockett, G. E.
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Dillon, Mrs. C. N.
Emamooden, E. T.
Eymard, E.
Ferreira, F. M.
Ferrier, J. B.
Gaberman, A.
Guedes, L. M.
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Hyndman, P. S.
Jack, Mrs. A. E.
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Mahomad, A. S.
Moore, H.
Noakes, Mrs. M.
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Prentiss, Mrs. J.
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Roza, Miss I.
Rosario, J. M.
Shaw, Mrs. H.
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Swindell, Miss D. A.
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Whitehouse, H. T.
Wilson, Miss M. E. C.
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Block, R. F.
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Hunter, Miss J. K.
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Kikoin, A. Z.
Pennell, W. A.
Pettitt, A. V.
Seaborn, Miss M.
Snyder, O. W.

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Dowding, J. C.
Stafford Smith, F

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Peacock, C. S.

General—

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Bassis, M.
Beeman, Mrs. S.
Coleman, Miss J.
Dillon, B. P.
England, W. W., O.B.E.
Gutter, J. L.
Hargreaves, Mrs. H. H.
Lamaschewsky, Miss V.
Lessner, P.
Marshall, Mrs. A. M.
McGeachie, Miss J. M.
McKenzie, Miss I. D.
Phang, Miss H. E. L.
Pocock, Miss C.
Prescott, Miss M.
Robinson, Miss A. M.
Sullivan, Mrs. R.
Turner, Mrs. E. F.

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Jansen, W. H.
Jones, E. T.
Buckstone, W.
Chougainova, Miss M.
Herzberg, M.
Jensen, J. V.
Krainukoff, G. T.
Leontieff, T. T.
Nehoroshkoff, A.
Oushkoff, A.
Polgolsky, E.
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Stops, Miss L.
Vouich, Miss M.

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Blinko, A. R.
Andrews, H. T.
Baptista, T.
Browning, F.
Cameron, W. G
Diniz, Miss M. B.
Doriela, O.
Fuxman, C.
Goldenberg, W.
Henderson, J.
Henderson, G.
Johnsford, W.
Lester, E.
Lundberg, E. M.
Maher, P.
Mott, J.
O'Neill, T. C.

(a) BAT's predecessor in 1906 (b) BAT in 1926

Figure C.3: Employment at British American Tobacco (BAT) and its predecessor in Shanghai, 1906 and 1926

Source: The 1906 and 1926 issues of the Hong List.

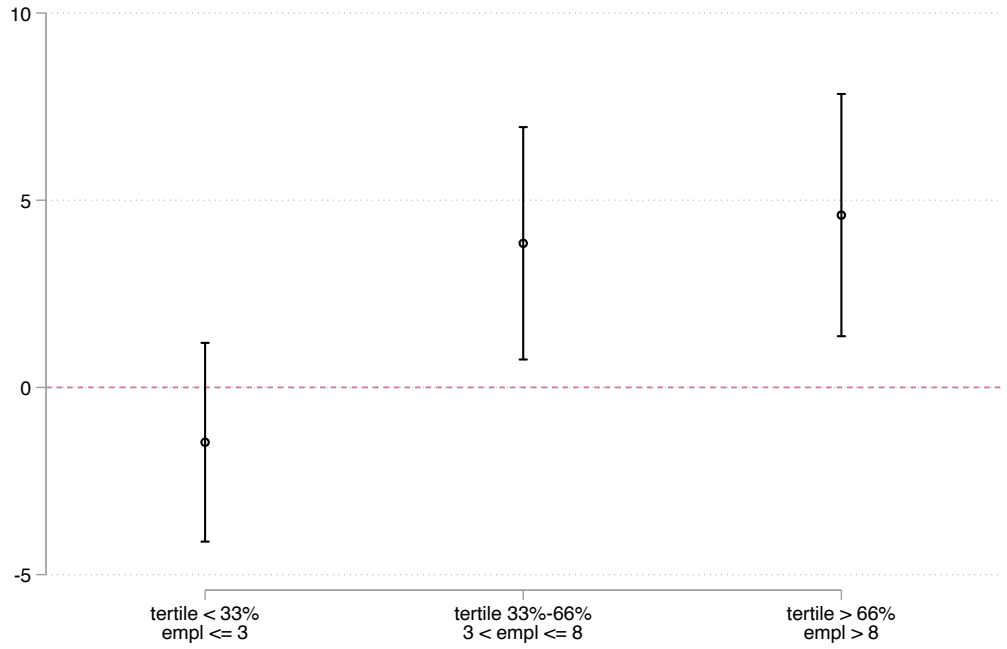


Figure C.4: Heterogeneous Effect of the Trademark Law on the Employment of Western Firms

Notes: For this graph we run the baseline estimation used in column (3) of Table 2 on Western firms, and allow the effect to vary by initial employment size tertile.

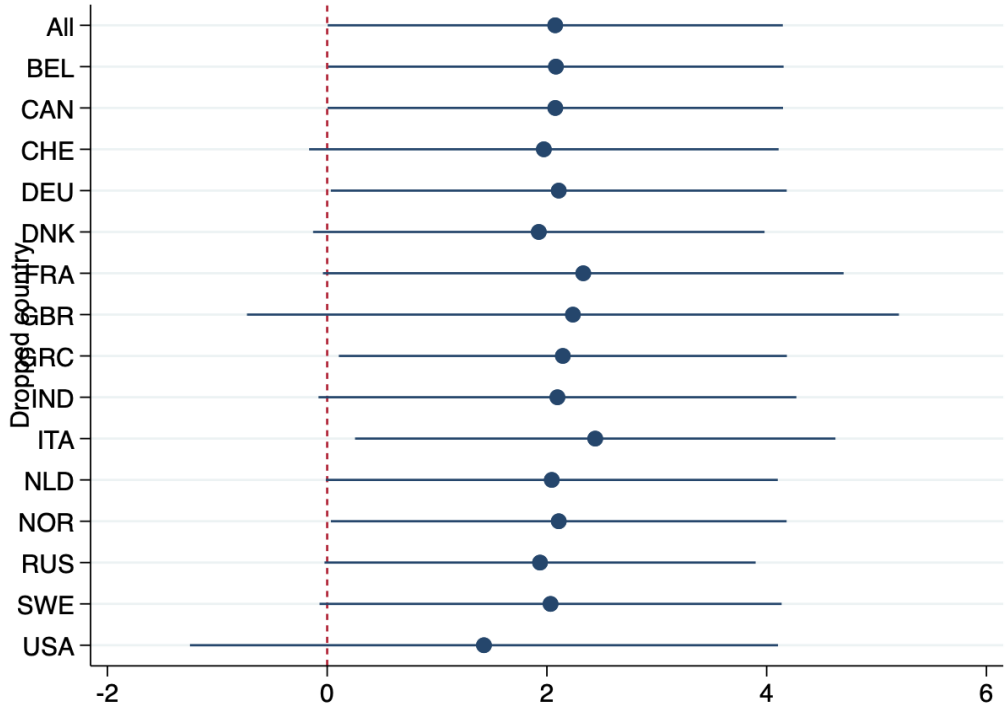


Figure C.5: Effect of the Trademark Law on Employment at Western Firms, dropping one home country at a time

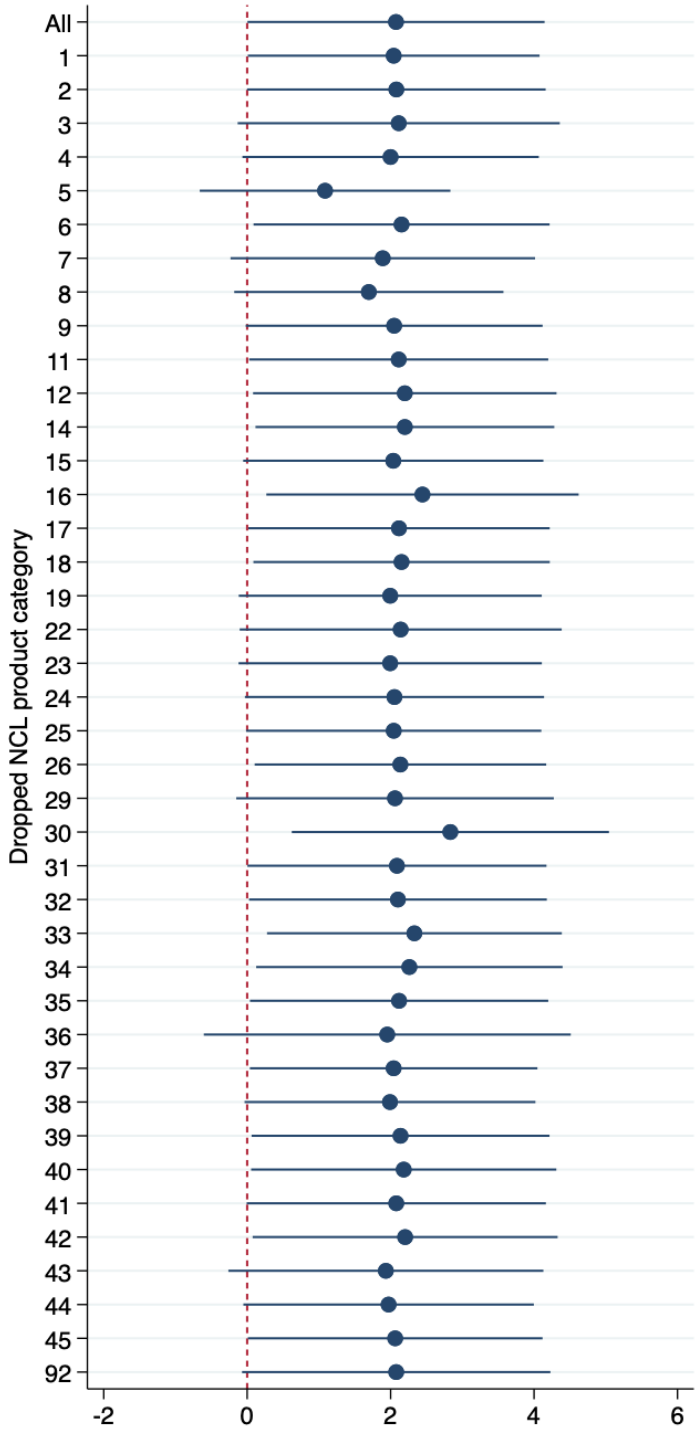


Figure C.6: Effect of the Trademark Law on Employment at Western Firms, dropping one NCL product category at a time

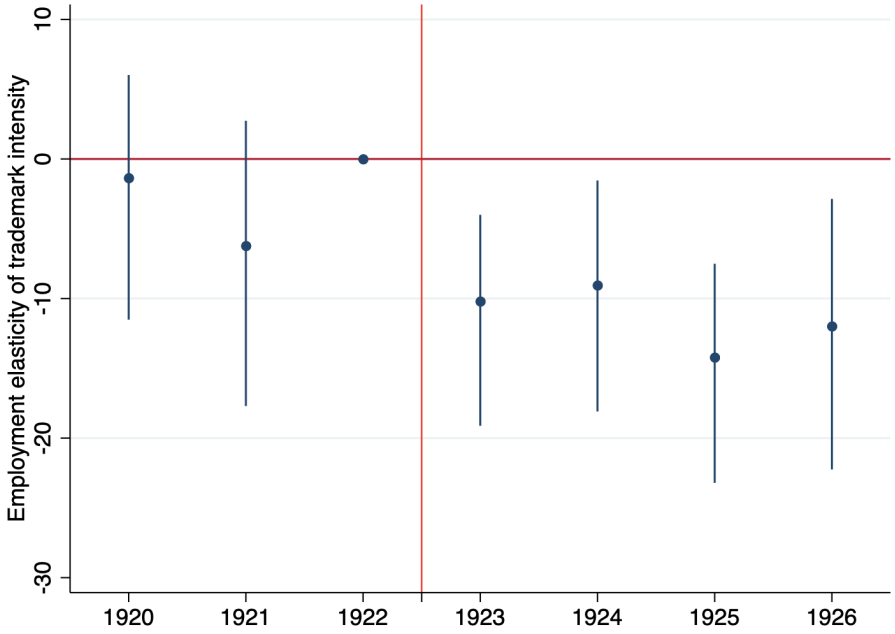


Figure C.7: Effect of the Trademark Law on Employment at Japanese Firms: Event Study

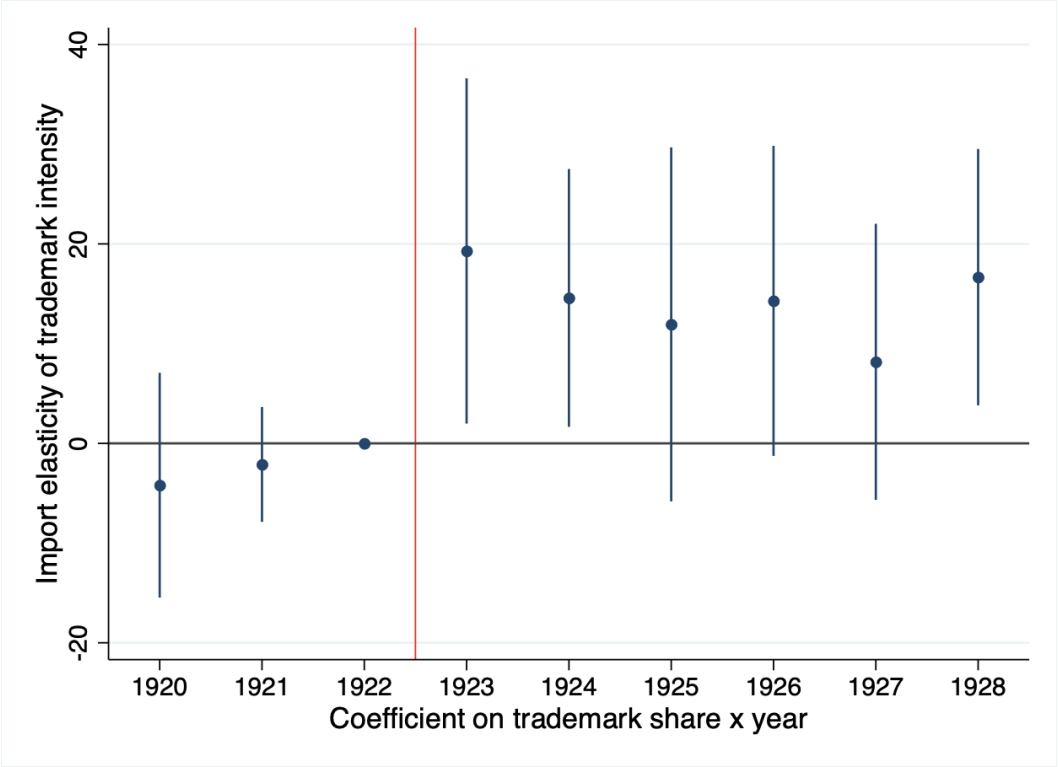


Figure C.8: Effect of the Trademark Law on Chinese Imports from Western countries: Event Study

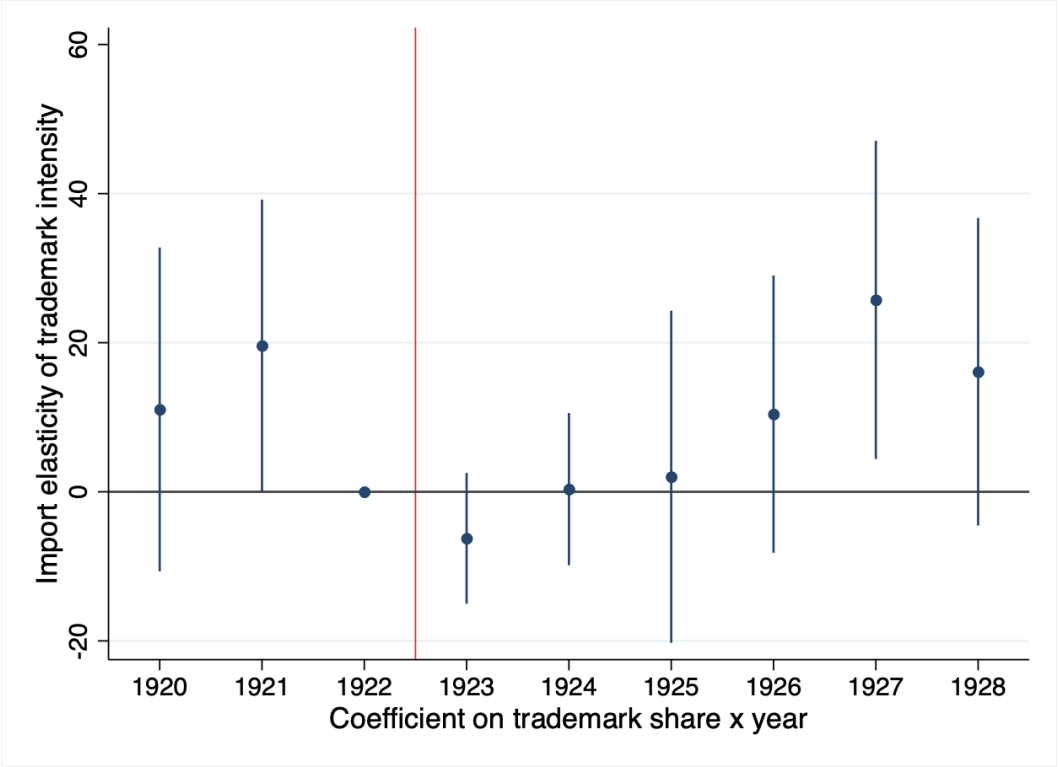
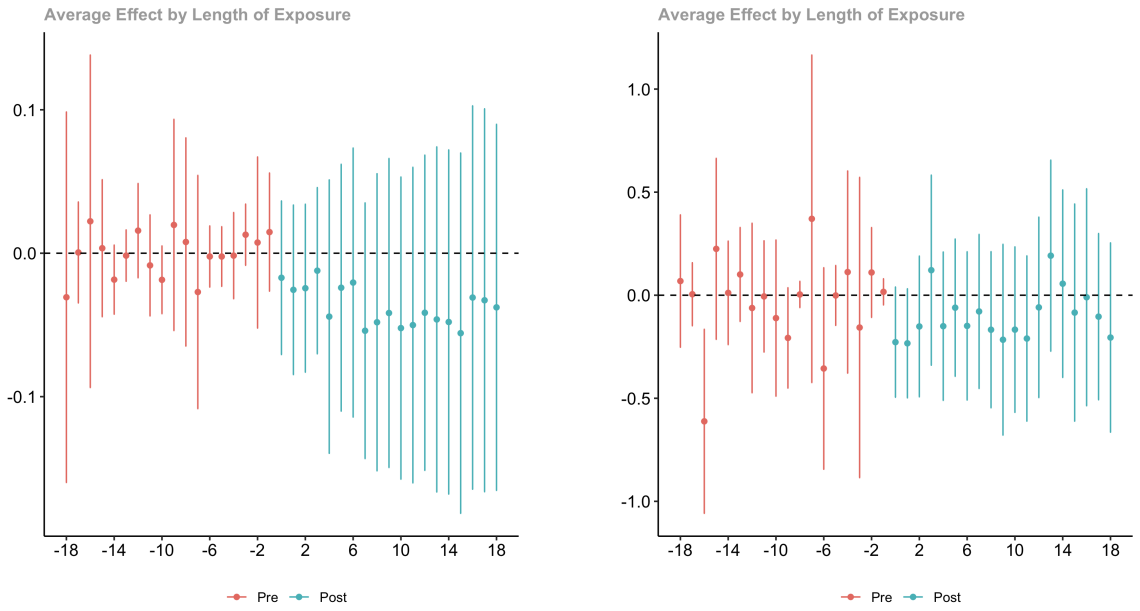


Figure C.9: Effect of the Trademark Law on Chinese Imports from Japan: Event Study

Notes: Observations from Japan are added to the sample, and estimating equation (12) is expanded to estimate separate coefficients for Japan and for non-Japanese countries. The figure plots only the time-varying coefficients for Japan; the coefficients for non-Japanese countries are identical to those in Figure C.8.



(a) Small sample: all industries

(b) Large sample: textiles

Figure C.10: Effect of the Trademark Law on Prices: Event Studies

Notes: The figures plot the effect of trademark registrations on prices; it draws on the method and program described by Callaway and Sant'Anna (2020). Red bars represent months before trademarks were registered; blue bars represent log prices after trademark registration. Time on the x-axis is measured in months.

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