Omnia Juncta in Uno:[*]
Foreign Powers and Trademark Protection
in Shanghai's Concession Era[†]

Laura Alfaro   Cathy Bao   Maggie X. Chen   Junjie Hong

Claudia Steinwender

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Abstract

We investigate how firms adapt to trademark protection, an extensively used but underexamined form of IP protection, by exploring a historical precedent: China's trademark law of 1923—an unanticipated and disapproved response to end foreign privileges in China. By exploiting a unique, newly digitized firm-employee-level dataset from Shanghai in 1872-1941, we show that the trademark law shaped firm dynamics on all sides of trademark conflicts. The law spurred growth and brand investment among Western firms with greater dependence on trademark protection. In contrast, Japanese businesses, which had frequently been accused of counterfeiting, experienced contractions while attempting to build their own brands after the law. The trademark law also led to new linkages with domestic agents, both within and outside the boundaries of Western firms, and the growth of Chinese intermediaries. At the aggregate level, trademark-intensive industries witnessed a net growth in employment and the number of product categories. A comparison with previous attempts by foreign powers—such as extraterritorial rights, bilateral treaties, and an unenforced trademark code—shows that those alternative institutions were ultimately unsuccessful.

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 which has focused almost exclusively on patent and copyright protection, with relatively little evidence on the effects of trademark institutions on firm and industry dynamics.

This paper aims to fill the gap by investigating how firms 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, disapproved introduction of China's first trademark law in 1923. 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—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] One way to overcome this information-asymmetry problem is for sellers to use trademarks to signal the identity of the producer to the consumer (Grossman and Shapiro, 1988a). Trademarks enable firms to build reputation and benefit from the reputation over time; counterfeit-

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[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, and architecture, as well as 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.

ing undermines 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 for trademarks and the specific rights protected, the impacts of trademark protection on firm decisions and market competition can differ significantly from those of patent and copyright protection.

The establishment of a 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 of 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, a 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. A 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 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 trademark law was established to move a step closer to the abolition of foreign privileges.

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[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).

The timing of the trademark law was also unexpected. After the Opium Wars in the mid 19th century, British businesses had attained early dominance in the Chinese market, but this status was challenged by Japan 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. 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. Both the Western nations and Japan expressed objections and refused to recognize the law, only later to be overtaken by reality.

Another key advantage of our historical setting is the availability of a series of novel micro-level datasets from Shanghai, 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 an annual business-employee-level panel dataset covering the universe of firms operating in Shanghai's concession areas in the period 1872-1941. For each company, we recorded its name, address, products, importer/exporter status, and nationality; for companies' non-production employees, we recorded 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. For intermediaries that represented foreign manufacturers in Shanghai, we collected comprehensive lists of clients' names and nationalities. The coverage and richness of this information enable 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 separate difference-in-differences (DD) specifications for three sets of firms: Western firms, which according to court cases and historical archives had suffered most from trade-

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mark infringements; and Japanese and Chinese firms, which had been most frequently accused of counterfeiting (e.g., Motono 2011). Each 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 that is 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. Given that foreign powers neither anticipated nor approved the introduction of the Chinese trademark law, we 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 trademark-intensive Western firms grew, on average, by 5%; Japanese businesses, by contrast, experienced an average reduction in employment of 15%. Western firms increased their recruitment of engineers and manufacturing staff, signaling a transition from wholesale to domestic manufacturing; meanwhile Japanese firms significantly cut their sales employees. After the enactment of the law, Western firms also became less likely to exit the market or drop trademark-intensive products and more likely to invest in brand advertising. Interestingly, Japanese firms also became more likely to advertise and add trademark-intensive products to their portfolios, suggesting an effort to build up their own brands.

The trademark law also transformed the relationships between Western businesses and Chinese intermediaries. It led to greater domestic integration by Western firms, both within and outside the boundary of the firm. Trademark-intensive Western firms became more inclined to promote Chinese employees and recruit Chinese individuals for sales 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 significant growth of Chinese intermediaries.

As the implications of IP institutional reforms for market competition are a subject of longstanding concerns, we aggregate our data to the product-year level to examine the effect of the trademark law on within-industry competition. We find that the law led to both net growth in the total employment of existing trademark-intensive product categories and a higher likelihood of new trademark-intensive product categories being offered, implying that

the impact of the trademark law went beyond a pure reallocation from counterfeiting to authentic firms and entailed increases in consumer demand and market variety. This result is echoed when we examine price responses to trademark registrations using a sample—manually matched based on brand 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.

During the decades before the trademark law, foreign powers had made a series of alternative institutional attempts to protect their trademarks. We next compare the effect of the 1923 law to these 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. Using equivalent difference-in-difference specifications, we find that none of the alternative arrangements exerted a significant effect on firm growth, a finding that underlines the importance of domestic institutional reform.

An extensive literature on IP institutions assesses the effects of patent laws and, to a lesser extent, copyright protection, on economic growth.[5] In contrast, there are relatively few studies examining the economic effects of trademark protection. The main 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 granted 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 that the quality of exports increased after African countries joined the Madrid Protocol, a move that simplified the international trademark-registration process.

In contrast to previous studies, our paper examines a fundamental, rather than an incre-

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[5]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.

mental, change in trademark protection: the introduction of a trademark law. The arguably exogenous timing of China's 1923 trademark law allows us to establish its causal effect on firm and industry dynamics. Further, instead of focusing on authentic firms' responses to trademark protection as in previous studies, we 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 firm organization and the formation of domestic linkages taking advantage of rich firm-employee and firm-client data.

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 and the mechanisms through which the law could have affected firms and industries. Section 3 discusses the construction of the business-employee data and our firm-specific measure of trademark intensity. Section 4 presents empirical evidence on firm adaptations to the trademark law across different sides of trademark conflicts. Section 5 compares the effects of alternative institutional arrangements, and Section 6 concludes.

2 Historical Background: The Birth of China's First Trademark Law

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).[6] In contrast to the long history of trademark use, formal institutions to protect trademarks have a much shorter and more complex timeline in China.The development of formal trademark institutions in pre-1949 China underwent several phases, from the imposition of foreign legal institutions to bilateral commercial treaties with major trading partners, and from a 1905 Qing code that was never put into effect to the ultimate birth of China's first trademark law. This section describes the circumstances under which the 1923 trademark

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

law was introduced.[7]

2.1 The Appearance of Counterfeits

Early in the 20th century, China emerged as one of the world's most important markets. 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 around the world. Foreign firms had gained access to Chinese customers via a number of '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.[8] These treaties granted foreigners important privileges, including extraterritorial rights (ET; i.e., the use of foreign laws and establishments of foreign courts in China) and political governance in areas designated as 'concessions.'

British firms were among the first to enter the market. When Japan challenged British dominance after the end of the first Sino-Japanese War in 1894–95, Japanese firms lagged behind their Western rivals technologically and many sold counterfeits of Western goods. The Patent and Trade Mark Review (1907) asserted in 1907 that "Japanese trade in China consists largely of Japanese imitations".[9] By the early 1900s, a growing number of trademark disputes involved authentic Western firms, Japanese counterfeiters, and Chinese merchants, and products ranging from tobacco and textile to food and cosmetics. As the *Manchester Guardian* asserted in 1904, "perhaps for no market in the world is it more necessary that the trademarks upon our productions should be jealously safeguarded" (Heuser, 1975).

2.2 The Clashes of Foreign Legal Institutions

Great Britain reacted to the growing number of conflicts by asking British firms to register trademarks at their consulates in China; registered trademarks would then be transmitted to the Imperial Maritime Customs Service.[10] This form of protection proved inadequate, how-

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[7]Interested readers are referred to Motono (2011, 2013) for a comprehensive account of the history behind the trademark system.

[8]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.

[9]Motono (2011) provides a detailed description of some notable legal cases, including, for example, Sir Elkanah Armitage Sons Ltd. vs. Konishi Hanbei and British American Tobacco's "Peacock" brand vs. Sanlin Gongsi's "Peafowl" brand. The *North China Herald* reported additional prominent cases, such as the British whiskey brand "Black and White" producer J. Buchanan Co. vs. an Osaka spirit merchant.

[10]Western trademarks had usually been registered in their home countries, but given the nature of national trademark laws, the protection of their trademarks would not extend 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 were the case in China (Higgins, 2012).

ever, because neither the consulate nor the Customs Service could enforce compliance. In the absence of a legal basis for trademark protection, plaintiffs sometimes tried to make a case for 'unfair competition.' But even this too proved difficult; as an English language newspaper explained, "the imitation of a trademark or trade wrapper is not forgery at common law or under the Provisional Criminal Code, even when the trademark consists of a signature" (The North-China Herald, May 8, 1920).

Extraterritoriality further complicated the issue: 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 in Shanghai, following the laws of their home countries; other cases were tried in a "Mixed Court" under informal Chinese law. These coexisting legal systems led to a "legally pluralistic environment" in which up to 22 legal systems competed for jurisdiction.

In practice, Western firms encountered differential trademark protection against the actions of Chinese and Japanese firms. Trademark lawsuits filed against Chinese businesses were argued at the Mixed Court in Shanghai, which tended to enforce protection of trademarks registered at Customs.[11] However, cases against Japanese firms, which enjoyed ET, were heard at Japan's consular court, which was less inclined to enforce trademark protection. As the *Daily Consular and Trade Reports* observed in 1923, "the difficulty in the matter of infringements does not generally arise among the Chinese, with whom the authorities are usually prompt to deal in cases of infringement, but with certain European and Oriental manufacturers."

2.3   Bilateral Commercial Treaties and Failed Negotiations

In 1902-1903, Great Britain, the United States, and Japan each signed a commercial treaty with China, promising to abolish extraterritorial rights if China would establish adequate legal systems.[12] In particular, the treaties required the Chinese government to provide pro-

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[11]For example, Heuser (1975) noted that "In case of infringement by Chinese subjects it was possible to obtain injunctions by the Chinese authorities. [...] The British minister mentioned in a dispatch to the Foreign Office that 'the Chinese Courts, as they have done in the past, afford substantial protection against imitation on the part of Chinese subjects'."

[12]See, for example, the 1903 treaty between the United States and China, cited in Alford (1995, p. 36): 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."

tection for foreign trademarks and to establish offices to register trademarks.[13] As noted by Alford (1995), "trademark protection was the centerpiece of the intellectual property issues addressed" in these commercial agreements.

The Qing government, and specifically its Ministry of Commerce, responded by asking the Japanese government for help drafting a trademark law as a first step toward satisfying the conditions specified in the treaties for abolishing ET. Japan suggested 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. Western governments' opposition led the Qing government to cease implementation of a trademark law. As the Patent and Trade Mark Review observed in 1904, "local merchants being dissatisfied with the measure, the British and German Ministers protested and the enforcement of the regulations was indefinitely postponed."

After the 1911 Xinhai Revolution, China's new government attempted to introduce its own regulations in April 1914. The draft again failed to satisfy foreign diplomats, and revisions were further postponed by the outbreak of the First World War. The *North China Herald* expressed Great Britain's continuing frustrations in 1922 by comparing the military threat that Japan posed to China to its traders' willingness to infringe trademarks.

2.4   China's First Trademark Law of 1923

Neither Great Britain nor Japan anticipated the Chinese government to introduce a trademark law on its own. After decades of failed negotiations, China viewed a *fait accompli* as the only way to make progress on the trademark issue and ultimately to abolish ET. The Chinese Congress passed a law, put it into effect on May 9, 1923, and only then informed foreign diplomats. 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 two firms applied for the same trademark, in which case the first-to-use principle would apply.

At first, the foreign governments and foreign chambers of commerce fiercely opposed the law (Motono, 2011; Patent and Trade Mark Review, 1923). As late as March 1924, the front page of the *North China Herald* stated that the trademark law threatened the interests of British trademark owners by "placing the responsibility for trademark adjudication in the

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[13]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.

hands of inexperienced Chinese courts." The foreign diplomats and businesses were soon overtaken by reality, however, when Japanese and German businesses—who had previously lost ET status—began to register their trademarks, fearing that rivals would do so first. It became evident that implementation of the law had become irreversible.

Between 1923 and 1926, 13,647 trademarks were registered with the Chinese trademark bureau (see Motono, 2011, Table 3). The *Trademark Gazette* reported in 1924 that Japanese and German businesses accounted for the majority of initial trademark applications, but by 1926 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 1 shows, trademarks were most frequently registered in textiles (cotton textiles, clothing, woolen products, cotton yarns), chemicals (paints, medication, soap, cosmetics), and tobacco.[14]

2.5   A First Test: The Decline in Advertisements that Warn against Imitations

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 pretences."[15]

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.[16]

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*, the

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[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. By 1934, 7,932 Chinese companies had registered their trademarks in Shanghai, accounting for 86% of all trademarks registered in China (Motono, 2013).

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

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

leading English-language newspaper in China at the time, and classified as anti-imitation advertisements those that included phrases referencing "imitation".[17]

Figure 2 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 had been effective in deterring counterfeiting.

2.6 Mechanisms: Trademark Institution and Firm Dynamics

Before turning to formal empirical analysis, we discuss next the various mechanisms through which the trademark law may have shaped firm and industry dynamics (Grossman and Shapiro, 1988a) and the resulting hypotheses on firm growth, organization, and brand investment decisions.

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. Authentic producers can label the product with a 'trademark' and over time consumers may learn to associate the trademark with the unobserved product characteristics, resolving the information asymmetry.[18] If trademarks are not protected, however, consumers may mistake counterfeits as authentic goods and further 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.[19] 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

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[17]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.

[18]This role of trademarks differs from that of patents and copyrights, which are protected to incentivize innovation, while trademark aims to reduce information asymmetries.

[19]During the period in question, foreign firms often turned to domestic intermediaries for expanded market access to overcome language barriers and inland market restrictions. As Section 3.1 shows, the intermediary sector accounted for more than half of the businesses.

trademarks in solving information asymmetry surrounding the identity and product attributes of the producer, could affect firm dynamics in the following three ways: (i) reallocation, (ii) demand, and (iii) distribution.

Reallocation. Without trademark protection, both authentic and counterfeiting firms sell their products (with potentially dissimilar characteristics) under the same brand name; consumers in turn are unable to discern the true identity of the seller. The introduction of trademark protection, which ensures authentic firms' exclusive rights to use their brands, can lead to a direct market reallocation within brand-specific market segments from counterfeiters to authentic producers, increasing the latter's likelihood of growth and survival. 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 can increase consumers' confidence in the quality of purchased goods and thus their willingness to pay for high-quality goods, further expanding aggregate market demand for authentic firms' products. 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.

Distribution. Trademark protection can also affect authentic firms' modes of distribution. By mitigating the risk that intermediaries would dilute the trademark, trademark protection can increase authentic firms' willingness to collaborate with domestic intermediaries, both within and outside the boundary of the firm. The new linkages between authentic firms and domestic intermediaries can both expand authentic firms' market access and lower their distribution costs, while offering growth opportunities to intermediaries.

These three mechanisms jointly lead to a range of potential implications for firm dynamics. First, both the reallocation and demand channels imply that trademark protection may spur growth of authentic firms and shrink counterfeiting firms. Second, while trademark protection may help authentic producers capture brand-specific markets, it may not, in contrast to patent protection, necessarily reduce market competition, as authentic firms become more likely to survive and some counterfeiters re-brand their products. Third, by protecting the

value of a brand as a firm-specific asset, trademark protection can increase firms' incentives to invest in their brands. Finally, 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. These implications yield distinct predictions on how firms on different ends of trademark conflicts would adapt to the Chinese 1923 trademark law, which we empirically investigate in Section 4.

3   Data: Firms during Shanghai's Concession Era

To examine the hypotheses outlined in the above section and quantify 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 and a database of cross-country trademarks in 1870-1922.[20]

3.1   Firm-Employee and Agent-Client 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 fourteen-fold, 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). Shanghai 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 cov-

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[20]Section A.4 of the Online Appendix presents additional analysis of product-level customs data on Chinese imports in 1920-1928 to assess the trade effects of the law.

ering 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.[21] 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 its time. The Hong Lists provide detailed information on all firms operating in the Public and French concessions.[22] 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 a number of sources such as directories of China's importers and exporters, directories of foreign businesses, and documents from the Japanese Chamber of Commerce.[23] For the remaining unmatched businesses, we manually sought out nationality information or assigned a nationality based on country reference in the firm's name (if unambiguous).[24]

We also collected comprehensive information on each firm operating as an intermediary (labelled 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. We also downloaded all business advertisements published in the leading Chinese daily newspaper *Shen Bao* (申报) in 1920-1926 and matched the advertisements to businesses in our sample based on information on the advertisement holder to examine firms' brand-investment decisions.

Using the data from each edition of the Hong List and matching firms over time, we con-

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

[22]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.1 of the Online Appendix for more detail.

[23]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.

[24]Our measure of a firm's nationality is time-invariant; we have no information about changes in the nationality of firms over time.

structed 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 contested markets. The key firm variables are defined as follows:

- 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 3.2)

- nationality: the 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[25]

- job titles: we classify job titles as sales-related (titles such as sales, salesman, marketing, representative, advertising, and publicity), engineering-related (engineer, engineering, technical, machinery, draughtsman, mechanic, mechanician, and technician), and manufacturing-related (manufacturing, production, producing, and factory)

- 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 1900s.

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

As Figure 3 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 grew 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, Meyer & Co, and Mistui 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 non-production employees and a relatively simple organizational structure; two decades later, BAT's operations in Shanghai had expanded to over 100 non-production 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 a gradual growth in industrial activities during the same period, and a transition to a more diverse economic landscape. As Figure 4 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 in Shanghai.

The array of nationalities represented by Shanghai businesses also varied significantly over time. As Figure 5 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.

3.2 Measuring Trademark Intensity

As discussed in Section 2.6, 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). Nelson (1970) termed such products *experience* goods—that is, products that must be consumed in order to learn about their characteristics.[26] Given the

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[26]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.

role of trademarks in reducing information asymmetry surrounding product attributes, the demand for trademarks is expected to be greater for experience goods.

We construct a measure of *trademark intensity* by calculating the share of registered trademarks across product categories in countries where trademark registration was possible before 1922. 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.[27] 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.[28]

For each country, we calculated the cumulative sum of all trademarks registered between 1872, when the trademark data start, and 1922, the year before enactment of the trademark law.[29] 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 $TrademarkInt_p$.[30]

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 a firm-specific measure of trademark intensity based on each firm's

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

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

[29]Before 1872, only a handful of trademarks were reported on January 1, 1801. We exclude these from our dataset.

[30]Services were not covered in trademark laws in this time period. Nevertheless, some service trademarks appeared in the data; we dropped these trademarks 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.

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

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

where P_i denotes the set of products that the firm offered in the period 1920 to 1922.[31] This firm-specific trademark intensity enables us to explore cross-firm variation in demand for trademark protection within each industry and country group and compare how firms selling more trademark-intensive products adjusted to trademark institutions relative to firms selling less trademark-intensive products.

4 Empirical Evidence

In this section, we empirically examine how Western, Japanese, and Chinese firms, respectively, adapted to the trademark law. We first assess how the trademark law shaped growth dynamics on differing sides of trademark conflicts through a combination of the reallocation and demand mechanisms. Then we explore the effects of the trademark law on linkages between foreign firms and domestic intermediaries, and whether the linkages benefited the domestic sector.

4.1 Empirical Specification

One attractive feature of our historical experiment is that the probability of being an authentic producer or a counterfeiter differed across firms of different nationalities: Western firms were more likely to be authentic producers; Chinese and Japanese firms were more likely to be, or to collaborate with, counterfeiters (e.g., Motono 2011). This pattern enables us to evaluate firms' reactions to trademark protection on all sides of the trademark conflict.

Empirically, 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, $r \in$ {Western, Chinese, Japanese}. We estimate the three DDs together in a pooled specification by estimating:

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[31]In Section A.5 of the Online Appendix, we show that our results are robust to using the mean trademark intensity across a firm's products.

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

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 such as boycotts against foreign goods; and broad industry-year specific fixed effects FE_{jt} to account for industry-specific shocks in Shanghai. 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 to 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. Table B.1 in the Online Appendix presents the summary statistics for this regression sample.

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.

4.2 Authentic vs. Counterfeiting Firms

We begin by examining how the trademark law shaped firm dynamics depending on the firms' role in trademark conflicts. As noted in Section 2.6, 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 frictions. 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.

4.2.1 Within-Firm Employment

Table 2 shows that the trademark law exerted a net positive effect on the growth of trademark-intensive Western firms. Our main analysis, in columns (1) to (3), 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) hence extends the sample to 1930 to determine whether the effectiveness of the trademark law changed; the results remain similar.[32]

As reported in column (3)—our baseline specification which includes the broad industry-year fixed effect—employment at Western firms with mean trademark intensity grew by 4.6% 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 7.8% to 19.2% (an increase of 1-2 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 1.3-3.5%.[33]

In contrast to the growth of Western firms, Japanese firms selling trademark-intensive

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[32]We do not extend the analysis beyond 1930; in 1931 Japan invaded Manchuria, which later led to Japanese occupation of Shanghai in 1937.

[33]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.

products experienced a significant contraction in employment after 1923. In terms of magnitude, employment at Japanese firms with mean trademark intensity decreased by 15% after the establishment of the law. The effect on Chinese firms was also negative, but its magnitude was smaller and mostly statistically insignificant.[34] Section A.5 in the Online Appendix shows that these effects are robust to different ways of measuring trademark intensity including measures excluding Japanese trademarks, country-specific trademark intensity, and trademark intensity normalized by industry employment.

To ensure that our results are not driven by pre-trends, we estimate equation (2) for the three types of firms. As Figure 6 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 7 shows the corresponding event study for Chinese and Japanese firms, confirming the absence of pre-trends and the negative effect of the trademark law.[35] These results suggest that, after years of Anglo-Japanese trademark conflicts, enactment of China's first trademark law enabled Western firms to grow their trademark-intensive operations in China while disadvantaging Japanese and Chinese businesses.

Next we examine whether the positive effect of the trademark law on Western firm employment indeed reflects variation in firms' dependence on trademark protection, rather than other attributes of firms or products. Though we are unaware of other major shocks in China during 1923, we want to ensure that we are measuring the effect of the trademark law on the firms that were ex-ante most dependent on trademark protection. 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.[36] We find trademark and patent intensity to be only

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[34]Section A.4 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.

[35]We combine Chinese and Japanese firms in the event study; the event study for Japanese firms is noisier because the sample includes fewer Japanese firms. Figure C.7 in the Online Appendix reports the event study for Japanese firms; it still shows a decline in employment but is noisy.

[36]See https://www.uspto.gov/learning-and-resources/electronic-data-products/historical-patent-data-files.

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; the trademark law could 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.[37] In column (5) we check whether the competitiveness in the product category rather than trademark intensity 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. Finally, in column (6) we check whether the size of the firm rather than the trademark-intensity of the product explains our effects by adding interaction terms with firm's average employment before the trademark law was implemented. Overall, none of these measures explain the employment effects of trademark intensity. Finally, we show in column (7) that the estimated effects are not due to general macroeconomic shocks in home countries, measured by home-country GDP, that could have affected trademark-intensive firms differentially.[38,39]

One may also expect trademark protection to be more important for sellers of final goods than for sellers of intermediate inputs, as the former sell to consumers who are more likely to be deceived than businesses due to lack of expertise and infrequent interactions with retailers. Figure 8 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 adoption of the trademark law is only evident for final goods; the effects on intermediate inputs are not significantly different from zero for all three groups.

We next explore how firms grew or shrank in response to the trademark law by exploiting information on employees' job titles. This allows us to understand, for example, whether the growth of Western firms was more mechanically driven by hiring more lawyers in anticipation of law suits, rather than by a general expansion of the business. Because we lack job

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As in the case of trademark intensity, we use the maximum patent intensity across products for each firm.

[37]We use the number of unique firms (or their non-production employment) that offered the product in at least one year between 1920 and 1922.

[38]Note that we already control for general macroeconomic shocks in home countries by including a country-year specific fixed effect.

[39]Section A.3 of the Online Appendix goes further and shows that neither a specific country nor a specific product group drives the results.

titles for some firms in our sample, column (1) of Table 4 applies our baseline analysis to this subsample 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 of 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 on Shanghai in Figure 4. Japanese and Chinese firms' contraction of employment is evident in most hiring categories but particularly pronounced for sales staff.

4.2.2 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 already 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.[40] 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

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

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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.

4.2.3   Brand Investment

If the trademark law helped incumbent Western firms to grow their trademark-intensive products, we would also expect to see increased investment in, for example, brand promotion, as such firms experienced larger returns. Prior to 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 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 how to distinguish the authentic brand from counterfeits would decrease with strengthened trademark protection, as discussed in Section 2.6.

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 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.[41]

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[41]Incentives to invest in product quality can also change with trademark protection. 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 to 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 A.7 of the Online Appendix), we explore in section A.6 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 2.6, trademark protection can generate welfare effects even without changing product quality–by reducing the information asymmetry surrounding the source and attributes of the product.

4.3 Domestic Intermediaries

Next, we examine how the trademark law affected Western firms' incentives to work with intermediaries, both within and outside the boundary of the firm. As Section 2.6 points out, the trademark law reduced the risks of using domestic intermediaries as a mode of distribution and could thereby provide authentic foreign firms with greater incentives to collaborate with local middlemen and agents.

We begin by constructing several variables to capture Chinese employees' positions within the hierarchies of Western firms. First, we distinguish Chinese employees from foreign employees using the names reported in the Hong List. Second, we identify 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 and calculate the average rank of Chinese employees in Western companies' employment hierarchy. Finally, we examine whether Chinese employees filled positions in sales, engineering, and manufacturing.

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)). Further, Chinese employees were more likely to be hired in sales-related positions than in engineering- or production-related positions (columns 6-8). These results suggest that Western businesses became more inclined to promote Chinese employees after enactment of the trademark law, especially in the managerial and sales 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.

A common alternative to setting up a foreign-owned subsidiary in a treaty port like Shanghai was to enter the Chinese market via agents located in China. Before the trademark law, however, Western firms might have feared that Chinese agents would mix their

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branded products with counterfeits, undermining their brand value (Motono, 2011). We test whether Western companies employed more Chinese agents after the trademark law by exploiting the client directory of agents in the Hong List. Table 8 shows 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. In contrast, Western and Japanese firms did not experience significant changes in their numbers of clients.

This pattern suggests heterogeneity in the effect of the trademark law on Chinese firms: those that acted as intermediaries for foreign firms may have grown while others shrank. We examine this possibility in Table 9 by estimating whether Chinese firms that acted as agents for Western firms experienced differential growth. Indeed, though Chinese firms contracted, on average, Chinese agents exhibited strong growth.

4.4 Aggregate Industry-Level Effects

We next examine a longstanding question concerning IP institutional reforms: the implications of stronger IP protection for market competition.

To explore the net effect of the trademark law on industry-level employment and market 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 more product categories with active firms.[42]

These results suggest that the impact of the trademark law went beyond a simple reallo-

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[42]It is noteworthy that an increase in the number or probability of having active firms in a given product category does not reflect 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 4.2.2.

cation from counterfeiting to authentic firms. The law did not reduce overall market competition; instead, it entailed an expansion in total employment and in the number of product categories offered. This finding, in line with the firm-level results reported in Section 4.2.2, 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.

The same effect is also pronounced in prices. In Section A.7 of the Online Appendix, we investigate price responses to trademark registrations. We obtained detailed brand-level price panel data by digitizing issues of *The Shanghai Market Prices Report*, published by the Ministry of Finance, Bureau of Markets, for the period of April 1923-December 1929.[43] We then manually matched all the brands listed in the price reports to trademarks in China's trademark registry, i.e., *Shangbiao Gongbao* (商标公报), based on brand names and trademark images to obtain the registration date of each trademark after the trademark law. Applying the staggered diff-in-diff methodology developed by Callaway and Sant'Anna (2020), we find that Western brands did not increase prices after their trademarks were registered. Instead, brand prices exhibited a slight and statistically insignificant decline after trademark registrations, again suggesting that the trademark law did not reduce market competition.

5 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

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[43]The price reports cover eight product categories: cereals, other food products, textiles, metals, fuels, building materials, industrial materials, and sundries. Each product is "affixed with its trade mark, brand and, in some cases, the name of the company" (*Shanghai Market Prices Report*, April-June 1924, p. 2). The market price reports typically indicate the manufacturer's country of origin, which we classified as Western, Japanese, or Chinese.

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, certain countries were added to or deleted from the list of nations that enjoyed extraterritorial status.[44] These shifts in extraterritorial power caused changes to firms' legal status. In legal disputes, when the defendants' home countries had extraterritorial status, their home-country 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 a dummy variable to denote the commercial treaties that China signed with Great Britain and the United States. These bilateral treaties, which required China to establish its own legal trademark system, among other demands, embodied conflicting interests; both Western nations, such as Great Britain, and Japan attempted to export their respective trademark laws to China, leading to an indefinite postponement in the establishment of a domestic law.

Finally, we include a dummy variable to denote China's first attempt after the 1902-1903 bilateral treaties to establish a domestic trademark code. 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 is interacted with firm-specific trademark intensity.[45] 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. The unenforced 1905 trademark code, as anticipated, 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 institu-

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[44]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).

[45]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 product or service, 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 manually assign products to firms.

tions and bilateral treaties appear to have been largely unsuccessful as means of trademark protection; a positive growth effect was not achieved until the establishment of a domestic trademark institution.

6   Conclusion

In this paper, we investigate how firms on different sides of trademark conflicts adapt to trademark protection by exploiting a historical precedent–the introduction of China's first trademark law of 1923–and a series of newly digitized micro-level datasets in one of the world's most contested markets at the time.

Our empirical evidence 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, which had frequently been accused of counterfeiting, experienced employment contractions while attempting to build their own brands after adoption of the law. The trademark law also led to new linkages 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 significant growth in both employment and the volume of foreign clients.

At the aggregate level, despite widespread concerns over reduced market competition after IP reforms, the trademark law 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 in comparison to other forms of IP and the prospect of enforcing trademark protection and reducing consumer-information frictions while sustaining market competition and fostering domestic sectors. The comparison of alternative institutional attempts also highlights the challenges in addressing international trademark disputes and the importance of domestic institutional reforms, which continue to be salient issues in today's international markets and policy debates.

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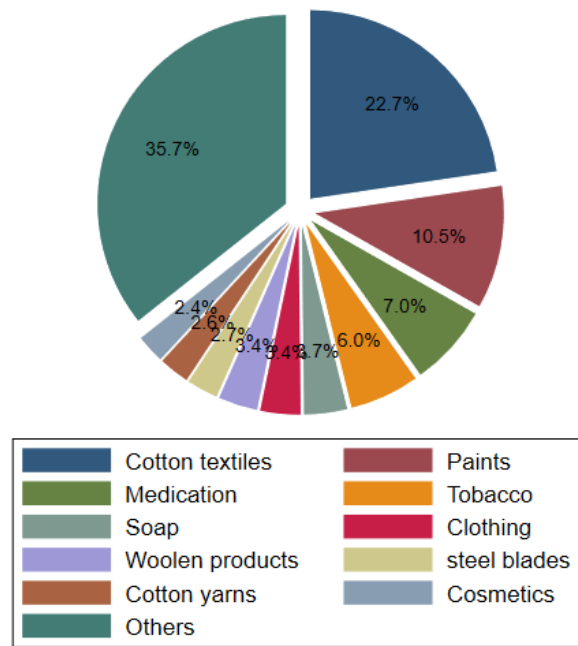
Figure 1: Chinese trademark registries, most common product categories, 1924-1927

Notes: The statistics are based on our own digitization of Chinese trademark registries *(Shangbiao Gongbao* (商标公报)), between 1924 and 1927.
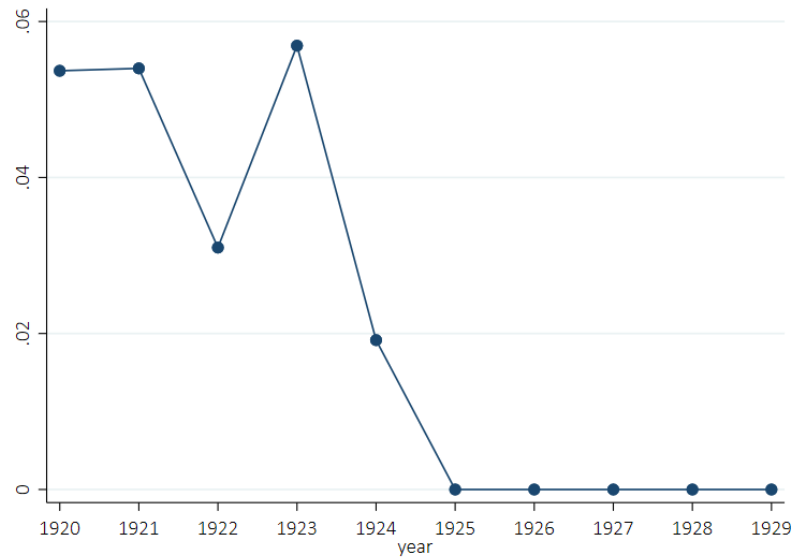
Figure 2: Anti-Imitation Advertisements as a Share of All Advertisements, *North China Herald*, 1920–1929

(a) Number of firms

(b) Total employment
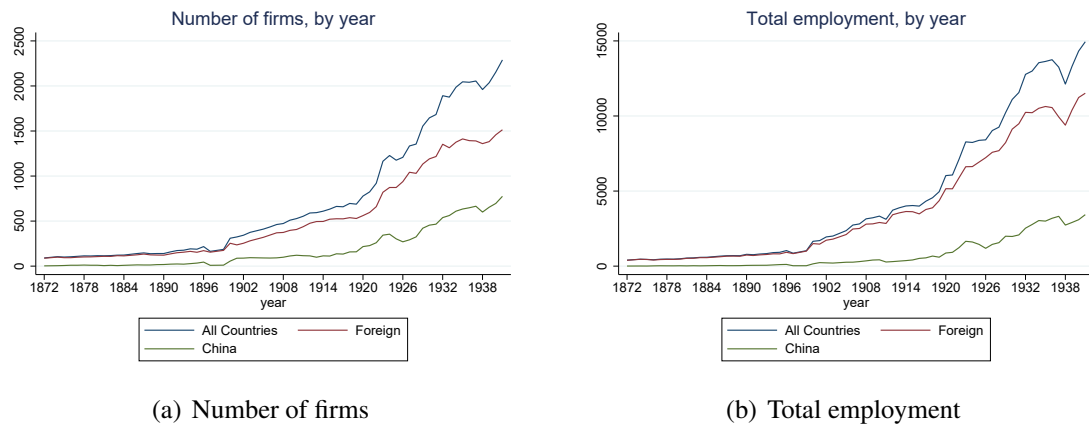
Figure 3: Trends in Firms and Employment in the Shanghai Concessions, 1872-1938
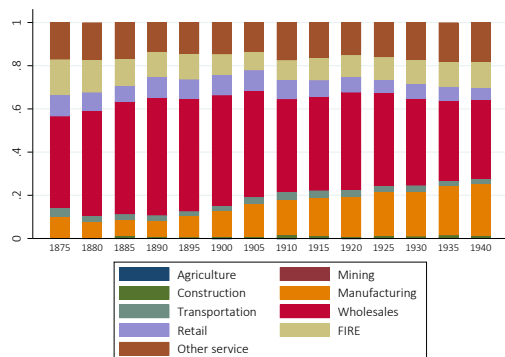
(a) By number of firms
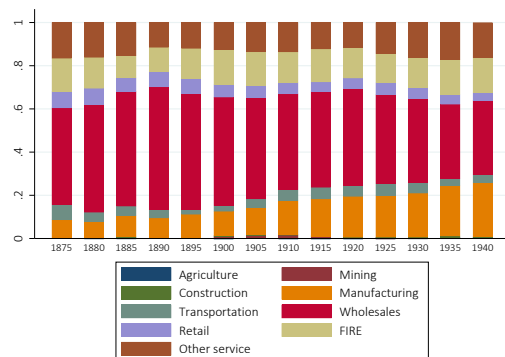
(b) By employment

Figure 4: Composition of Firms in Shanghai's Concessions by Industry, 1875-1941
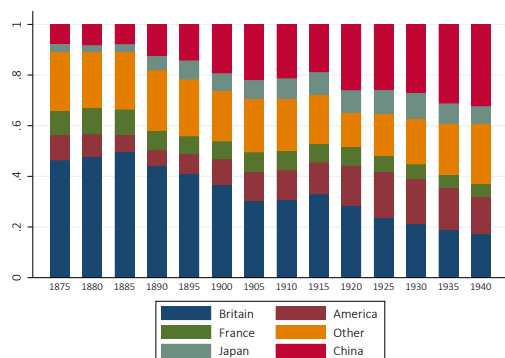
(a) By number of firms
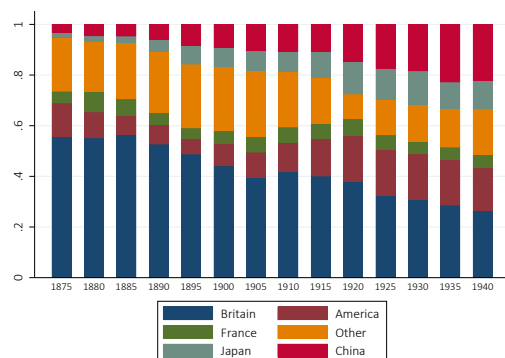
(b) By employment

Figure 5: Composition of Firms in Shanghai's Concessions by Nationality, 1875-1941
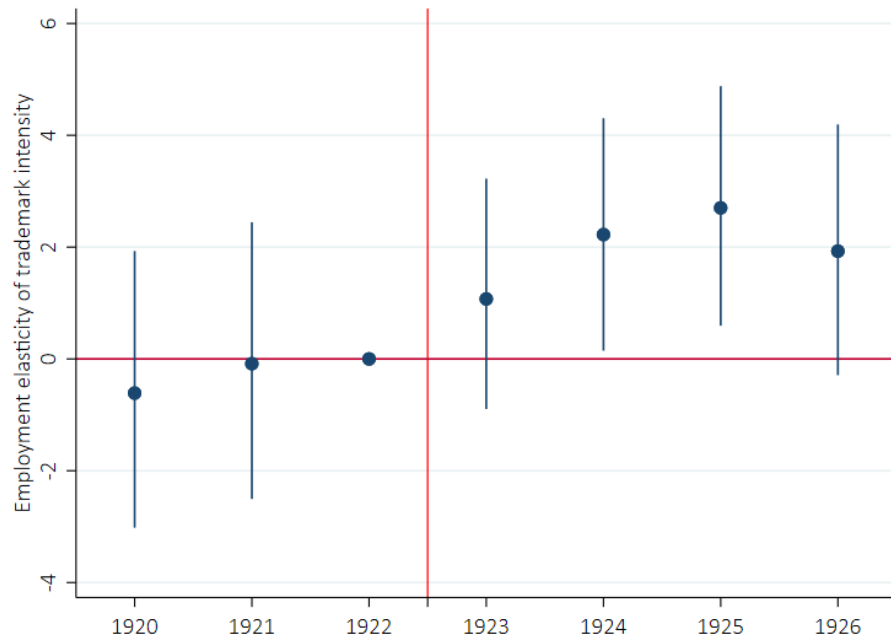
Figure 6: Effect of the 1923 Trademark Law on Employment at Western Firms: Event Study

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).
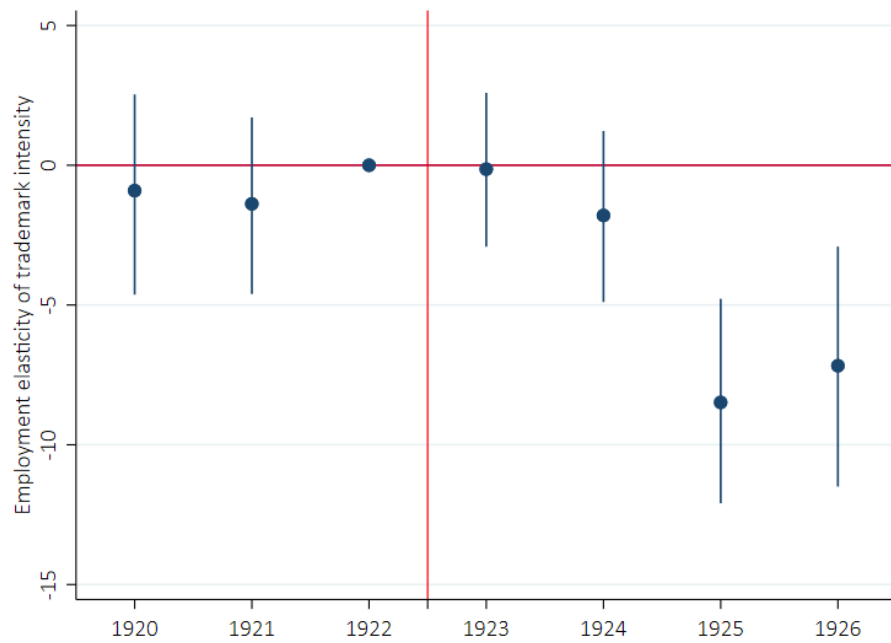
Figure 7: Effect of the 1923 Trademark Law on Employment at Chinese and Japanese Firms, 1920-1926: Event Study

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).
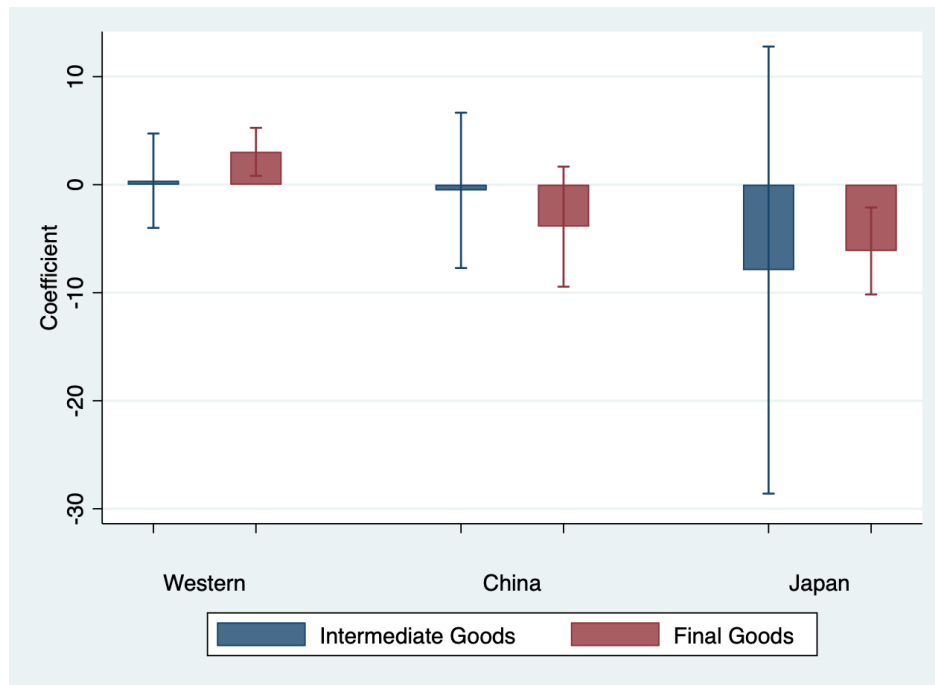
Figure 8: Effect of the 1923 Trademark Law on Intermediate and Final Goods

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	0.088	Fabrics and fabric covers	0.016
Non-medicated cosmetics and toiletry	0.076	Toys, games, sports equipment	0.016
Foodstuffs of plant origin	0.073	Precious metals, jewellery, clocks, watches	0.013
Foodstuffs of animal origin	0.048	Medical equipment	0.013
Alcoholic beverages	0.047	Furniture	0.013
Chemical products	0.046	Natural or synthetic yarns	0.012
Paper, cardboard and office goods	0.045	Dressmakers' articles	0.012
Tobacco	0.041	Leather and leather goods	0.010
Non-alcoholic beverages; beer	0.040	Musical instruments	0.008
Machines, motors and engines	0.036	Canvas and other materials	0.008
Hand-operated tools	0.035	Firearms	0.006
Paints and colorants	0.034	Scientific and technological services	0
Scient. instruments and audio equip.	0.034	Food and drink services	0
Metals	0.031	Telecommunications services	0
Clothing, footwear and headwear	0.030	Transport; packaging and storage of goods	0
Industrial oils and fuels	0.029	Legal, security, and personal services	0
Small, hand-operated utensils	0.026	Medical and veterinary services	0
Live animals and plants	0.024	Construction services; mining and drilling	0
Environmental apparatus	0.024	Business services	0
Vehicles	0.021	Treatment and recycling	0
Electrical, thermal, acoustic insulating material	0.021	Insurance, financial and real estate services	0
Materials, not of metal	0.018	Education, entertainment, sports	0

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)	(2)	(3)	(4)
	ln(empl)	ln(empl)	ln(empl)	ln(empl)
Post 1923 * trademark intensity				
– Western firms	1.408*	1.748**	2.177**	2.223**
	(0.821)	(0.774)	(1.058)	(1.063)
– Chinese firms	-1.842	-1.814	-3.096	-3.960*
	(1.655)	(1.678)	(2.395)	(2.251)
– Japanese firms	-0.401	-0.071	-6.849***	-8.897***
	(2.112)	(2.599)	(1.840)	(2.338)
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)	(2)	(3)	(4)	(5)	(6)	(7)
	ln(empl)	ln(empl)	ln(empl)	ln(empl)	ln(empl)	ln(empl)	ln(empl)
Post 1923 * trademark int.							
– Western firms	2.177**	2.068*	2.148*	2.078*	2.208**	1.698*	2.953***
	(1.058)	(1.056)	(1.059)	(1.060)	(1.009)	(0.956)	(1.006)
– Chinese firms	-3.096	-3.100	-3.091	-3.084	-3.187	-2.556	-3.011
	(2.395)	(2.314)	(2.399)	(2.405)	(2.378)	(2.155)	(2.380)
– Japanese firms	-6.849***	-7.201***	-5.501**	-5.923***	-7.052***	-7.310***	-6.311***
	(1.840)	(2.282)	(2.037)	(2.064)	(2.459)	(2.139)	(1.857)
Post 1923 * control							
– Western firms		0.429	-0.004	-0.008	-0.029	-0.089***	
		(0.564)	(0.016)	(0.008)	(0.129)	(0.023)	
– Chinese firms		0.469	0.002	0.004	0.145	-0.075*	
		(0.426)	(0.030)	(0.029)	(0.199)	(0.040)	
– Japanese firms		-0.957	0.097*	0.056	0.081	0.082	
		(2.045)	(0.054)	(0.044)	(0.373)	(0.112)	
Trademark int. * ln(real GDP)							-5.552
							(5.206)
Control		patent intensity	ln(number of firms)	ln(total empl)	Herfindahl-Index	ln(avg empl 20-22)	
Observations	3,006	3,006	3,006	3,006	3,006	3,006	3,006
R-squared	0.913	0.913	0.913	0.913	0.913	0.914	0.913

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	3.566**	0.913	0.453	0.732*
	(1.326)	(0.573)	(1.179)	(0.394)
– 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	0.709	0.785

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	-0.621	-0.717**
	(0.648)	(0.321)	(0.771)	(0.715)	(0.268)
– Chinese firms	-0.345	-1.423**	1.077	-0.585	-0.093
	(0.746)	(0.596)	(0.853)	(0.641)	(0.344)
– Japanese firms	-1.594*	0.035	-1.629	2.334***	-3.193
	(0.893)	(0.728)	(1.345)	(0.189)	(2.538)
Observations	7,652	7,652	7,652	2,782	2,782
R-squared	0.667	0.572	0.556	0.318	0.342

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	0.542	3.316*	3.366*
	(0.877)	(1.887)	(1.950)
– Chinese firms	-0.300	0.641	0.567
	(0.578)	(2.137)	(2.221)
– Japanese firms	3.464**	3.060	3.680
	(1.457)	(2.013)	(2.260)
Observations	3,098	3,098	3,098
R-squared	0.695	0.809	0.805

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)	(6)	(7)	(8)
				Hierarchy		Job titles		
		ln(foreign	Dummy	Dummy	Avg layer of	Chinese	Chinese	Chinese
	ln(empl)	empl)	Chinese empl	Chinese mgr	Chinese empl	sales staff	engineers	manuf staff
Post 1923 * trademark int.								
– Western firms	2.177**	1.646	1.995**	0.719***	-0.818***	0.130**	-0.690	-0.386
	(1.058)	(1.033)	(0.789)	(0.201)	(0.279)	(0.062)	(0.535)	(0.437)
– Chinese firms	-3.096	-1.538	-0.024	-0.503***	0.206***	-1.075	-0.129	0.912***
	(2.395)	(1.416)	(0.195)	(0.034)	(0.062)	(1.039)	(0.221)	(0.256)
– Japanese firms	-6.849***	-9.394***	-1.998	-1.468	2.853	0.043	0.000	0.000
	(1.840)	(3.031)	(2.323)	(0.871)	(2.022)	(0.052)	(0.000)	(0.000)
Observations	3,006	3,006	3,006	3,006	1,607	2,344	2,344	2,344
R-squared	0.913	0.948	0.809	0.656	0.593	0.741	0.751	0.387

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 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 the presence of Chinese employees and managers, Chinese employees' average rank/layer in the management hierarchy, and the presence of Chinese sales, engineering, and manufacturing staff, 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 8: Client Growth at Chinese Intermediary Firms

	(1)	(2)
	Dummy having clients	ln(num clients+1)
Post 1923 * trademark intensity		
– Western firms	-0.247	-1.858
	(0.631)	(2.279)
– Chinese firms	1.606***	2.672***
	(0.459)	(0.593)
– Japanese firms	-0.036	-3.601
	(0.823)	(2.559)
Observations	3,006	3,006
R-squared	0.770	0.783

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. 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)	(2)	(3)
	ln(empl)	Firm entry	Firm exit
Post 1923 * trademark intensity	-3.657	-0.701	-1.212*
	(2.415)	(0.881)	(0.614)
Post 1923 * trademark intensity * agent dummy	14.855*	7.319*	-3.367
	(7.197)	(3.163)	(2.237)
Post 1923 * agent dummy	-0.387**	-0.508***	0.121
	(0.115)	(0.117)	(0.103)
Observations	868	2,330	2,330
R-squared	0.881	0.665	0.555

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)	(2)	(3)	(4)	(5)	(6)	(7)
	ln(empl)	ln(empl+1)	ln(empl)	ln(empl+1)	ln(# firms)	ln(# firms+1)	Firm dummy
Post 1923*trademark int.	3.564*	9.315***	1.589	8.642**	0.076	5.920*	2.279*
	(1.904)	(3.269)	(1.384)	(3.902)	(1.739)	(3.179)	(1.175)
Observations	548	1,274	575	1,274	582	1,274	1,274
R-squared	0.848	0.757	0.875	0.739	0.904	0.745	0.626

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.

	(1)	(2)	(3)	(4)	(5)	(6)
	ln(empl)	ln(empl)	ln(empl)	ln(empl)	ln(empl)	ln(empl)
Part I: ET						
ET	0.099	0.143	0.182	0.182	0.131	
	(0.090)	(0.141)	(0.152)	(0.152)	(0.166)	
ET*trademark intensity		-1.445	-2.591	-2.593	-1.272	-3.534
		(2.811)	(2.880)	(2.877)	(3.402)	(4.175)
Part II: Bilateral Treaties						
Treaty				-0.289**	-0.289**	-0.281*
				(0.142)	(0.142)	(0.144)
Post 1904*trademark intensity				-6.775**	-6.447***	-6.301***	-8.774***
				(2.640)	(1.620)	(1.584)	(2.478)
Treaty*trademark intensity				3.640	3.640	3.361	5.782
				(3.055)	(3.055)	(3.103)	(4.337)
Part III: Provisional Trademark Code						
(Post 1905)*trademark intensity					-0.349	-1.478	-1.431
					(2.408)	(2.228)	(2.413)
Part IV: 1923 Trademark Law						
(Post 1923)*trademark intensity						3.142**	3.493**
						(1.478)	(1.602)
Observations	17,768	17,768	17,768	17,768	17,768	17,520
R-squared	0.772	0.772	0.773	0.773	0.774	0.784
Country-year controls	Yes	Yes	Yes	Yes	Yes	No

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 and the United States, respectively. *Post 1905* is a dummy denoting a trademark code proposed in 1905 but not enforced. *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. 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   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 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 census of the international concession; we believe that this finding confirms the thoroughness of the Hong List's coverage.

A.2   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.2. 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.3   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.4   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.[1] The source of the data is the annual series "Foreign Trade of China," published by the *Statistical Department of the In-*

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[1]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.

spectorate 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).[2] Our analysis focuses on the products that 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:

$$\ln(imports_{pct}) = \beta_0 + \beta_1 * TrademarkInt_p * Post1923_t + FE_{pc} + FE_{ct} + \epsilon_{pct} \quad (3)$$

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 3.2, $Post1923_t$ 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 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).[3]

Table B.3 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.3'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

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[2] 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.

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

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 (3) by estimating:

$$\ln(imports_{pct}) = \beta_0 + \sum_{t=1920}^{1928} \beta_t * TrademarkInt_p + FE_{pc} + FE_{ct} + \epsilon_{pct} \qquad (4)$$

Figure C.8 shows the estimation results. There is no evidence of pre-trends: coefficients before 1923 are smaller by an order of magnitude and insignificantly different from zero; coefficients after 1923 are consistently large and mostly significantly different from zero. The effect of the trademark law appears, however, 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.3 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.

A.5 Robustness to Alternative Measures of Trademark Intensity

Table B.4 uses alternative measures of trademark intensity. Column (2) computes the mean trademark intensity across all products that the firm offers (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 size of the industry. Table 3 has already shown that our results are robust to controlling for the size of a given industry in Shanghai; but 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.[4] Though doing so rescales the trademark-intensity variable using employment,

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[4]We are grateful to Dave Donaldson, James Lee, and Rick Hornbeck for sharing digitized U.S. census data. Employment data detailed enough to match to NCL product categories are only available for the United States.

we continue to find significantly positive effects only for Western firms. Chinese firms, on the other hand, are estimated to have experienced significant employment losses.[5]

A.6 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 as they capture a larger market share, charge higher prices, and/or experience larger demand as consumers worry less about counterfeits. On the other hand, 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 A.7 below), 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.5, columns (1) to (3), we find an insignificant increase in such advertising.[6]

A.7 The Effect of Trademark Registration on Prices

Section 4.4 has documented a net increase in employment and the number of product categories after adoption of the trademark law. Here, we examine how the trademark law might have influenced prices, another important outcome for assessing the impact of trademark institutions on market competition and consumer welfare. Ex ante, trademark protection is likely to exert an ambiguous net effect on prices. Prices might rise if authentic producers gain market power via market reallocation or increased consumer demand or raise quality; the opposite might occur if, for example, authentic producers achieve greater economies of scale thanks to an expanded market share or to lower product quality (if they feel less need to distinguish themselves from counterfeiters).

We obtained detailed brand-level price panel data by digitizing issues of *The Shanghai Market Prices Report*, published by the Ministry of Finance, Bureau of Markets. Specifically, we digitized *Wholesale Prices of Commodities at Shanghai* or *The Table of Wholesale Prices in Shanghai* (in later issues), which reported monthly price series beginning in April 1923.

The price reports cover eight product categories: cereals, other food products, textiles, metals, fuels, building materials, industrial materials, and sundries. Each product is "affixed with its trade mark, brand and, in some cases, the name of the company" (*Shanghai Market Prices Report*, April-June 1924, p. 2). We considered only products consistently reported

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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.

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

[6]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.

between June 1923 (some prices were missing before this date) and December 1929, yielding 117 products. Of these, 39 listed at least one brand name (as opposed to a generic product description); we use this subset for our analysis.[7] The market price reports typically indicate the manufacturer's country of origin, which we classified as Western, Japanese or Chinese.

We then manually searched all the brands listed in the price reports in China's trademark registry, i.e., *Shangbiao Gongbao* (商标公报) based on the texts or images of the trademarks (we located all volumes of trademark catalogs prior to December 1927 except the first). We found trademark registrations for 28 products.

Because price data are only available beginning in April 1923, one month before the trademark law was announced, we employed a different empirical strategy than the specifications used earlier: we manually checked the Chinese trademark registry to identify if and when a given brand was registered, and implemented a staggered differences-in-differences estimation. Since gradual adjustment of prices can bias the coefficients in the standard OLS estimation, we estimated the average effect on the treated (ATT) using the method presented in Callaway and Sant'Anna (2020).

Table B.6 presents the results. Column (1) uses the potentially biased OLS, which shows a positive but insignificant effect on prices after trademark registration. Column (2) reports the ATT estimated using the Callaway and Sant'Anna (2020) method, which is slightly negative but insignificant. Columns (3) and (4) repeat the analysis on the sample of Western products; the negative effect becomes stronger but is still insignificant.

Before we could trust the estimates, we again needed to check for pre-trends. Figure C.10 shows that log prices were stable in the months before a trademark was registered, declined upon registration, and stabilized after about 8 months. We also formally tested for pre-trends using the method described by (Callaway and Sant'Anna, 2020) and found no evidence for them.

Overall, we find no evidence that authentic producers raised prices as a result of 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.

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[7]In some instances, product prices were missing for specific months. To generate a fully balanced panel, necessary for the method suggested by Callaway and Sant'Anna (2020), we replaced the missing data with prices from the previous period.

B Online Appendix — Tables

Table B.1: Summary Statistics

	(1) Observations	(2) Mean	(3) Std.dev.	(4) Min	(5) Max
Number of employees	3220	10.215	20.864	1	387
Chinese employees as share of total employees	3220	0.298	0.382	0	1
Number of products	3220	1.635	1.222	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	0.279	0.449	0	1
Japanese firm dummy	3220	0.081	0.272	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: 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.3: 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 ≥ 1923) * All countries excl. Japan	16.263**	22.591**	23.029**	0.637**
	(7.415)	(9.194)	(9.337)	(0.290)
Trademark intensity * (Post ≥ 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.4: Robustness to Alternative Measures of Trademark Intensity

Dependent variable: ln(empl) TM intensity measure:	(1) baseline	(2) mean	(3) excl. Japan	(4) country-specific	(5) 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

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.5. 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.5: 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	0.119	0.979	0.996
	(0.425)	(0.689)	(0.750)
– Chinese firms	-0.363	-0.001	-0.118
	(0.268)	(0.664)	(0.696)
– Japanese firms	n/a	n/a	n/a
Observations	3,098	3,098	3,098
R-squared	0.585	0.671	0.669

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.6: Effect of Trademark Registrations on Prices

	(1)	(2)	(3)	(4)
Sample:	All products		Western products	
	ln(price)	ln(price)	ln(price)	ln(price)
Post trademark registration	0.039	-0.010	0.041	-0.032
	(0.038)	(0.034)	(0.043)	(0.037)
Observations	3,042	3,042	2,418	2,418
R-squared	0.140	n/a	0.132	n/a
Method	OLS	CS	OLS	CS

Notes: This table reports the estimated effect of trademark registrations on prices. Columns (1) and (3) estimate OLS regressions of log monthly prices on an indicator variable designated 1 after the product's trademark was registered in China, including time and product fixed effects. Standard errors are clustered by product category. Columns (2) and (4) compute the average treatment effect based on the method of Callaway and Sant'Anna (2020) (designated CS) which is appropriate for staggered differences-in-differences settings, and implicitly allows for product and time fixed effects. Columns (3) and (4) restrict the analysis to products manufactured by Western companies. *** p<0.01, ** p<0.05, * p<0.1.

C   Online Appendix — Figures
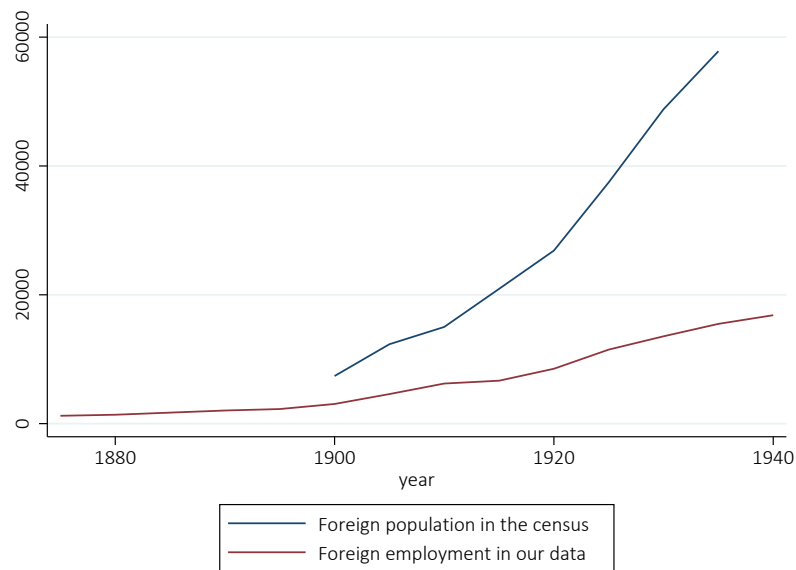
(a) All concessions
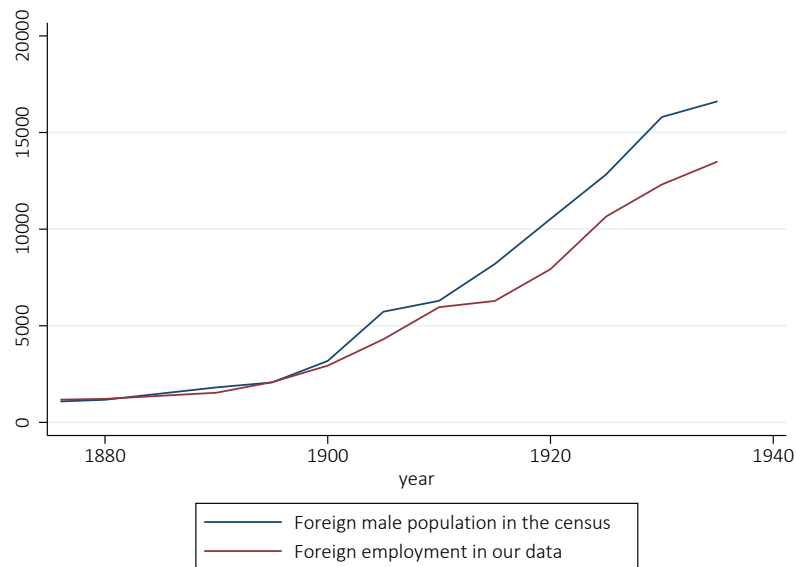
(b) International concession

Figure C.1: Data Validation

SHANGHAI HONG LIST, 1927

A

商 業 印 字 房
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

祥 記 *Zeang-kee*
229 Szechuen Road
Cent. 1829   P.O. Box 241
Tel Add : Abdoolally

Abdoolally, Ebrahim & Co.
*Merchants and Com-
mission Agents*
Ebrahim, D. E. (ab.)
Ebrahim, S. C.   ,,
Poonawalla, G. F., mgr.

鼎 興 *Ting-shing*
12a Nanking Road
Cent. 6320   Tel Add : Abbros

Abraham Bros.
*Importers, Exporters and
Commission Agents; Customs
Clearance, Shipping and
Forwarding Agents*
Abraham, D.
Johnnison, Y.
Abraham, I.
Sze, N. Y.

丰 盒 *Yik-foong*
23 Peking Road
Tel Add : Pigeon

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

凱 時 *Ka-sze*
7 Ezra Road   Cent. 1864
Tel Add : Abkatz

Abraham, Katz & Co.
Importers and Exporters
Katz, M.

蓄 電 池 製 造 有 限 公 司
12a Nanking Road   Cent. 4195
Tel Add : Tudorwerk

**Accumulatorenfabrik-
Aktiengesellschaft**
(Engineering Office)
Schmidt, G., mgr.
Schade, Miss M.

三 德 *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., Ger-
many
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.

英 商 達 利 鐵 廠 有 限 公 司
*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.

大 美 保 險 公 司 *Dah-me*
Room 113, H. & S. Bank Bldg.
Tel Add : Happy

Adams, William A.
General Insurance Broker
Adams, W. A.
Cheng, S. F.
Agent for—
Great American Ins. Co.

大 同 *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

諦 金 吉 *A E G*
33 Kiangse Road
Cent. 7472
Tel Add : Aegchinaco

A E G China Electric Co.
*Electrical Manufacturers
and Contractors*
Junginger, L., dir.
Schulze, C., elect. engr.
Jaach, J. G., elect. engr., T'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, Ena-
melling, 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. 9ᴀ, 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

英商駐華英美煙
公司有限公司美

*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 To-
bacco 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

Heuckendorff, 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.

Legal Dept.—

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.

Accounting Dept.—

Foster, W. C., accnt.

McKenzie, S. F.,
sub-accnt.

Barnes, D. J.

Bauld, Miss I.

Beale, C. J.

Beesley, O.

Berry, Miss E. L.

Boulton, F.

Britto, J. C.

Brockett, G. E.

Corveth, A. H.

Coulon, Mrs F. V.

Dillon, Mrs. O. N.

Emamooden, E. T.

Eymard, E.

Ferreira, F. M.

Ferrier, J. B.

Gaberman, A.

Guedes, L. M.

Hall, P.

Harran, C. R.

Henningsen, Mrs. M.

Hooper, E. T.

Hyndman, P. S.

Jack, Mrs. A. E.

Langley, H.

Lintilhac, Miss E. M.

Mahomad, A. S.

Moore, H.

Noakes, Mrs. M.

O'Brien, R.

Prentiss, Mrs. J.

Raeburn, D. J.

Rapanakis, A. G.

Rawlinson, H. T.

Remedios, F. M. dos

Riboiro, Miss A. M.

Roberts, F. C.

Roza, A. J.

Roza, Miss I.

Rosario, J. M.

Shaw, Mrs. H.

Sullivan, C. A.

B.-A. T. Co. —cont.

Smith, H. J. P.

Swindell, Miss D. A.

Syms, C. V.

Thorpe, E. F.

Webb, W. S.

Whitehouse, H. T.

Wilson, Miss M. E. C.

Worby, G.

Advertising Dept.—

Bungey, W. S.

Berrien, E. G.

Block, R. F.

Crane, W. H.

Gomez, G.

Hunter, Miss J. K.

Illium, H. C.

Kikoin, A. Z.

Pennell, W. A.

Pettitt, A. V.

Seaborn, Miss M.

Snyder, O. W.

Eastern Division—

Dowding, J. C.

Stafford Smith, F

Exchange Dept.—

Peacock, C. S.

General—

Barker, G. S.

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.

Insurance Dept.—

Konch, O. C.

Motion Picture Dept.—

Jansen, W. H.

Jones, E. T.

Buckstone, W.

Choogainova, Miss M.

Herzberg, M.

Jensen, J. V.

Krainukoff, G. T.

Leontieff, T. T.

Nehoroshkoff, A.

Oushkoff, A.

Polgolsky, E.

Purin, A.

Stops, Miss L.

Vouich, Miss M.

Traffic Dept.—

Thomas, H.

Solomon, H. H.

Blinko, A. R.

Andrews, H. T.

Baptista, T.

Browning, F.

Cameron, W. G

Diniz, Miss M. B.

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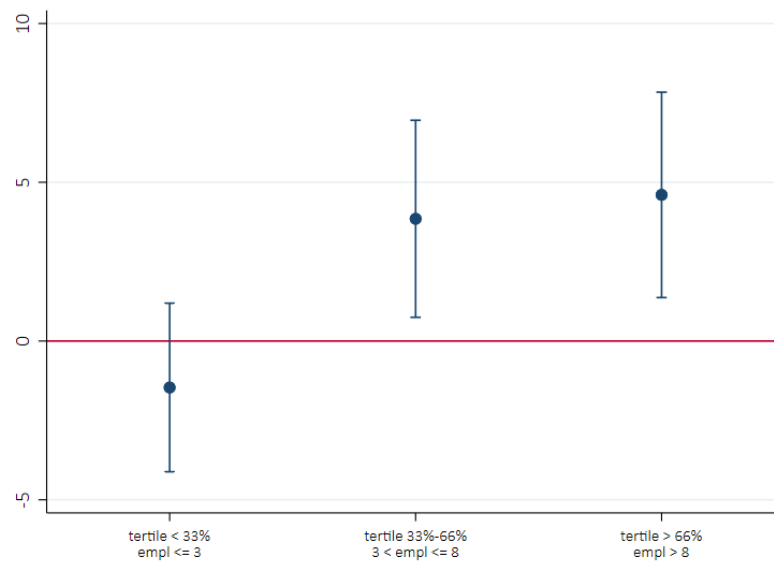
Source: The 1906 and 1926 issues of the Hong List.

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.
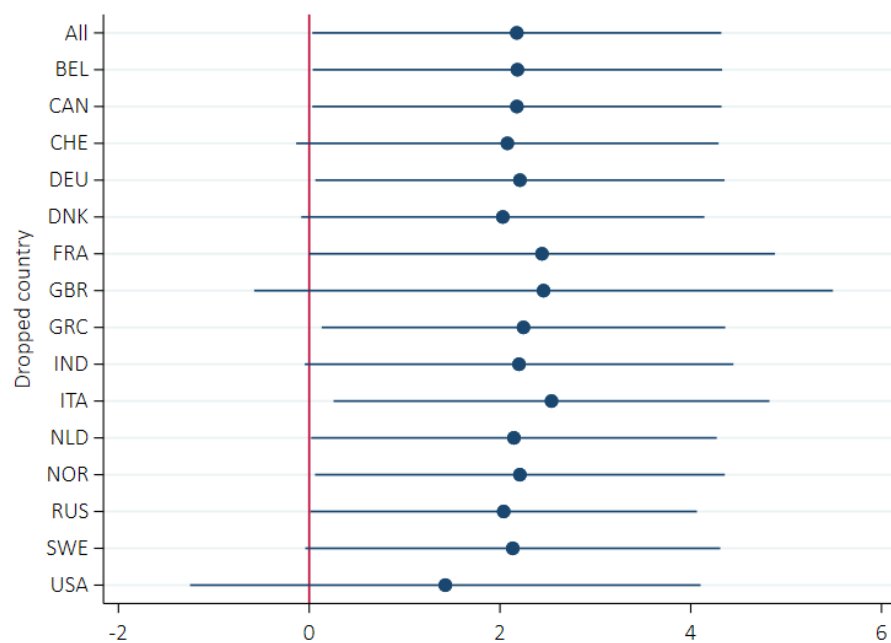
Figure C.5: Effect of the Trademark Law on Employment at Western Firms, dropping one home country at a time
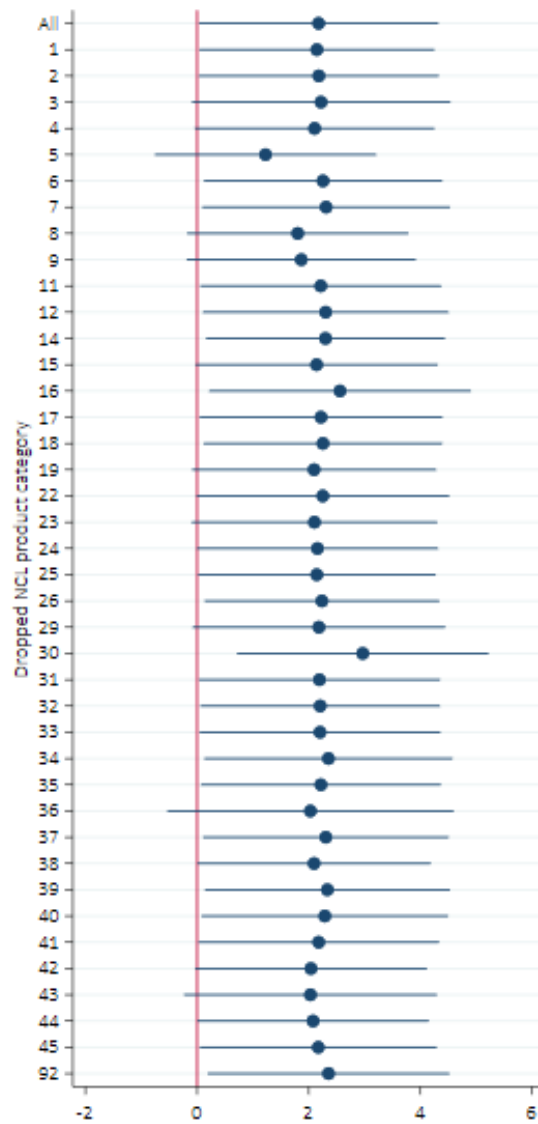
Figure C.6: Effect of the Trademark Law on Employment at Western Firms, dropping one
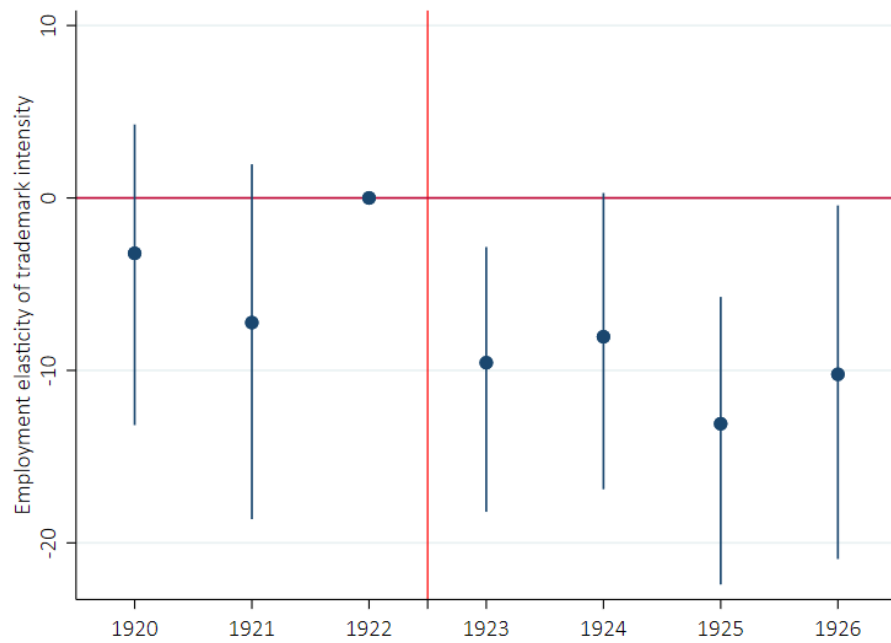NCL product category at a time

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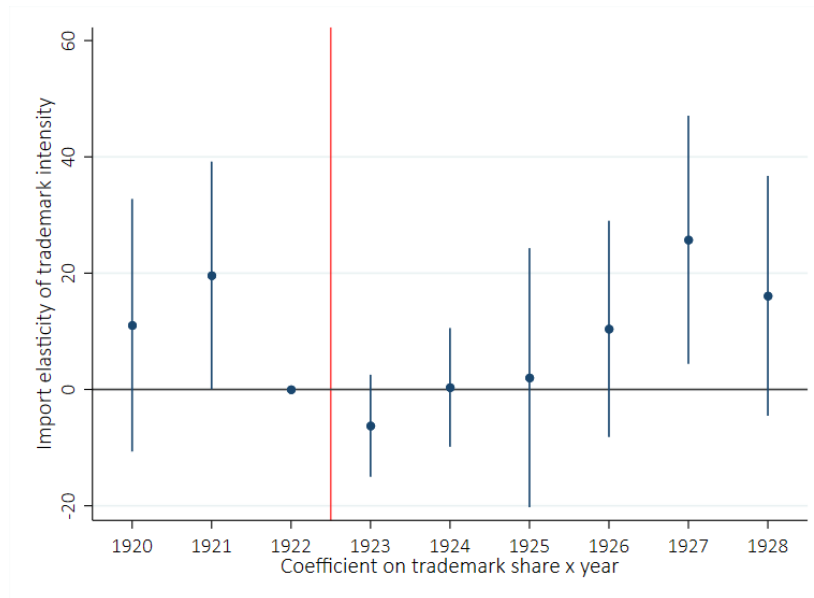
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Figure C.9: Effect of the Trademark Law on Chinese Imports from Japan: Event Study

Notes: Observations from Japan are added to the sample, and estimating equation (3) 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.
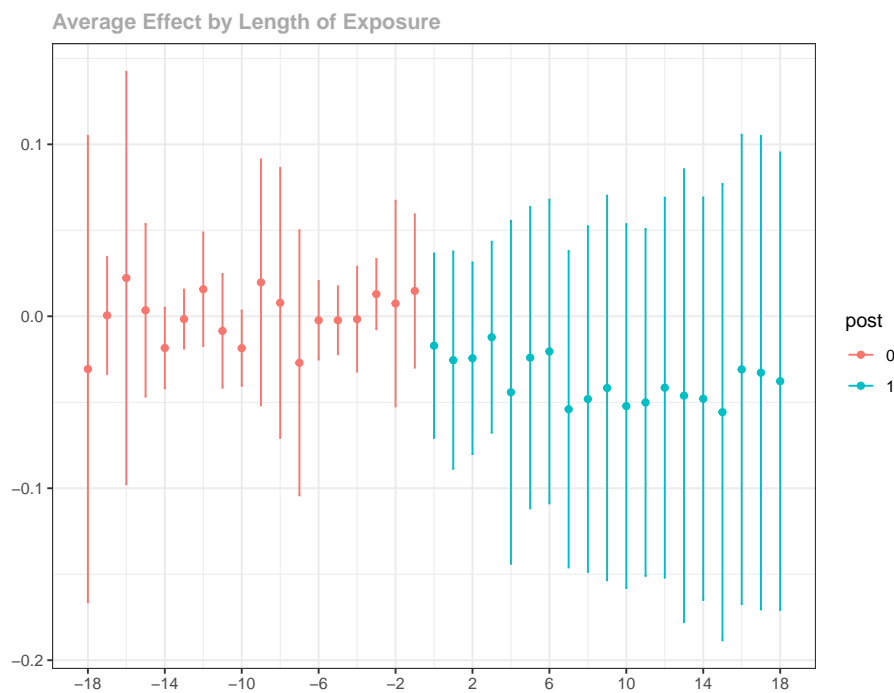
Average Effect by Length of Exposure

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

Notes: The figure plots 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.