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

January 2024

Abstract

We investigate how firms, markets, and consumer welfare adapt to trademark protection, an extensively utilized but under-examined form of IP protection intended to address asymmetric information, by exploring a historical precedent: China's trademark law of 1923. Exploiting unique, newly digitized firm-employee, price, and newspaper data from Shanghai's Concession Era, we show that the trademark law, established as an unanticipated and Western-disapproved response to end foreign privileges in China, significantly reduced information friction and shaped firm dynamics and market allocation on the opposite sides of trademark conflicts. Western firms that suffered from counterfeits decreased dependence on alternative communication channels and gained market share from Japanese counterparts who were most frequently accused of counterfeiting. The reduced information friction did not result in higher brand prices as new authentic varieties emerged after the law, leading to a coexistence of trademarks and competitive markets. Quantifying the consumer welfare effect based on the empirical findings suggests a 4.2% welfare gain from the trademark law. A comparison with previous attempts by foreign powers—such as extraterritorial rights and bilateral treaties—shows that the alternative institutions were broadly unsuccessful.

JEL: K11, D2, O1, O3, N4, F2

Keywords: trademark, intellectual property rights, information friction, asymmetric information, reallocation, competition, consumer welfare

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

†Harvard Business School, NBER and CEPR, lalfaro@hbs.edu; UIBE, baoge@uibe.edu.cn; George Washington University, xchen@gwu.edu; UIBE, hongjunjie@uibe.edu.cn; Ludwig Maximilian University of Munich, claudia.steinwender@econ.lmu.de. We thank Arnaud Costinot, a second co-editor, and three anonymous referees for valuable comments and suggestions. We also thank Kyle Bagwell, Dave Donaldson, Ruixue Jia, Wolfgang Keller, Rocco Macchiavello, Petra Moser, Nancy Qian, Marco Tabellini, David Weinstein, Daniel Xu, and seminar and conference participants at Yale, Stanford, Northwestern, MIT Sloan, NYU, Michigan, Duke Fuqua, Georgetown, HEC, Brandeis, Vienna, HKU, Pompeu Fabra, Max Planck Institute, ifo, Bocconi, Padova, Frankfurt, PSE, NBER China Group, NBER Productivity, CEPR ERWIT, Barcelona GSE, British Academy, UCL Gorman, EOS, VfS, WEHC, BER ITI, and SIOE for helpful feedback, and our research assistants Bennett Adamson, Chelsea Carter, Gerard Domenech Arumi, Mona Dong, Zineb El Mellouki, Zhihua Guan, Sara Ji, Chris Kaiser, Xueyun Luo, Yifan Mao, Feifei Mi, Emanuela Migliaccio, Erxiao Mo, Julia Reinhold, Alexander Shusko, Mengru Wang, Alison Zhao, and Tianyu Zhao for outstanding assistance. We acknowledge Harvard's China Fund Faculty Grant, GW IIEP and CIBER, and MIT Sloan's EFA and JFRAP for support.

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., 70% of the 26 million IP filings in 2021); within IP-intensive sectors, trademark-intensive industries contribute most to employment (90% in the United States; 78% in Europe).[2] However, a considerable disparity persists in trademark institutions worldwide with many less-developed nations continuing to provide limited to minimal protection despite pressure from businesses and governments in high-income countries.[3] The economic importance of trademark protection also stands in stark contrast to the academic literature, which has focused primarily on innovation-related IPs (namely, patent and copyright protection), with relatively little analysis exploring the effects of trademark institutions.

This paper aims to fill the gap by investigating how trademark institutions affect firm growth, market allocation, and consumer welfare. We address the question by exploiting an exogenous institutional shock provided by a historical policy experiment—the unanticipated, Western power-disapproved introduction of China's first trademark law in 1923—in one of the world's most contested markets for trademark protection. We draw on a series of newly digitized micro-datasets covering Shanghai's Concession Era to examine how different sides of trademark conflicts—authentic producers, counterfeiters, and consumers—respond 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., Akerlof, 1970; Shapiro, 1982; Shapiro, 1983).[4] In the presence of

[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 United States 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 WIPO (2022), USPTO (2020), EUIPO (2022a), and EUIPO (2022b).

[3] See the *2023 International IP Index* (Category 3) (https://www.uschamber.com/intellectual-property/2023-international-ip-index) and OECD and EUIPO (2019).

[4] As defined by the USPTO, a patent is a "limited duration property right relating to an invention in exchange for public disclosure of the invention." It protects "the right to exclude others from making, using, offering for sale, or selling an invention." A copyright protects "original works of authorship" in literature, music, art, architecture, and software. Patents and copyrights address market failures associated with the public-good nature of knowledge and aim to provide incentives for innovation and knowledge creation. As Besen and Raskind (1991) note, "patents require novelty; copyright requires originality; the counterpart of these terms for trademarks is distinctiveness."

such information friction, markets can fail to provide an efficient allocation of resources across producers (Akerlof, 1970). This problem is especially salient in international markets when sellers and buyers come from different nations and face greater information asymmetries. One way to overcome the information friction is for sellers to use trademarks to disseminate information and signal producer identity to the consumer, enabling firms to build reputation and benefit from reputation over time. However, trademark infringements by counterfeiters undermine the function and value of this firm-specific asset.[5] Trademark protection—protection of a firm's exclusive right to use a mark—is therefore needed to ensure trademarks' effectiveness at resolving the information-asymmetry problem. Because of the distinct rationale and the specific rights protected, the impacts of trademark protection on firm decisions, market competition, and consumer welfare may differ significantly from those of patent and copyright protection.

The establishment of trademark law can affect firms and consumers in complex ways. First and foremost, trademark protection, by strengthening the role of trademarks in conveying the identity of producers, reduces consumers' difficulty in assessing unobserved product attributes and authentic firms' dependence on alternative communication channels. Second, trademark protection leads to a direct market reallocation from counterfeiters to authentic producers, improving the allocative efficiency of markets and resources. Third, by raising consumers' confidence in receiving authentic products, trademark protection may expand both overall demand for brand products and consumers' choice set. Fourth, 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 hinder the entry of new authentic varieties. The aggregate effect of trademark protection on consumer welfare depends on the magnitude of the reduced information friction and the subsequent changes in price, market allocation, and varieties. Importantly, unlike patent and copyright protection, whose welfare effect hinges on the tradeoff between innovation and market competition, trademark protection offers a source of welfare gains—reduced information friction—that may coexist with market competition. As a result, trademark institutions, as shown in Grossman and Shapiro

[5]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 lawsuits and trademark disputes. In the words of the *North China Herald*: "Such an imitation when it has been intended to be and has been the means of inducing persons to part with their money, in the belief that they were buying one thing when in fact they were buying another, is sufficient to support a conviction on an indictment for obtaining money by false pretenses." North China Herald, 'A Cotton Fraud: Need of Criminal Law', May 8, 1920.

(1988a), entail an unambiguous increase in welfare when there is free entry.

A key challenge in assessing the economic 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. 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 enjoyed by foreign powers due to a series of "Unequal Treaties" signed in the previous century. The law, established to move a step closer to the abolition of foreign privileges, offers an exogenous fundamental trademark institution shock that is unusual in the history of trademark laws.

The timing of China's 1923 trademark law was also unanticipated. After the Opium Wars in the mid-1800s, British businesses attained early dominance in the Chinese market, but Japan challenged this status after the Treaty of Shimonoseki in 1895. Japanese counterfeits of Western trademarks, spanning from tobacco and textiles to food and cosmetics, rose rapidly, leading to a large volume of trademark disputes between Western nations and Japan (Patent and Trade Mark Review, 1907; Motono, 2011). In response, both Great Britain and Japan attempted to export their trademark laws with contradictory filing principles, but their disagreements led to an indefinite postponement of 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 implemented. All foreign treaty nations refused to recognize the law, fearing the loss of long-standing treaty privileges, only to be overtaken by reality as firms raced to register trademarks afraid to lose to competitors.

Another important advantage of our historical setting is the availability of a series of novel micro-level datasets covering periods both before and after the introduction of a modern trademark institution in one of the world's most sought-after emerging markets. Shanghai, a city that rose to become China's economic hub by the 1930s, accounted for over half of China's trade and two-thirds of its inward FDI in manufacturing (Ma, 2008). Like many less developed countries today, Shanghai, in the early 20th century, was undergoing a significant economic and institutional transformation, providing us with a unique lens to study how trademark institutions may shape firms and markets in emerging economies. We manually digitized and assembled a rich annual business-employee panel dataset covering the universe of firms operating in Shanghai's concession areas from 1872-1941. For each company, we recorded its name, address, industry, products, trade sta-

tus, ownership nationality, as well as detailed information about its main employees, including their names, nationalities, job titles, and levels in the firm's hierarchy. To offer direct evidence on the role of the trademark law in reducing information friction, we collected firms' advertisements in the leading Chinese daily newspaper, *Shen Bao* ("Shanghai News", 申报), and identified advertisements specifically aimed at helping consumers distinguish authentic products from counterfeits. In addition, we compiled a monthly brand-variety-level price panel dataset from the *Shanghai Market Prices Report* to investigate price responses to trademark protection. The richness of the available information enables us to offer rare insights into how firms, markets, and consumers adapted to the introduction of a modern trademark institution.

To estimate how the trademark law affected information friction and key firm and market outcomes that determine welfare effects, we implement triple-difference (DDD) intent-to-treat specifications that compare two sets of firms: Western firms, which, according to the trademark disputes published by the *Trademark Gazette (Shangbiao Gongbao*, 商标公报), court cases, and various other historical archives, had suffered most from trademark infringements, and Japanese firms, which had been most frequently accused of counterfeiting. For the second dimension in the DDD, we construct a firm-specific measure of trademark intensity based on each firm's initial product composition and the pre-1922 distribution of trademark registrations across products in foreign countries that already had trademark laws. Measuring products' intrinsic dependence on trademark protection using pre-1923 trademark data outside China and grouping firms based on the intent-to-treat status mitigate the potential bias arising from firms' endogenous decisions and abilities to obtain trademarks. We thus examine the responses of Western brands and firms to the trademark law relative to their Japanese counterparts within the same products and how the differential responses vary with trademark intensity. Given that foreign powers neither anticipated nor approved the introduction of the trademark law, we also expect the timing of the law to be exogenous to the growth dynamics of trademark-intensive firms, an assumption that we can test and confirm in a pre-trend analysis.

Our analysis suggests that the trademark law significantly reduced information friction surrounding producer identities and reshaped firm and market dynamics. First, the newspaper data analysis reveals that authentic firms suffered less from information friction after the trademark law and exhibited a significantly reduced need to protect their brands via alternative communication channels such as advertising. Second, in line with the prediction of Grossman and Shapiro (1984), the decrease in information friction, by potentially expanding both demand and competi-

tion from new authentic varieties, exerted an ambiguous and overall insignificant effect on brand prices. Comparing granular brand prices before and after the trademark law and across products, we disentangle demand and competition mechanisms and show brands in more vertically differentiated products were more likely to raise prices whereas brands with greater competition and larger prior spending on anti-imitation communications tended to experience lower prices after the law. Third, we document significant market reallocation between the opposite sides of trademark conflicts: the employment share of trademark-dependent Western firms grew by 2.6 percentage points while their Japanese counterparts contracted. Western firms also became more likely to establish manufacturing after the trademark law, signaling a transition from wholesale to domestic manufacturing.[6] Fourth, trademark protection, in contrast to other forms of IP, did not reduce the extent of market competition and, in fact, led to a net increase in the number of Western authentic varieties while Japanese firms either exited the markets or rebranded themselves.

The above empirical findings help inform the magnitude by which the trademark law ultimately affected consumer welfare. Building on a stylized framework adapted from quantitative trade models (e.g., Arkolakis, Costinot, and Rodríguez-Clare 2012; Costinot and Rodríguez-Clare 2014), we show that the welfare effect of trademark protection can be expressed in terms of the change in the market share of authentic varieties and the price elasticity of demand. Increased trademark protection may raise welfare by reducing consumers' direct loss from information friction, improving the efficiency of consumer market allocations, and expanding the number of authentic varieties. Invoking the estimates from key empirical moments—the market share of authentic firms and the exits of counterfeiters, we find that the trademark law increased consumer welfare in industries with mean trademark intensity by 4.2%, with the gains increasing with the industry's dependence on trademark protection.

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

The findings of our paper highlight the distinct role of trademark institutions in industrial

[6]In addition to the intent-to-treat specification, we also directly identify authentic firms and counterfeiters in a robustness check by digitizing data on trademark applications and approvals, which yields similar results.

growth and welfare improvement. Most of the controversy surrounding IP institutions has centered on their implications for market competition and consumer welfare and, in the context of less-developed countries, rent transfer to IP owners in the industrial world (Javorcik and Fink 2002; Maskus 2000). However, in contrast to innovation-targeted IP protection which expressly grants monopoly power, trademark protection, as we show in the paper, can foster both industrial growth and consumer gains that do not necessarily compromise competitiveness. These findings may help alleviate the concerns of low- and middle-income nations and persuade policymakers to strengthen trademark protection as a first and essential component of comprehensive IP reforms.

Related Literature. An extensive literature on IP institutions assesses the patterns and economic effects of patent laws and, to a lesser extent, copyright protection. For example, Ginarte and Park (1997), Javorcik (2004), Branstetter, Fisman, and Foley (2006), and Branstetter, Fisman, Foley, and Saggi (2011) provide important evidence on the determinants of patent protection and the impacts of patent protection on technology transfer and industrial development, and Moser (2013) offers a comprehensive review of patent institutions. More recently, Biasi and Moser (2021), Giorcelli and Moser (2020), Oberholzer-Gee and Strumpf (2007), and Li, MacGarvie, and Moser (2018) examine the effects of copyright protection on innovation, creativity, and prices.

In contrast, relatively few studies have examined 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. Baroncelli, Fink, and Javorik (2005) provide the first empirical analysis documenting the global distribution patterns of trademarks. Heath and Mace (2019) study the profit effects of increased trademark protection via the 1996 Federal Trademark Dilution Act, which enhanced legal protection to selected trademarks. Qian (2008), examining counterfeiting by Chinese shoe companies, finds that a loosening of trademark protection enforcement led authentic producers to pursue alternative strategies to differentiate products from counterfeits. Exploring Chinese tire exports to Africa, Kuroishi (2020) finds export quality increased after African countries joined the Madrid Protocol which simplified the international trademark registration process.

Our paper contributes to the existing literature by examining the economic impact of a fundamental, rather than an incremental, change in trademark protection: the introduction of a trademark law. The arguably exogenous timing of China's 1923 trademark law, as a policy experiment disapproved by foreign powers to end foreign privileges, allows us to establish its causal effect on firm

and market dynamics. Further, instead of focusing on authentic firms' responses in a particular industry as in previous studies, we exploit rich firm-employee and price data across industries and nationalities to investigate how different sides of trademark conflicts respond to trademark protection. Finally, by quantifying the consumer welfare effect of the trademark law, we provide the first estimates of the welfare gains from trademark institutions.

Finally, our paper builds on an emerging literature that assesses the historical patterns of the Chinese economy and the roles of institutions 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 of Shanghai and China's trade and foreign investment while Keller and Shiue (2021) examine the Western influence on the Chinese economy after the Opium War. Levine, Lin, Ma, and Xu (2023) examine the role of legal origins in financial development by exploring the formation and rendition of the Mixed Court in colonial Shanghai's concession zones. In a related study, Li (2022) assesses the effect of legal systems on land values by comparing the International Settlement and French Concession areas in colonial Shanghai.[7]

The rest of the paper is organized as follows. Section 2 describes the historical background of China's first trademark law and how the law changed the legal situation. Section 3 develops predictions about the effect of the trademark law on firms, markets, and consumer welfare. Section 4 describes the novel micro datasets, including (i) firm-employee data, (ii) monthly brand price series, (iii) newspaper data, and (iv) cross-country trademark registrations and Chinese trademark applications, approvals, and disputes. Section 5 provides the empirical tests of our developed hypotheses. Section 6 quantifies the consumer welfare effect of the trademark law. Section 7 compares the effects of alternative institutional arrangements, and Section 8 concludes.

2 Historical Background

China's use of trademarks can be traced to the Northern Zhou Dynasty (556-580 A.D.) when merchants began to use distinctive marks to differentiate their products and craftsmanship (Chang, 2014). In contrast to the long history of trademark use, formal institutions to protect trademarks have a much shorter and more complex timeline in China. This section describes the circumstances under which the 1923 trademark law was introduced.[8]

[7] An earlier study by Zeitz (2013) exploits how employment institutions may have explained the divergent performance of British, Chinese, and Japanese textile firms. Also exploring the Chinese textile industry in the same era, Liu (2020) studies the effect of trade disruptions due to World War I on the entry of industrial firms.

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

2.1 The Appearance of Japanese Counterfeits

Early in the 20th century, China emerged as one of the world's most coveted markets (Heuser, 1975). With a quarter of the world's population, China offered an alluring "promise of a market of four hundred million customers" (Alford, 1995, p.35) to manufacturers and merchants worldwide. Foreign firms gained access to the Chinese market via 'treaty ports' after Qing China was forced to sign a series of 'Unequal Treaties' as a result of the Opium Wars in the mid-19th century.[9] These treaties granted foreigners important privileges, including low tariffs, extraterritorial rights (ET)—the use of foreign laws and establishment of foreign courts in China, and political governance in areas designated as 'concessions.'

British firms were among the first to enter the market, followed by counterparts from the US and other Western European countries. When Japan started challenging Western dominance after the first Sino-Japanese War in 1894–95, Japanese firms lagged behind their Western rivals technologically and resorted to counterfeiting Western goods (Motono, 2011). The Patent and Trade Mark Review (1907) asserted in 1907 that "Japanese trade in China consists largely of Japanese imitations," spanning products from tobacco and textile to food and cosmetics. Bryan (1919) called Japanese firms "the worst trademark pirates in the Orient" and quantified "at least fifty percent of the infringements in China are of Japanese origin." As the *Manchester Guardian* warned in 1904,

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

2.2 Bilateral Commercial Treaties and Failed Negotiations

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

Between 1902 and 1903, Great Britain, the United States, and Japan each signed a commercial treaty with China in which the Chinese government promised to protect foreign trademarks. In return, the foreign powers would abolish extraterritorial rights once China 'modernized' its legal systems.[10] As noted by Alford (1995), "trademark protection was the centerpiece of the intellec-

[9]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.

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

tual property issues addressed" in these commercial agreements. The Qing government responded by asking the Japanese government for help drafting a trademark law in 1905 (Motono, 2011, p.11). Japan suggested China's adoption of its first-to-file principle, which would allow Japanese counterfeiters to register Western trademarks if they acted quicker than the authentic firms. Predictably, Western governments opposed this proposal fiercely, and the Qing government ended up not implementing the law.

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

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

2.3 China's First Trademark Law of 1923

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

Because neither Great Britain nor Japan was satisfied by this compromise and, furthermore, feared the trademark law would mark a precedent towards the slow erosion of their extraterritorial rights, all treaty nations' governments strongly opposed the law (Motono, 2011; Patent and Trade Mark Review, 1923). However, they were soon overtaken by reality when firms raced to apply for trademarks: counterfeiters tried to be the first to register the authentic trademarks they were copying, and authentic firms worried about losing their trademarks to counterfeiters. Between 1923 and 1927, 13,736 trademarks were registered with the Chinese trademark bureau as documented in our trademark registration data (and similarly reported in Motono, 2011, Table 3).[11] 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

between the United States and China.

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

frequently registered in textiles, chemicals, and tobacco.[12] With this widespread use, it became evident that the law's implementation had become irreversible.

Why did China introduce a trademark law in 1923? As discussed earlier, foreign countries including Great Britain, the United States, and Japan had signed treaties in which they promised to abolish extraterritorial rights once China had 'modernized' its legal systems (Heuser, 1975).[13] While the trademark law was only part of the Chinese legal system, its establishment signified China's first step towards satisfying this condition and bringing the country closer to its long-term goal of abolishing the Unequal Treaties and regaining sovereignty.

2.4 How the Trademark Law Altered the Legal Trademark Situation

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

Before 1923, the key difficulty for settling trademark disputes, especially those involving businesses from different countries, was the absence of a domestic legal basis. Because of extraterritoriality, 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' Consular Courts, following their own countries' laws (e.g., cases of Western firms accusing Japanese firms of counterfeiting were tried at the Japanese Consular Court). Since foreign laws did not cover trademark protection on Chinese territory, authentic firms received little legal trademark protection. What was absent was neither the court system nor the execution of court orders but a domestic legal basis on which all cases could be adjudicated. As written in The North China Herald (1919), "the only means at present open to merchants whose trademarks are being infringed of asserting their rights are hopelessly inadequate."

The legal situation changed dramatically when the trademark law was introduced: Court cases were now adjudicated under the Chinese trademark law rather than the defendant's home-country law. In addition, the law, for the first time, allowed the authentic producer to seek damages to obtain compensation for the loss of reputation, and imposed penalties on convicted counterfeiters,

[12] After the Chinese civil war broke out in 1927, the Nationalist government retained the 1923 trademark law. See Motono (2013): "The Nationalist government failed to replace the Chinese trademark law of 1923. [...] The primary reason was, needless to say, the complex situation in which the Nationalist government found itself. In addition to the fragile balance of power within their own government and the relationship with opponent local warlords, they had to fight against the Chinese communist party." Nonetheless, we will focus most of our analysis on the period 1920-1926, i.e., before the Nationalist government took over, and then provide robustness checks by expanding the period to 1930.

[13] For example, the 1903 treaty between the US and China stated that the foreign powers might be "prepared to relinquish extra-territoriality when satisfied that the state of the Chinese law, the arrangements for their administration and other considerations warrant" (cited in Alford 1995, p. 36).

including up to a $500 fine and jail time.

We digitized two datasets on trademark disputes to understand the legal effects of the trademark law. This reveals two important insights about how successful the law was. First, our digitization of the trademark disputes published in China's Trademark Gazette between 1924 and 1927 shows that while some Japanese counterfeiters attempted to register other businesses' trademarks, such attempts were quickly disputed and ultimately unsuccessful. The records indicate that the majority of disputed trademarks were originally filed by Japanese firms (63.4% as shown in Figure 2 (a)) and firms that filed complaints were mostly from Western countries (Figure 2 (b)). Our analysis of the dispute outcomes shows that Japanese firms lost 72% of the disputes filed against them by Western plaintiffs.[14] Second, we digitized verdicts of trademark cases as reported in the *North China Herald*. As we show in Figure 3 and Online Appendix's Section A.1, the legal provisions from the trademark law significantly raised both the share of cases won by the plaintiffs and the severity of the financial and jail time penalties.

3 Hypotheses: Trademark Institution, Firms, and Consumer Welfare

In this section, we build on existing theoretical work, including Shapiro (1982), Shapiro (1983), and Grossman and Shapiro (1988a), and discuss how trademark law is expected to shape firm and market outcomes by addressing information friction between firms and consumers. We then derive four testable hypotheses on the effect of the trademark law on information friction, prices, market reallocation across firms, and the number of varieties.

Consider a setting where authentic producers (denoted as type a) sell differentiated varieties of a given product. Consumers derive utility from certain characteristics of the product but are unable to observe these characteristics at the time of purchase. Consumers may only be able to evaluate them after they experience the product; examples are product materials and ingredients that affect quality, safety, or durability (e.g., Shapiro, 1982; Shapiro, 1983). Nelson (1970) termed these types of products *experience* goods—that is, products that must be consumed for consumers to learn about their characteristics.[15] This information asymmetry is particularly severe when buyers and sellers come from different countries and face greater communication costs.

Authentic producers attempt to resolve the information asymmetry by labeling the product with a 'trademark' and consumers learn over time to associate the trademark with the unobserved

[14] Online Appendix's Section A.1 presents examples of the disputes documented in the Trademark Gazette.

[15] 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.

product characteristics.[16] If trademarks are not protected, however, a second type of firm, counterfeiters (denoted as type c), arise, who offer a version of the authentic product with likely inferior unobservable characteristics under the same trademark. The true source of a product is known to the producer, but consumers are unable to verify the source and distinguish counterfeits from authentic products upon purchase. In this case, the information conveyed by the trademark becomes unreliable, and the trademark's function in signaling the source of the product is undermined.

Following Grossman and Shapiro (1988a), consumers are assumed to have a probability of s of receiving authentic goods upon purchase (and a probability of $1 - s$ of encountering counterfeits) in the absence of trademark protection. When consumers mistake counterfeits for authentic goods, they obtain less or no utility, i.e., $u_a > u_c$ where u_a and u_c denote the utility from consuming authentic versus counterfeit products, respectively. The expected utility of the consumer is hence given by $E(u) = su_a(q) + (1 - s)u_c(q)$. The authentic firms receive a fraction s of the market demand, i.e., $q_a = sq$, and set price $p_a = p(c_a)$ where c_a is the authentic firms' marginal cost of production. Counterfeiters receive $1 - s$ of the market demand, i.e., $q_c = (1 - s)q$, and follow $p_c = p_a$ to avoid being distinguished from authentic firms. To help consumers identify the true source of goods, authentic firms may choose to adopt (imperfect) alternative mechanisms such as advertising to convey additional information at a cost that rises with the number of consumers they try to reach (Nelson, 1974, Grossman and Shapiro, 1984, and Bagwell, 2007).[17]

The introduction of the trademark law gives authentic firms the exclusive right to use their trademarks and precludes counterfeiters from free-riding on the reputation of authentic firms. The law reduces the probability of the consumer receiving counterfeited products (i.e., $1 - s$), strengthening the role of trademarks in resolving the information asymmetry on the identity of the producer. As such, increased trademark protection can affect both the demand for and the supply of authentic products. On the demand side, as shown in Grossman and Shapiro (1988a), trademark protection first results in a direct market reallocation within brand-specific market segments from counterfeiters to authentic producers. Further, by increasing consumers' information and confidence in receiving authentic products, trademark protection may expand both aggregate demand and the product choice set considered by the consumers. On the supply side, as trademarks effectively communicate the identity of the producer, authentic firms become less dependent on alternative,

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

[17] In Grossman and Shapiro (1988a), authentic firms may help customs agents detect counterfeits by supplying information about the recognizable differences between counterfeit and authentic goods as well as investing in product characteristics to increase such differences.

costly information mechanisms. In addition, because the trademark law protects the right to use a trademark, rather than the right to make a product, increased trademark protection and market share may attract new authentic varieties when there is free entry.

The aggregate effect of trademark protection on expected consumer welfare $\Delta E(u)$ ultimately depends on the magnitude of the reduced information friction (Δs) and the resulting changes in price, market reallocation, and number of authentic varieties. More specifically, we derive the following four predictions on these key outcomes.

H1. Information friction: Trademark protection reduces information friction and the need for alternative communication channels.

In the absence of the trademark law, authentic firms rely on (imperfect) alternative channels such as advertising to disseminate recognizable product information and warn consumers against imitations. By strengthening the role of trademarks in representing the true origin of products and services, the trademark law reduces information friction between consumers and authentic firms. The reduced information friction, in turn, lowers authentic firms' need to communicate their brand identities with consumers through alternative information channels that educate the consumers on how to distinguish authentic products from counterfeits.

H2. Price: Trademark protection exerts an ambiguous effect on brand prices.

As noted earlier, increased trademark protection affects both the demand for and supply of authentic products, shaping the price p_a in various ways. First, reduced information friction increases consumers' confidence in receiving authentic products and thereby expands both aggregate demand and the choice set. Increased aggregate demand raises consumers' willingness to pay, while larger choice sets have the opposite effect on prices. Second, as discussed in H1, firms with protected trademarks have a reduced need for alternative communication and differentiation strategies, which result in cost savings that are partially passed onto consumers. Third, higher expected revenue from protected trademarks enables more authentic firms to overcome fixed costs and enter markets with new brands and products, placing downward pressure on prices. Grossman and Shapiro (1988a) incorporate the above channels and show that overall trademark protection exerts an ambiguous effect on brand prices depending on whether authentic firms use alternative strategies to effectively deter counterfeiters and the strength of barriers to market entry. They conclude that "the possibility of counterfeiting may raise or lower equilibrium price" (Grossman and Shapiro, 1988a, p.73).[18]

[18]Trademark protection may also change the choice of product quality by authentic firms. On the one hand,

H3. Reallocation: Trademark protection reallocates market from counterfeiters to authentic firms.

As discussed earlier, increased trademark protection, by raising the probability of the consumer receiving authentic products (s), leads to a direct market reallocation within brand-specific market segments from counterfeiters to authentic producers. The market share of authentic firms relative to that of counterfeiters (i.e., $s/(1-s)$) grows. In the short run, when there is limited entry, the market reallocation leads to a growth of incumbent authentic firms and a contraction of counterfeiters. As we discuss next, some counterfeiters eventually exit the market while others rebrand themselves, and new authentic firms emerge over time.

H4. Variety: Trademark protection can spur new authentic varieties and counterfeiter exits.

When there is free entry, the expanded market share for authentic firms enables more authentic firms to pay the fixed cost of entry and introduce new brands and products, while counterfeiters exit the market or rebrand themselves. The increase in the number of authentic brands and products expands the level of competition and the number of authentic varieties available to consumers. This point has been highlighted in Fink and Javorcik (2002) who note that "a closely related difference between the two forms of IPRs is that patents and copyright expressly grant monopolies—-albeit limited in scope—-whereas trademarks can, in theory, coexist with perfectly competitive markets."[19] As a result, consumers may benefit not only directly from reduced information friction and market reallocation but also from the increased number of authentic varieties.

Comparing the levels of social welfare in the no-counterfeiting and the counterfeiting equilibria, Grossman and Shapiro (1988a) conclude that with free entry, trademark protection entails an unambiguous increase in welfare. This prediction is echoed in Fink and Javorcik (2002), who note that "from a social welfare perspective, preventing free-riding–as all forms of IPRs do–is clearly

Schumpeterian forces would imply that the expectation of greater revenue by authentic firms would lead to more incentives to innovate and upgrade product quality as they expect stronger returns from investment. On the other hand, increased trademark protection may also lower the need for quality upgrading to escape the threat of counterfeiters, as shown in Grossman and Shapiro (1988a), leading to an ambiguous net effect. It is also worth noting that since trademarks alone do not prevent imitations of products or technologies as long as the imitations are sold under different brand names, the Schumpeterian effect of trademark protection on innovation is likely to be weaker than that of patent and copyright protection. While our historical data do not have direct measures of R&D or product quality, we attempted to provide some suggestive evidence by exploring the textual composition of business advertisements in Section A.12 of the Online Appendix and found no significant increase in advertisements stressing the quality of their products after the law.

[19]Maskus (2000) similarly points out that in general, the market power associated with a particular trademark tends to be small because "the potential supply of competing trademarks is virtually unlimited" and trademark protection can induce new firms and varieties to enter the market. It is worth noting that this effect can be weakened in some cases when consumers treat trademarks as status goods and/or a highly successful brand in an industry with high fixed investment costs serves to augment entry barriers.

desirable when it concerns reputation for quality."

In Section 5, we empirically test these predictions and investigate how information friction, price, market allocation, and the number of varieties, respectively, responded to the introduction of trademark law. In Section 6, we then use a stylized welfare formula adapted from quantitative trade models (e.g., Arkolakis et al. 2012; Costinot and Rodríguez-Clare 2014) that comprises sufficient statistics inferred from the estimated outcomes in Section 5 to quantify consumer gains from the trademark law.

4 Data: Firms and Brands During Shanghai's Concession Era

To examine the hypotheses outlined in the above section and assess responses to the trademark law, we digitized and assembled a rich array of micro-level datasets, including (i) a firm-employee panel dataset covering the universe of firms that operated in Shanghai's concession areas in 1872-1941; (ii) monthly brand-variety level price panel data; (iii) newspaper advertisements warning against trademark infringements; and (iv) a database of cross-country trademarks.

Our series of micro datasets (i)-(iii) covers China's economic center, Shanghai. Often called "Paris of the East," Shanghai had by 1930 become one of the world's largest cities and commercial hubs, boasting over 3 million inhabitants, vibrant manufacturing and service sectors, and remarkable openness to trade and investment (Osterhammel, 1989). The preceding decades marked one of the most transforming and turbulent periods in Shanghai's history as Shanghai grew from an unknown fishing village to the world's major industrial and financial hub (Brandt, Ma, and Rawski, 2014). Between 1865 and 1930, trade passing through 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 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). Not surprisingly, as the top destination for Western and Japanese firms, Shanghai also experienced the largest volume of trademark disputes.

4.1 Firm-Employee Panel Data

We digitized and assembled an annual business-employee-level panel dataset covering the universe of firms that operated in Shanghai's concession areas in 1872-1941 based on the *North-China Hong List*, a business directory that provided comprehensive information on firms operating in the leading port cities of northern China. 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.[20] For each company listed in a given year, the Hong Lists reported, among other things, its name (in English, traditional Chinese, and Wade-Giles), address, activities (a textual description that corresponds to industries), the names and job titles of each firm's main employees, and the products produced and/or sold by the firm (reported in the Hong List Appendices). Figure C.1 in the Online Appendix shows a representative page from the 1927 Hong list. We identified each firm's nationality using several separate sources such as directories of China's importers and exporters, directories of foreign businesses, and documents from the Japanese Chamber of Commerce. For the remaining unmatched businesses, we manually collected nationality information or assigned a nationality based on the country reference in the firm's name (if unambiguous). Firms were matched over time based on their names (in both English and traditional Chinese) and industries to produce a firm panel. We also investigated the business history of many companies to track companies over time despite their potential name changes. See Online Appendix A.2 for additional details on the construction of the firm-employee dataset.

The resulting panel data provides us with a unique historical firm-employee dataset in one of the world's most competitive markets and enables us to examine firm dynamics in response to the introduction of a modern trademark institution.

4.2 Brand Price Data

To examine the effect of trademark protection on prices, we obtained detailed, monthly brand-product-level price panel data from the issues of the *Shanghai Market Prices Report*, published by the Chinese Ministry of Finance, Bureau of Markets.

The *Shanghai Market Prices Report* was the official source of information on market prices for goods and commodities. The report was released quarterly and contained detailed monthly data on wholesale prices across a wide range of industries, including cereals, food products, textiles, metals, fuels, building materials, industrial materials, and sundries. Each issue of the report featured tables and listings that presented the prices of commodities and products in a systematic and organized manner. The data included specific product categories, relevant information about the

[20] Shanghai consisted of three areas: the International Settlement (or Public Concession), the French Concession, and the Chinese portion of the city; most foreign firms were located in one of the two concessions. In the International Settlement, 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.3 for more details on the validation of the dataset.

products such as trademarks, brands, company names, and packaging sizes, and price levels.

We digitized all the issues between January 1923 (the first available issue) and December 1926 and matched brands over time to create a panel dataset. Since the *Shanghai Market Prices Report* sometimes dropped or added brands, we restricted the dataset to brands that we observed for at least 12 months to avoid bias due to changing sample composition. This unusually rich and comprehensive historical price report allows us to construct the most comprehensive and disaggregated price panel data at the time and undertake a granular analysis of how the introduction of trademark institutions shaped price dynamics.[21]

4.3 Newspaper Advertisements

To provide direct evidence on the role of the trademark law in addressing information friction, we collected all the business advertisements published in the leading Chinese daily newspaper *Shen Bao* (申报) from 1920 to 1930. We then identified the subset of advertisements that were used to warn consumers about counterfeits by focusing on advertisements that contained phrases related to the terms "infringement," "fake," "imitation," and similar terms. We manually reviewed these advertisements to validate their content and whether they were indeed used to educate consumers about how to distinguish between the authentic and the counterfeit goods.[22] Next, we extracted information on titles, publishing dates, products, and brand and firm names (when available) from the advertisements.

This newspaper data provides us with a valuable source of information on the alternative communication strategies adopted by companies to combat counterfeits. The establishment of the trademark law, as discussed in Section 3, is expected to reduce authentic firms' need for such alternative communication channels.

4.4 Measuring Dependence on Trademarks

To measure products' pre-existing dependence on trademark protection, we compute $TrademarkInt_p$ as the product-specific share of trademarks registered before 1923 in countries outside China where trademark laws existed, based on historical trademark data between 1872 and 1922 from the IP Portal of the World Intellectual Property Organization (WIPO). Product groups are defined according to the international Nice Classification (NCL) scheme. For additional details on the construction

[21] We also merged the price data to trademark registrations by manually searching all the brands listed in the price reports in China's Trademark Gazette based on the texts or images of the trademarks. This enabled us to obtain the dates on which each trademark was registered and examine potential changes in pricing patterns after trademark registrations in a robustness analysis.

[22] In Section A.12 of the Online Appendix, we also estimate the effect of the trademark law on other advertisements.

of this measure, see section A.4 in the Online Appendix.

Table 1 shows how $TrademarkInt_p$ is distributed across product groups. The products 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. Services were not covered by trademark laws in this period.[23] 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 the trademark. Our measure of trademark intensity is also highly correlated with the frequency of trademark infringements documented in court cases and newspapers, which were concentrated in products such as medicines, cosmetics, and tobacco.

For our data on prices and advertising, we match this product-specific trademark intensity directly to the data based on products. For our firm-level analysis, we construct a firm-specific measure of trademark intensity based on each firm's product composition before the trademark law. Specifically, we calculate the maximum trademark intensity across a firm i's products offered before 1923:

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

where P_i denotes the set of products the firm offered in 1920-1922. This firm-specific trademark intensity enables us to explore cross-firm variation in pre-existing dependence on trademark protection within an industry and country group and how firms selling more trademark-intensive products adjusted to the trademark law relative to firms with less trademark-intensive products.[24]

5 Empirical Evidence

In this section, we empirically examine the predictions established in Section 3 and assess the effects of the trademark law on information friction and firm and market outcomes. In Section 6, we will incorporate these empirical results into a stylized welfare framework to estimate the consumer welfare effect of the trademark law.

[23] We provide robustness checks excluding services in the Online Appendix (Section A.8).

[24] We consider a variety of alternative ways to measure trademark intensity in Section A.5 of the Online Appendix, including country-specific trademark intensity.

5.1 Information Friction

As discussed in Hypothesis H1 of Section 3, a direct, first test on the role of the trademark law in addressing information asymmetry is to examine whether the trademark law reduced authentic firms' dependence on alternative information channels to communicate with consumers.

To address the problem of counterfeits in the absence of formal trademark protection, many brand producers in Shanghai 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.[25] This type of anti-imitation advertising served as an imperfect alternative means to communicate the identity of the producer. Our hypothesis posits that when the role of trademarks is strengthened, the demand for this alternative communication channel diminishes.

We formally examine this hypothesis by estimating the following equation,

$$AntiImitationAds_{pt} = \beta \times TrademarkInt_p \times PostMay1923_t + FE_p + FE_t + \epsilon_{pt} \qquad (1)$$

where p denotes a product group and t a month, and outcomes $AntiImitationAds_{pt}$ denote different measures for the prevalence of anti-imitation advertising in a product group.

The estimates in Table 2 show that after the trademark law, trademark-intensive products such as tobacco, cosmetics, and medicines became significantly less likely to utilize anti-imitation advertisements to protect brands and combat counterfeits. According to column (1), the probability of posting such ads fell by 40% percent from the pre-law level for products with mean trademark intensity. Columns (2) and (3) show that the share of anti-imitation ads and the number of anti-imitation ads in a product category also decreased significantly. In Figure 4 we show in the corresponding event study that there were no pre-trends in anti-imitation ads. The intensity of having anti-imitation ads in trademark-intensive products started to decline visibly in 1923 and stayed low afterward.[26]

These results provide direct evidence for the role of the trademark law in reducing information friction between consumers and authentic producers: the trademark law, by ensuring the role of the trademark in conveying producer identity information to consumers, lessened the need (as well

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

[26] In Online Appendix Table B.2, we also estimated the effect of the trademark law for a longer period (1920-1930). The results are largely consistent, with a small expected decline in magnitude.

as the cost) for authentic firms to adopt alternative information channels.

5.2 Brand Prices

How did reduced information friction affect prices? As noted in Hypothesis H2 of Section 3, trademark protection does not guarantee market power and may exert an ambiguous effect on brand prices by influencing both the demand and the supply sides of authentic products.

We examine the net effect of the trademark law on brand prices by estimating the following equation using the monthly brand-product-level price panel data:

$$\ln(price)_{bt} = \beta \times TrademarkInt_b \times PostMay1923_t + FE_b + FE_t + FE_{jq} + \epsilon_{bt} \qquad (2)$$

where b denotes the branded product, t a month, j a broad industry,[27] q a quarter, and the outcome is the log price of the branded product in a given month. We include brand, month, and broad industry times quarter fixed effects (i.e., FE_b, FE_t, and FE_{jq}) in the regression to control for brand and monthly factors and industry-specific-quarterly shocks that may affect prices.

The results of the above regression are reported in column (1) of Table 3 and show that the establishment of the trademark did not, on average, significantly affect the level of brand prices. In Figure 5 we show the corresponding event study and find there were no pre-trends, and price responses of trademark-intensive brands to the trademark law were insignificant across periods.[28]

To disentangle the potential offsetting effects of the demand and supply mechanisms, we next explore heterogeneity in price responses across products as the importance of each mechanism can vary with product attributes. First, trademark protection is expected to exert a greater positive effect on aggregate demand in industries with a stronger preference for quality and a larger scope of vertical product differentiation. Producers in these industries are more likely to raise prices after trademark protection as their ability to signal quality via trademarks rises.

To explore this channel, we construct a measure of consumer preference for quality and vertical product differentiation by following the methodology by Khandelwal (2010) which utilizes both

[27] We group the brands into 5 broad industries according to their NCL product classification p: chemicals, food/beverages/tobacco, metals/machinery/vehicles, non-metallic materials, and textiles.

[28] In a robustness check, we implemented an alternative identification strategy by testing how the prices of individual brands changed after the respective month in which each brand got registered at the trademark office, by implementing a staggered diff-in-diff estimation. Since the trademark registration month may be an endogenous choice of the firm, we prefer the above intent-to-treat specification, but find it nonetheless reassuring that the alternative specification yields similar results: no significant effects of the trademark law on prices. To implement this alternative research design, we matched the price data manually to the trademark registrations in China based on the brand and product variety names. Results are reported in Table B.3 of the Online Appendix.

unit value and quantity information in detailed trade data to infer quality and quality dispersion. Conditional on price, imports from countries with higher market shares are assigned higher quality. We implement this approach and estimate the quality of each country variety in Chinese import data by compiling bilateral product-level import data covering China's imports from over 40 countries in 246 harmonized product categories from 1920-1922 and combining this with information on tariffs.[29] We then construct a measure of *quality dispersion* within a product category based on the quality distance between the top 90th and bottom 10th percentiles to reflect the scope of quality differentiation and consumer preference for quality.[30] As an alternative proxy, we also use our brand price data to construct a measure of *price dispersion*, which is shown in Khandelwal (2010) to be positively correlated with quality dispersion.

Columns (2)-(4) of Table 3 use these two measures and show a positive relationship between price responses to the trademark law and the degree of vertical differentiation.[31] Firms from industries with larger vertical differentiation and stronger consumer preference for quality increased prices after the trademark law relative to the less differentiated industries. In the last row of Table 3 we compute marginal effects for the products with the largest measure of quality and price dispersion, respectively: the positive marginal effects indicate that the trademark law led to price increases in those industries, and significantly so in columns (3) and (4).

Second, another factor in shaping price responses to trademark protection is the degree of free entry. Grossman and Shapiro (1988a) highlight that in industries with low entry barriers, trademark protection results in new entries and new varieties and subsequently limits firms' ability to raise prices. To examine the role of entry conditions in price responses, we construct several proxies of fixed cost, including average factory size and capital per factory.[32] Columns (5)-(6) of Table 3 reveal that–consistent with the hypothesis–the trademark law tended to lower prices in industries

[29]To estimate the quality of each variety, we follow equation (15) in Khandelwal (2010) and regress, separately for each NCL product category, the import share of a variety on the unit price of the variety, its market share within the product, the population of the origin country (which we merge in from the Maddison project, see Bolt, Inklaar, de Jong, and van Zanden, 2018), and variety and year fixed effects, using the lagged ad valorem equivalent tariff, the number of varieties China imported per product, and the number of products a country exported to China as instruments. We then compute quality based on the estimated fixed effects as in equation (16) in Khandelwal (2010).

[30]This metric, as measured in equation (18) of Khandelwal (2010), has been termed the length of the quality ladder which reflects consumer preferences for quality.

[31]Note that in column (3) we control for the number of varieties on which the quality dispersion measure is based, as products with more varieties tend to mechanically have larger quality dispersion.

[32]We obtained this data by digitizing detailed product-level input and output data from Lieu (1936) who conducted industrial surveys in 1931 and 1933 to collect Shanghai's economic statistics at the detailed industry level. Apart from average factory size and capital per factory, which we use in this analysis, we also used capital intensity and capital per blue-collar worker as additional proxies for entry cost and found similar results.

with lower entry barriers relative to industries with higher entry barriers.

Third, we explore how the price effect of trademark protection varies with the product's prior dependence on alternative communication and differentiation channels. For industries that use anti-imitation advertising to communicate and protect their identities (or other mechanisms to increase product differentiation), stronger trademark protection lowers the dependence and cost spent on such mechanisms, as shown in Section 5.1. As modeled in Grossman and Shapiro (1984), advertising cost—or generally the cost to disseminate information—increases with the fraction of consumers that the producer seeks to reach. When the importance of such information channels diminishes, the reduced costs lower prices.[33] To test this channel, we interact our main treatment variable with the product's anti-imitation advertising intensity before the law in column (7) of Table 3 and find that, consistent with the hypothesis, products that utilized anti-imitation advertising more frequently were more likely to see a decline in prices after the trademark law.

5.3 Firm Reallocation

After exploring the price responses to trademark protection, we next examine how the trademark law reshaped market allocation on the opposite sides of trademark conflicts. As noted in hypothesis H3 of Section 3, following the implementation of the trademark law, incumbent Western firms—the main complainants about trademark infringements—are expected to grow thanks to the reallocation from counterfeiters. Japanese firms, which had been the main group accused of counterfeiting, would be expected to contract in size and eventually exit the market.

We assess this hypotheses by comparing Western and Japanese firm outcomes before and after the trademark law by implementing triple-difference (DDD) specifications that examine the responses of authentic firms to the trademark law relative to those of counterfeiters within the same products and how the differential responses vary with trademark intensity. More specifically, we estimate:

$$\begin{aligned} y_{it} &= \beta \times Western_i \times TMInt_i \times Post1923_t + \gamma \times TMInt_i \times Post1923_t \\ &\quad + FE_i + FE_{ct} + FE_{rjt} + \epsilon_{it} \end{aligned} \tag{3}$$

with firm i in year t from home country c operating in broad industry j. $TMInt_i$ is the firm-specific trademark intensity based on products that the firm offered in 1920-1922. $Western_i$ is a

[33] See Sections 2.3 and 5.2 of Bagwell (2007) for a comprehensive overview on the information role of advertising and the implications for prices among differentiated products.

dummy variable indicating that a firm is from a Western country. We use firm fixed effects FE_i to control for time-invariant firm characteristics; country-year specific fixed effects FE_{ct} to absorb potential macroeconomic shocks from the firms' home countries or domestic shocks specific to firms of particular nationalities; and broad industry-year specific fixed effects FE_{rjt} to account for industry-specific shocks in Shanghai that are allowed to be different for Western and Japanese firms.[34] Standard errors are two-way clustered by product category and country-year.[35]

To examine the reallocation effects, we use either the log employment or the employment share of a firm in a specific product group p as the dependent variable in specification (3) based on the sample of firms that existed between 1920 and 1922 and were tracked through 1926. Column (1) in Table 4 shows that the trademark law indeed differentially increased the employment of Western firms at the expense of Japanese firms in trademark-intensive products, compared to non-trademark-intensive products. Specifically, at the mean trademark intensity, the employment of individual Western firms rose by 4.6% while the employment of individual Japanese firms shrank by 19.7%.[36]

In column (2), we directly examine the effect on firm-specific employment shares and show that the employment share of Western firms expanded significantly at the expense of Japanese firms after the trademark law for trademark-intensive firms. According to column (2), the employment share of individual Western firms with mean trademark intensity grew, on average, by 0.8 percentage points while the market share of individual Japanese businesses shrank by 5.5 percentage points. For Western firms that sold the ten most trademark-intensive products listed in Table 1, the growth in individual firms' employment share exceeded 1.3 percentage points.[37] In columns (3)-(4) we replace the main interaction term with product category-year fixed effects which absorb

[34]We have eight broad industries: agriculture/mining, construction, manufacturing, transportation, wholesale, retail, finance/insurance/real estate, and services. Firms may belong to multiple broad industries. Region r denotes whether a firm is a Western or a Japanese firm.

[35]Clustering by product category allows for both the autocorrelation of errors at the firm level (as we fix firms' products before 1922 when constructing firm trademark intensity) as well as the correlation of errors across firms that offer the same products and may be affected by product-specific shocks. Country-year clustering allows for the correlation of errors across firms that offer different products but are affected by the same macroeconomic shocks in their home countries. We also considered firm-level clustering and found the results to be robust.

[36]Our firm-level data report employment instead of output, but one can transform the estimated percentage change in employment into an estimated percentage change in output using an output elasticity of workers. For example, we digitized product-level input and output panel data from Lieu (1936) who conducted industrial surveys to collect Shanghai's economic statistics from the number of factories, output value to raw materials, motive power, capital, and the number of workers by type and gender, which could be used to estimate sector-specific output elasticities.

[37]In robustness checks, we also included Chinese firms as some had also been accused of counterfeiting, though to a smaller extent and often in collaboration with Japanese firms. We found the extent of reallocation from Chinese toward Western firms significantly smaller, as expected.

all product-specific shocks and find similar reallocation effects.[38]

In Figure 6, we estimate the event study equivalent of equation (3) as implemented in column (4) of Table 4, our preferred specification, by allowing the effect to vary every year. The event study shows that no pre-trends were apparent in the reallocation from Japanese to Western firms: the estimated employment elasticities of trademark intensity before 1923 are not significantly different from zero and the reallocation effect appeared in 1923 and remained in place thereafter.

Columns (5)-(8) extend the analysis to a longer period until 1930 and show that the employment effects persisted after 1926. Based on column (6), the employment share of individual Western firms with mean trademark intensity grew by 0.7 percentage points while the market share of individual Japanese businesses shrank by 6.4 percentage points.[39]

To corroborate the mechanism that trademark protection affects reallocation by reducing information friction, we implemented an additional test: the ability of trademarks to convey the true identity of the producer should be particularly important for final goods compared to intermediate inputs, as consumers of the former are more likely to be deceived due to a lack of expertise and direct interactions with producers, while business-to-business transactions for intermediate inputs are more likely to involve in-person interactions with producers and thus make deceptions more difficult. Figure 7 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 to Western firms was only evident for final goods while the effects on intermediate inputs are close to zero and insignificant.[40]

We next explore how firms grew or shrank in response to the trademark law by adapting their

[38] As shown in Figure C.8 of the Online Appendix, the reallocation effect of the trademark law affected firms of all sizes, but was slightly larger for large and medium-sized businesses, potentially because more established companies and brands tended to suffer more from trademark infringements.

[39] In 1927, when the civil war broke out and the Nationalist government came into power, the 1923 trademark law remained in place. Columns (5)-(8) show that the effectiveness of the trademark law remained similar. In Section 7, we expand the period to 1936, the year before Japan's occupation of Shanghai in 1937, and again find similar results.

[40] In the Online Appendix, we conduct a battery of robustness checks: we use different measures of trademark intensity (Section A.5) and control for other firm or product attributes–such as innovation intensity, industry size, average firm size, or competitiveness–and macroeconomic shocks (A.6) as well as potential effects of consumer boycotts (A.7). We also show that the results are robust to dropping firms that sell services, a specific product group or country, or distributors (A.8). Further, the findings are robust to the extraterritorial status of the Western firm (A.9) and limiting the sample to comparable Western and Japanese firms by performing propensity score matching (A.10). In Section A.11, we conduct an alternative research design and examine the responses to the trademark law by identifying a list of authentic firms and likely counterfeiters based on trademark application approval and denial records and involvements in trademark disputes. We find, consistent with the baseline results, that authentic firms, i.e., firms that were granted trademarks based on either the length of their market presence or application/dispute reviews, experienced significant growth. In contrast, the likely counterfeiters, i.e., firms whose trademark applications were denied or trademark registrations were revoked, witnessed a contraction.

employment composition. This allows us to understand, for example, whether the growth of Western firms was more mechanically driven by hiring lawyers in anticipation of lawsuits or by a general expansion of the business operation. We take advantage of the information on job titles and assess how the composition of the positions may have been adjusted after the trademark law. Columns (1)-(2) of Table 5 confirm the baseline analysis holds on the sub-sample of firms with available job title information. Columns (3)-(5) examine firms' decisions to employ lawyers, sales, and manufacturing staff, respectively. The results suggest that after the trademark law, Western firms were more likely than Japanese counterparts to increase sales and manufacturing staff, while the effect on lawyers is positive but not statistically significant. This finding indicates that Western firms that had entered the Chinese market by importing goods produced in their home countries became more likely to undertake and expand production activities in Shanghai after the trademark law, making a transition from wholesale and retail to manufacturing—a trend that was also visible in the aggregate statistics in Figure C.5.

5.4 Authentic Varieties and Counterfeiters

As discussed in Hypothesis H4, increased trademark protection induces the exits of counterfeiters while spurring an increased number of authentic varieties. To test this, we examine the effect of the trademark law on exit and entry by running the following DDD specification:

$$\begin{aligned} NumFirms_{prt} &= \beta \times Western_r \times TMInt_p \times Post1923_t + \\ &+\gamma \times TMInt_p \times Post1923_t + \\ &+FE_{pr} + FE_t + \epsilon_{prt} \end{aligned} \tag{4}$$

where we aggregate the data to the product p-region r (Western vs. Japan)-year t level and compute two new dependent variables. The first is the stock of firms that entered the market before the end of the sample period (starting with the stock of firms in 1920 and then adding newly entered firms every year while ignoring exits); the change in this stock variable captures the number of new entries in a given product and year. The second dependent variable is the stock of surviving firms in a given year (ignoring entries); the change in this stock variable measures the number of exits in a given product and year. In this way, the coefficients on the interaction terms in the DDD specification can be interpreted as the effects of the trademark law on the entry and exit of firms. $TMInt_p$ is the product-specific trademark intensity, and $Western_p$ is a dummy variable indicating that the stock of Western, as opposed to Japanese, firms. We use region-product fixed effects FE_{pr}

to control for region-specific differences across products and year fixed effects FE_t to account for time shocks.

In column (1) of Table 6, we examine how the trademark law affected entry decisions of Western versus Japanese firms across products of different trademark intensities. The results show that the trademark law had a significant positive effect on the entries of Western firms, expanding the number of Western varieties by an average of 2.9 at the mean trademark intensity. The entries of Japanese firms, in contrast, were negatively but insignificantly affected. Column (2) investigates how the trademark law affected firm exits. The estimates show that the trademark law increased the exits of Japanese firms by around 0.13 while exerting no significant effect on the exits of Western firms. Columns (3)-(4) extend the period to 1930 and find the effects on entries and exits to be stronger over a longer period.

This finding highlights the distinct role of trademark protection: contrary to the widespread concerns that greater IP protection would reduce competition, trademark protection is shown to increase the number of varieties by protecting the functioning of brands. As discussed in Section 3, the decrease in information friction and the subsequent improvements in market allocation and the number of authentic varieties constitute sources of consumer welfare gains.[41,42]

6 Estimating the Consumer Welfare Effect

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

6.1 Consumers and Firms

Building on the framework outlined in Section 3, we start with the case in which the economy has no trademark protection. As before, firms comprise two types: authentic producers (type a) and counterfeiters (type c). Each authentic producer sells a variety j of a differentiated product. The true source of the product variety is known to the producer, but consumers are unable to verify the

[41]The result of increased entry is also mirrored in an increase in advertisements that introduce new products, as we show in Section A.12 of the Online Appendix.

[42]The effects of the trademark law on prices, market reallocation, and varieties documented in this section are also shown to hold in Chinese imports (Section A.13 of the Online Appendix): the trademark law led to increased Chinese imports from, and new trade relationships with, Western countries in trademark-intensive products without significant effects on unit prices. In contrast, imports from Japan fell, though the effect is not statistically significant.

source upon purchase. Without trademark protection, consumers have a probability of s to receive authentic products upon purchase (and a probability of $1-s$ to encounter counterfeits).

Consumers have a utility function with a constant elasticity of substitution (CES) ($\sigma > 1$) over a set of varieties Ω.[43] As shown in Grossman and Shapiro (1988a), counterfeiters optimally offer minimum quality; as a result, for simplicity, consumers are assumed to realize zero utility after purchasing counterfeits. The consumer's expected utility is hence given by:

$$E(U) = s\left(\int_{j\in\Omega} q_j^{\frac{\sigma-1}{\sigma}} dj\right)^{\frac{\sigma}{\sigma-1}} \tag{5}$$

where q_j denotes the quantity of the variety j consumed.

Maximizing the utility function subject to the budget constraint $\int p_j q_j dj \leq I$, where I denotes the constant aggregate expenditure, yields the demand function for each variety j:

$$q_j = \left(\frac{p_j}{P}\right)^{-\sigma} Q \tag{6}$$

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

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

$$\pi_j^a = (p_j - c_j)\, q_j^a - f \tag{7}$$

where $q_j^a = sq_j$, c_j is the marginal cost of production, and f is the fixed cost of production.[44]

Profit maximization leads authentic firms to set the following optimal price:

$$p_j^a = \frac{\sigma}{\sigma-1} c_j. \tag{8}$$

[43] Following Arkolakis et al. (2012) and Costinot and Rodríguez-Clare (2014), we build on trade models with constant markups, specifically, monopolistic competition with Dixit-Stiglitz preferences. While allowing for variable markups through, for example, quasi-linear preferences, translog expenditure functions, or Bertrand competition could introduce an additional source of welfare change, it does not alter the total gains as shown in Arkolakis et al. (2012). Further, our empirical result in Section 5.2 shows that the trademark law did not lead to significant net changes in brand prices.

[44] In a more complex model, we could consider the role of the trademark law in raising consumers' willingness to pay for authentic products and/or changing authentic producers' costs such as spending on alternative information or differentiation channels. However, Section 5.2 shows that while there is evidence in support of these mechanisms, the net price effect of trademark protection is insignificant across the economy as the opposing forces offset each other.

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

$$q_j^a = sQ^{1-\sigma}I^{\sigma}\left(\frac{\sigma c_j}{\sigma-1}\right)^{-\sigma}, \tag{9}$$

and her revenue and profit are given by:

$$r_j^a = sQ^{1-\sigma}I^{\sigma}\left(\frac{\sigma c_j}{\sigma-1}\right)^{1-\sigma} \quad \text{and} \quad \pi_j^a = r_j^a/\sigma - f. \tag{10}$$

The counterfeiters charge the authentic producer's price when selling the counterfeits to avoid being distinguished from authentic firms. Because the counterfeited products have a minimum quality, we assume their unit production cost is negligible (Grossman and Shapiro, 1988a; Landes and Posner, 1987). For each authentic variety, there are n_c counterfeiters in equilibrium. Each counterfeiter earns the following revenue and profit:

$$r_j^c = \left(\frac{1-s}{n_c}\right)Q^{1-\sigma}I^{\sigma}\left(\frac{\sigma c_j}{\sigma-1}\right)^{1-\sigma} \quad \text{and} \quad \pi_j^c = r_j^c - f. \tag{11}$$

When there is free entry and exit, firms exit the market when they incur a loss and enter the market when there are positive profits, leading to zero equilibrium profits.

6.2 Consumer Welfare

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

$$\frac{E(U(s'))}{E(U(s))} = \frac{s'}{s}\frac{Q(s')}{Q(s)}, \tag{12}$$

where $s' > s$. An increase in trademark protection affects welfare by reducing the utility loss to consumers that results from their being deceived by the counterfeits (s) and changing aggregate consumption (Q).

In equilibrium, given equation (10) and zero profit conditions, we obtain:

$$\frac{Q(s')}{Q(s)} = \left(\frac{s'}{s}\right)^{\frac{1}{\sigma-1}}. \tag{13}$$

This leads to:

$$\frac{E(U(s'))}{E(U(s))} = \left(\frac{s'}{s}\right)^{\frac{\sigma}{\sigma-1}}. \tag{14}$$

Analogous to the welfare formula by Arkolakis et al. (2012) who show that gains from trade can be expressed as a function of the expenditure share on domestic goods and the price elasticity of demand across a class of commonly used trade models, the welfare effect of trademark protection can be measured using (i) the change in the market share of authentic varieties (s); and (ii) the price elasticity of demand (σ).

6.3 Estimating the Welfare Effect

To estimate the change in the market share of authentic firms (s) and the price elasticity of demand (σ), we invoke two moments observed in the data: (i) the change in the market share of authentic firms versus that of counterfeiters estimated in Section 5.3; and (ii) exits of counterfeiters estimated in Section 5.4.

Estimating s'/s based on market reallocation. Specifically, we first note that Δs corresponds to the following expression from estimating equation (3) where we use individual firms' employment share as a dependent variable:[45]

$$\Delta s \equiv s' - s = (\hat{\beta} + \hat{\gamma}) * TrademarkInt * M \tag{15}$$

where $\hat{\beta} + \hat{\gamma}$ is the estimated average effect of the trademark law on the employment share of individual Western firms, $TrademarkInt$ is the trademark intensity, and M is the number of Western firms in a product category. Based on column (6) of Table 4 and the average number and shares of Western varieties before the law, we find Δs = 0.026 and $s'/s \equiv 1 + \Delta s/s$ = 1.036, i.e., the market share of authentic firms rose by 2.6 percentage points or equivalently 3.6%.[46]

Inferring σ from exits of counterfeiters. To infer the price elasticity of demand, we turn to changes in the number of counterfeiters (Δn_c) (in conjunction with the estimated change in the market share Δs). Specifically, given the profit functions in equations (10) and (11) and the zero-profit conditions, we can solve for n_c and obtain $\Delta n_c = \sigma\Delta((1-s)/s)$ which leads to $\sigma = \Delta n_c/\Delta((1-s)/s)$. Combining the estimated change in the number of counterfeiters based on

[45] While Table 4 reports estimated effects on the share of employment instead of output, the employment share of a given firm serves as a proxy for its output share as the output elasticity of labor does not affect the transformation.

[46] Alternatively, we can compute Δs based on the estimated decrease in the employment share of Japanese firms and obtain similar results Δs = 0.027 and $s'/s \equiv 1 + \Delta s/s$ = 1.037.

column (4) of Table 6 (i.e., $\Delta n_c = -0.34$ at the mean trademark intensity) and the estimated $\Delta((1-s)/s) \equiv \Delta s/(ss')$ based on Western firms' employment share changes from column (6) of Table 4 (i.e., -0.048) yields $\sigma = 6.88$. The estimates are consistent with the range of demand elasticity estimates obtained in the existing trade literature (Head and Mayer, 2014; Costinot and Rodríguez-Clare, 2014).[47]

Applying the above estimates to equation (14) suggests that the trademark law increased consumer welfare by 4.2%, with the gains increasing with the industry's dependence on trademark protection. Equivalent calculations yield over 6.7% consumer welfare gains for industries with the 10 largest trademark intensities.[48]

7 Comparing Alternative Institutional Attempts

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

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

[47] For example, Eaton and Kortum (2002) structurally estimate the trade elasticity using a gravity equation and a measure of trade cost based on price gaps and find the values to range from 3.6 to 12.86 with the preferred estimate of 8.28. Simonovska and Waugh (2014), using an estimation strategy adapted from Eaton and Kortum (2002) to correct an overestimation of the elasticity based on price gaps, find a benchmark estimate of 4.14. Caliendo and Parro (2015) estimate sector-level trade elasticities and obtain an arrange of 0.37-15.72 (excluding petroleum).

[48] Applying estimates of Δs derived from changes in Japanese firms' employment in column (6) of Table 4 yields very similar welfare estimates (4.5% at mean trademark intensity and 7.2% for the 10 largest trademark intensities.

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

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

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

The estimation results that compare the effects of the three alternative institutions to the 1923 trademark law on Western firms are reported in Table 7, where each institutional measure interacted with firm-specific trademark intensity.[50] The results in column (6) show that, when taking into account all measures and controlling for country-year dummies, neither extraterritoriality nor bilateral treaty exerted significant positive effects on Western firm employment. As anticipated, the unenforced 1905 trademark code also appears to have had no effects. The 1923 trademark law is the only measure shown to have played a positive role in the growth of trademark-intensive Western firms. Earlier attempts involving direct imports of foreign institutions and bilateral treaties appear to have been unsuccessful as means of trademark protection; a positive effect was not achieved until a domestic trademark law was established.

8 Conclusion

In this paper, we investigate how firms, markets, and consumer welfare respond to the introduction of modern trademark institutions by exploiting a historical precedent—the establishment of China's first trademark law of 1923–in one of the world's most contested markets for trademark protection. Our empirical evidence, based on a series of micro-level datasets, shows that the trademark law significantly reduced information friction surrounding the identity of the producer and authentic firms' dependence on alternative communication channels. The reduced information friction did not come at the expense of higher brand prices as new authentic varieties emerged after the law, especially in industries with lower scope of quality differentiation and lower entry barriers. Trademark protection also reshaped firm dynamics on the opposite sides of trademark

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

conflicts by allocating markets from Japanese businesses that were most accused of counterfeiting to trademark-intensive Western firms.

At the aggregate level, despite widespread concerns over reduced market competition after IP reforms, we did not find the trademark law to reduce the level of competition. In contrast, it led to increased entry of authentic firms and new varieties. Quantifying the consumer welfare effect based on the empirical findings suggests a 4.2% welfare gain from the trademark law. These findings underscore the distinct role of trademark institutions compared to other forms of IP and the prospect of enforcing trademark protection and reducing consumer information friction while sustaining market competition, fostering domestic industrial growth, and producing consumer gains.

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

References

Akerlof, G. A. (1970). The market for "lemons": Quality uncertainty and the market mechanism. *The Quarterly Journal of Economics 84*(3), 488–500.

Alford, W. P. (1995). *To steal a book is an elegant offense: Intellectual property law in Chinese civilization*. Stanford University Press.

Arkolakis, C., A. Costinot, and A. Rodríguez-Clare (2012). New trade models, same old gains? *American Economic Review 102*(1), 94–130.

Bagwell, K. (2007). The economic analysis of advertising. *Handbook of Industrial Organization 3*.

Baroncelli, E., C. Fink, and B. S. Javorik (2005). The global distribution of trademarks: Some stylised facts. *World Economy 28*(6), 765–782.

Bertrand, M., E. Duflo, and S. Mullainathan (2004). How much should we trust differences-in-differences estimates? *Quarterly Journal of Economics 119*(1), 249–275.

Besen, S. M. and L. J. Raskind (1991, March). An introduction to the law and economics of intellectual property. *Journal of Economic Perspectives 5*(1), 3–27.

Biasi, B. and P. Moser (2021). Effects of copyrights on science. *American Economic Journal: Microeconomics 13*(4), 218–260.

Bolt, J., R. Inklaar, H. de Jong, and J. L. van Zanden (2018). Rebasing 'Maddison': new income comparisons and the shape of long-run economic development. Research memorandum gd-174, Groningen Growth and Development Centre, University of Groningen.

Brandt, L., D. Ma, and T. Rawski (2014). From divergence to convergence: Reevaluating the history behind China's economic boom. *Journal of Economic Literature 52*(1), 45–123.

Branstetter, L., R. Fisman, and F. Foley (2006). Do stronger intellectual property rights increase international technology transfer? Empirical evidence from U.S. firm-level panel data. *Quarterly Journal of Economics 121*(1), 321–349.

Branstetter, L., R. Fisman, F. Foley, and K. Saggi (2011). Does intellectual property rights reform spur industrial development? *Journal of International Economics 83*(1), 27–36.

Bryan, R. T. J. (1919). Japanese trade mark law and infringements. *Millard's Review of the Far East*.

Caliendo, L. and F. Parro (2015). Estimates of the trade and welfare effects of NAFTA. *The Review of Economic Studies 82*(1), 1–44.

Callaway, B. and P. H. Sant'Anna (2020). Difference-in-differences with multiple time periods. *Journal of Econometrics*.

Chang, S. (2014). Combating trademark squatting in China: New developments in Chinese trademark law and suggestions for the future. *Northwestern Journal of International Law and Business 34*(2), 337–358.

Costinot, A. and A. Rodríguez-Clare (2014). Trade theory with numbers: Quantifying the consequences of globalization. In *Handbook of international economics*, Volume 4, pp. 197–261. Elsevier.

Eaton, J. and S. Kortum (2002). Technology, geography, and trade. *Econometrica 70*(5), 1741–1779.

EUIPO (2022a). IPR-intensive industries and economic performance in Latin American countries. Technical report.

EUIPO (2022b). IPR-intensive industries and economic performance in the European Union:

Fourth edition. Technical report.
Fink, C. and B. Javorcik (2002). Trademarks, geographical indications and developing countries. In B. Hoekman, P. English, and A. Mattoo (Eds.), *Development, Trade and the WTO: A Handbook*, Volume 1 of *Development, Trade and the WTO: A Handbook*, pp. 19–26. World Bank.
Fouquin, M. and J. Hugot (2016). Two centuries of bilateral trade and gravity data: 1827-2014. *CEPII Working Paper No. 2016-14*.
Ginarte, J. and W. Park (1997). Determinants of patent rights: A cross-national study. *Research Policy 26*(3), 283–301.
Giorcelli, M. and P. Moser (2020). Copyright and creativity. Evidence from Italian opera during the Napoleonic age. *Journal of Political Economy 128*(11), 4163–4210.
Grossman, G. and C. Shapiro (1984). Informative advertising with differentiated products. *The Review of Economic Studies 51*(1), 63–81.
Grossman, G. M. and C. Shapiro (1988a). Counterfeit-product trade. *American Economic Review 78*(1), 59–75.
Grossman, G. M. and C. Shapiro (1988b). Foreign Counterfeiting of Status Goods*. *Quarterly Journal of Economics 103*(1), 79–100.
Head, K. and T. Mayer (2014). Gravity equations: Workhorse,toolkit, and cookbook. Volume 4, Chapter Chapter 3, pp. 131–195. Elsevier.
Heath, D. and C. Mace (2019). The Strategic Effects of Trademark Protection. *Review of Financial Studies 33*(4), 1848–1877.
Heuser, R. (1975). The Chinese trademark law of 1904: A preliminary study in extraterritoriality. *Oriens Heuser 22*(2), 183–210.
Higgins, D. M. (2012). Forgotten heroes and forgotten issues: Business and trademark history during the nineteenth century. *The Business History Review 86*(2), 261–285.
Hou, C. (1965). *Foreign Investment and Economic Development in China, 1840-1937*. Cambridge and London: Harvard University Press.
Javorcik, B. (2004). The composition of foreign direct investment and protection of intellectual property rights: Evidence from transition economies. *European Economic Review 48*(1), 39–62.
Javorcik, B. and C. Fink (2002). Trademarks, Geographical Indications and Developing Countries. *Development, Trade and the WTO: A Handbook*.
Jia, R. (2014). The legacies of forced freedom: China's treaty ports. *Review of Economics and Statistics 96*(4), 596–608.
Keller, W., B. Li, and C. H. Shiue (2013). Shanghai's trade, China's growth: Continuity, recovery, and change since the Opium Wars. *IMF Economic Review 61*(2), 336–378.
Keller, W. and C. H. Shiue (2020). China's foreign trade and investment, 1800 - 1950. Working Paper 27558, National Bureau of Economic Research.
Keller, W. and C. H. Shiue (2021). The economic consequences of the opium war. Working Paper 29404, National Bureau of Economic Research.
Khandelwal, A. (2010). The long and short (of) quality ladders. *Review of Economic Studies 7780*, 1450–1476.
Kratoska, P. H. (1990). The British Empire and the Southeast Asian rice crisis of 1919–1921. *Modern Asian Studies 24*(1), 115–146.
Kuroishi, Y. (2020). The value of trademarks: Micro evidence from Chinese exports to Africa.
Landes, W. M. and R. Posner (1987). Trademark law: An economic perspective. *Journal of Law*

and Economics 30(2), 265–309.
Lardy, N. (1994). *China in the World Economy*. Washington, D.C.: Brookings Institution Press.
League of Nations (1932, October). Appeal by the chinese government. report of the commission of enquiry. Technical report.
Levine, R., C. Lin, C. Ma, and Y. Xu (2023). The legal origins of financial development: Evidence from the Shanghai concessions. *Journal of Finance, forthcoming*.
Li, M. (2022). Firm foundations: Legal systems and economic performance in colonial shanghai, 1903-1934. Working paper.
Li, X., M. MacGarvie, and P. Moser (2018). Dead poets' property—how does copyright influence price? *RAND Journal of Economics 49*(1), 181–205.
Lieu, D. (1936). *The Growth and Industrialization of Shanghai*. China Institute of Economic and Statistical Research.
Liu, C. (2020). The effects of World War I on the Chinese textile industry: Was the world's trouble China's opportunity? *Journal of Economic History 80*(1), 246–285.
Ma, D. (2008). Economic growth in the lower Yangzi region of China in 1911-1937: A quantitative and historical analysis. *Journal of Economic History 68*(2), 355–92.
Maskus, K. (2000). *Intellectual Property Rights in the Global Economy*. Institute for International Economics.
Moser, P. (2013). Patents and innovation: Evidence from economic history. *Journal of Economic Perspectives 27*(1), 23–44.
Motono, E. (2011). Anglo-Japanese trademark conflict in China and the birth of the Chinese trademark law (1923), 1906-26. *East Asian History 37*, 9–26.
Motono, E. (2013). The nationalist government's failure to establish a trademark protection system, 1927-1931. *Modern Asian Studies Review 4*, 59–89.
Nelson, P. (1970). Information and consumer behavior. *Journal of Political Economy 78*(2), 311–329.
Nelson, P. (1974). Advertising as information. *Journal of Political Economy 82*(4), 729–754.
Oberholzer-Gee, F. and K. Strumpf (2007). The effect of file sharing on record sales: An empirical analysis. *Journal of Political Economy 115*(1), 1–42.
OECD and EUIPO (2019). Trends in trade in counterfeit and pirated goods, illicit trade. Technical report.
Orchard, D. J. (1930). China's use of the boycott as a political weapon. *The ANNALS of the American Academy of Political and Social Science 152*(1), 252–261.
Osterhammel, J. (1989). British business in China, 1860s-1950s.
Patent and Trade Mark Review (1907, October). China. Counterfeiting of Trade Marks by the Japanese.
Patent and Trade Mark Review (1923, October). China. New Trade Mark Law.
Qian, Y. (2008). Impacts of entry by counterfeiters. *Quarterly Journal of Economics 123*(4), 1577–1609.
Sant'Anna, P. H. and J. Zhao (2020). Doubly robust difference-in-differences estimators. *Journal of Econometrics 219*(1), 101–122.
Shapiro, C. (1982). Consumer information, product quality, and seller reputation. *Bell Journal of Economics 13*(1), 20–35.
Shapiro, C. (1983). Premiums for high quality products as returns to reputations. *The Quarterly*

Journal of Economics 98(4), 659–679.
Simonovska, I. and M. E. Waugh (2014). The elasticity of trade: Estimates and evidence. *Journal of International Economics 92*(1), 34–50.
Statistical Office of the United Nations (1962, May). International trade statistics 1900-1960.
The China Weekly Review (1923a). New chinese trademark law.
The China Weekly Review (1923b). New chinese trademark law.
The North China Herald (1919). The stolen trade mark.
USPTO (2020). Intellectual property and the U.S. economy: Third edition. Technical report.
WIPO (2022). World intellectual property indicators 2022. Technical report.
Zeitz, P. (2013). Do local institutions affect all foreign investors in the same way? Evidence from the interwar Chinese textile industry. *Journal of Economic History 73*(1), 117–141.
Zumoto, M. (1932). *The Origin and History of the Anti-Japanese Movement in China*. The Herald Press.
Òscar Jordà, M. Schularick, and A. M. Taylor (2016, May). *Macrofinancial History and the New Business Cycle Facts*, pp. 213–263. University of Chicago Press.

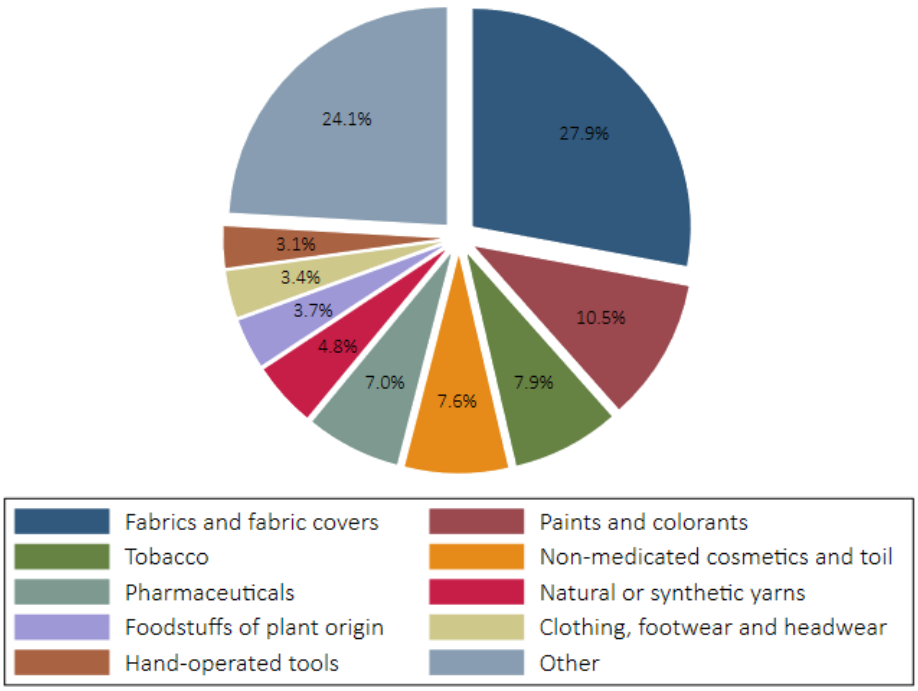


Figure 1: Chinese Trademark Registrations: Product Categories, 1924-1927

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

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

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

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

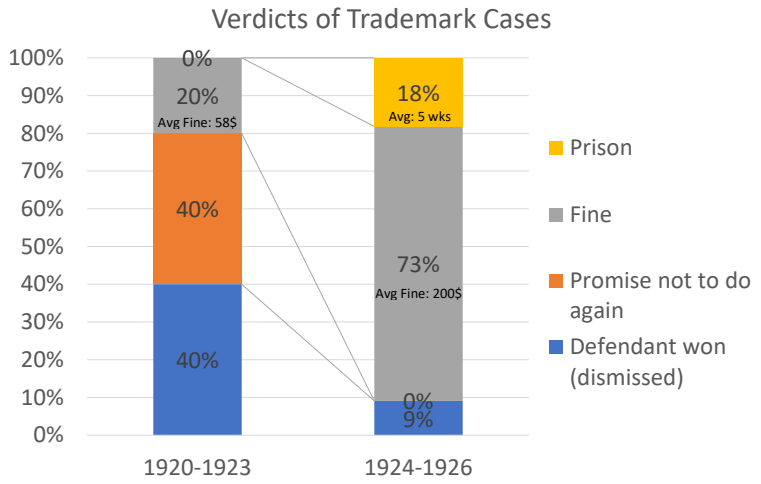


Figure 3: Verdicts of Trademark Cases, Before and After 1923

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

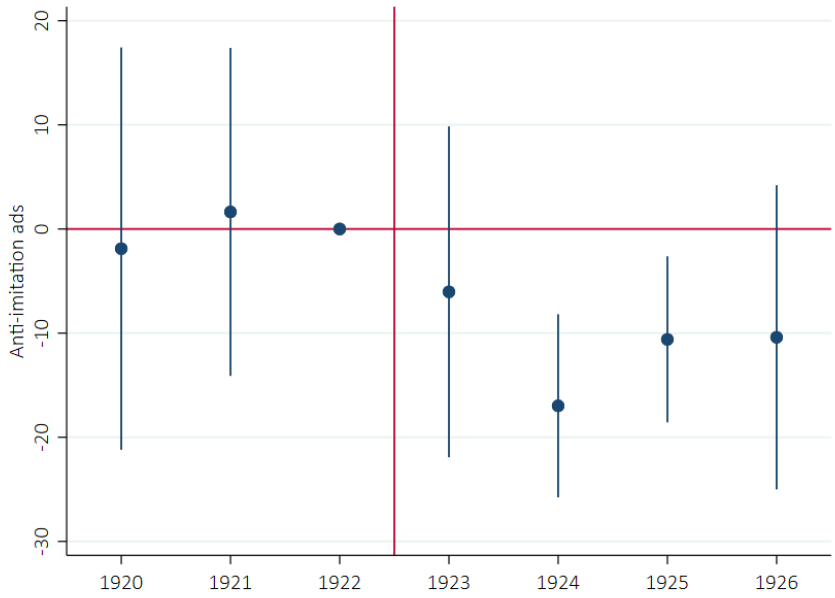


Figure 4: Effect of the Trademark Law on Anti-imitation Advertisements: Event Study

Notes: The figure estimates the event study version of column (3) in Table 2 where we aggregate the data to the annual level and allow the effect on trademark intensity to vary every year.

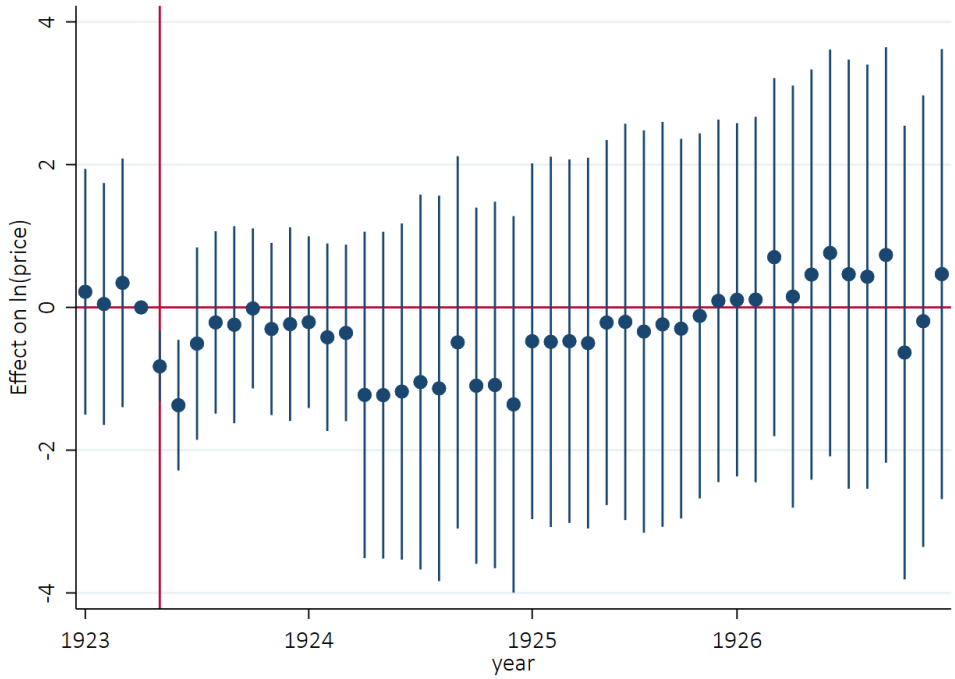


Figure 5: Effect of the Trademark Law on Prices: Event Study

Notes: The figure estimates the event study version of column (1) in Table 3 by allowing the effect on trademark intensity to vary every month.

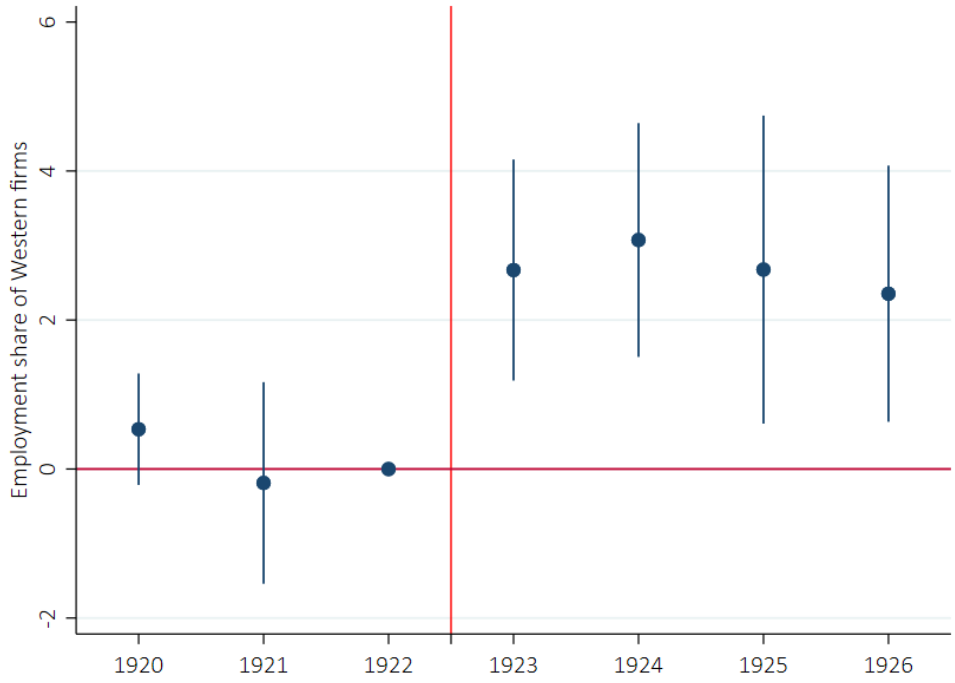


Figure 6: Effect of the Trademark Law on Reallocation from Japanese to Western Firms

Notes: The figure estimates the event study version of column (4) in Table 4 by allowing the effect on the differential trademark intensity of Western firms to vary every year.

Figure 7: Effect of the 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 the equation estimated in column (4) in Table 4: we add interaction terms for intermediate and final goods, depending on the NCL product classification of the most trademark intensive product that a given firm sells.

Table 1: Trademark Intensity across Product Categories

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

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

Table 2: Effect of the Trademark Law on Anti-imitation Advertisements

	(1) Dummy if > 1 anti-imitation ad	(2) anti-imitation ads/all ads	(3) $\sinh^{-1}$(anti-imitation ads)
Post May 1923 * trademark intensity	-1.529***	-0.162**	-3.155***
	(0.545)	(0.072)	(1.053)
Observations	2,856	2,856	2,856
R-squared	0.040	0.035	0.039
Number of NICE	45	45	45
Product FE	Yes	Yes	Yes
Month FE	Yes	Yes	Yes

Notes: This table reports the estimated effects of the trademark law on advertisements warning against imitations (anti-imitation ads) that were published in *Shen Bao* between 1920-1926. The dependent variables are a dummy variable indicating that there was at least one anti-imitation ad in the product-month, the share of anti-imitation ads in all ads in the product-month, and the inverse hyperbolic sine of the count of anti-imitation ads in the product-month. *Post May 1923* is a dummy denoting the period after adoption of the trademark law in May 1923. *Trademark intensity* is a product group-specific measure of trademark dependence, calculated using each product's share in total pre-1923 trademarks. All regressions include product group fixed effects and month fixed effects. Standard errors are clustered by product group. *** p<0.01, ** p<0.05, * p<0.1.

Table 3: Effect of the Trademark Law on Brand Prices

	(1) ln(price)	(2) ln(price)	(3) ln(price)	(4) ln(price)	(5) ln(price)	(6) ln(price)	(7) ln(price)
Post May 1923 * TM int.	-0.745	-4.520***	-3.317	-1.030**	-4.502***	-2.819**	-1.209
	(0.455)	(1.307)	(3.567)	(0.458)	(1.029)	(1.058)	(0.911)
Post May 1923 * TM int. *							
– quality dispersion		0.155*	0.147**				
		(0.078)	(0.069)				
– no. of varieties			-0.116				
			(0.264)				
– price dispersion				0.690**			
				(0.320)			
– avg firm size					0.016***		
					(0.004)		
– avg capital per firm						0.010**	
						(0.004)	
– anti-imitation ads							-0.088*
							(0.044)
Observations	33,245	16,955	16,955	15,618	32,344	32,344	33,245
R-squared	0.150	0.192	0.193	0.188	0.159	0.157	0.154
Number of panel_id	1,141	581	581	484	1,117	1,117	1,141
Brand FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Month FEs	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Broad industry-quarter FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Marginal effect for		13.137	13.387**	10.702*	1.523	2.611**	-14.171**
the top industry		(7.812)	(6.038)	(5.568)	(0.990)	(1.221)	(6.017)

Notes: This table reports the estimated effects of the trademark law on log prices. *Post May 1923* is a dummy denoting the period after adoption of the trademark law in May 1923. *Trademark intensity* is a product-specific measure of trademark dependence, calculated using each product's share in total pre-1923 trademarks. All regressions include brand fixed effects, month fixed effects, and broad industry times quarter fixed effects. Marginal effects at the bottom of the table are computed at the maximum values of the respective interacted variables. The sample includes all brands for which we have at least 12 monthly observations. Standard errors are clustered by product group. *** p<0.01, ** p<0.05, * p<0.1.

Table 4: Effects of the Trademark Law on Employment Reallocation

	(1) ln(empl)	(2) emp share	(3) ln(empl)	(4) emp share	(5) ln(empl)	(6) emp share	(7) ln(empl)	(8) emp share
Post 1923 * trademark intensity * Western firms	10.929***	2.839***	10.405***	2.607***	13.812***	3.262***	14.247***	3.187***
	(3.138)	(0.824)	(3.659)	(0.916)	(2.994)	(0.811)	(3.579)	(0.867)
Post 1923 * trademark intensity	-8.853**	-2.475***			-11.555***	-2.927***		
	(3.433)	(0.828)			(3.418)	(0.793)		
Observations	2,131	2,131	2,088	2,088	3,211	3,211	3,143	3,143
R-squared	0.914	0.952	0.922	0.955	0.895	0.950	0.904	0.950
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country*year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Region*broad ind*year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
NICE*year FE	No	No	Yes	Yes	No	No	Yes	Yes
Sample years	1920-1926	1920-1926	1920-1926	1920-1926	1920-1930	1920-1930	1920-1930	1920-1930

Notes: This table reports the differential effect of the trademark law on the employment shares of Western firms relative to Japanese firms. The sample includes Western and Japanese firms located in Shanghai's concessions with employment and activity information between 1920-1923. The dependent variable is either the natural log of a firm's employment in a given year or the share of employment of a firm in total employment in the respective product category-year. *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. Regions denote either Western countries or Japan. Standard errors are clustered by product category and country-year. *** p<0.01, ** p<0.05, * p<0.1.

Table 5: Effect of the Trademark Law on the Probability of Hiring in Certain Positions

	(1)	(2)	(3)	(4)	(5)
			Dummy for:		
	ln(empl)	emp share	Lawyers	Sales	Manuf
Post 1923 * trademark intensity * Western firms	14.666***	3.451***	1.327	4.800**	1.593*
	(3.485)	(0.877)	(1.917)	(2.090)	(0.776)
Observations	1,627	1,627	1,627	1,627	1,627
R-squared	0.928	0.960	0.854	0.744	0.706
Firm FE	Yes	Yes	Yes	Yes	Yes
Country*year FE	Yes	Yes	Yes	Yes	Yes
Region*broad ind*year FE	Yes	Yes	Yes	Yes	Yes
NICE*year FE	Yes	Yes	Yes	Yes	Yes

Notes: This table reports the estimated effect of the 1923 trademark law on Western firms' differential probability of hiring lawyers, sales staff, and manufacturing staff. Columns (1) and (2) show that our main results on employment and employment shares also hold on the subset of firms for which we have job title information. The dependent variables in columns (3)-(5) are dummies denoting whether a firm had lawyers, sales staff, and a manufacturing department. *Post 1923* is a dummy denoting the period after the adoption of the trademark law in 1923. *Trademark intensity* is a firm-specific measure of trademark dependence, based on each firm's pre-1923 product mix and product-level trademark intensity, calculated using each product's share in total pre-1923 trademarks. Standard errors are two-way clustered by product category and country-year. *** p<0.01, ** p<0.05, * p<0.1.

Table 6: Entry and Exit

	(1) Entry	(2) Exit	(3) Entry	(4) Exit
Post 1923 * trademark intensity * Western firms	125.615***	-10.610	155.844***	-16.570
	(28.783)	(8.556)	(33.531)	(10.593)
Post 1923 * trademark intensity	0.037	5.776*	-18.689	15.322***
	(5.533)	(2.933)	(11.438)	(4.534)
Observations	4,186	4,186	6,578	6,578
R-squared	0.948	1.000	0.897	0.999
Prod-region FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Sample	1920-1926	1920-1926	1920-1930	1920-1930

Notes: This table reports the estimated effect of the 1923 trademark law on the on the entry and exit of Western relative to Japanese firms, using data collapsed to product-years. The dependent variables in columns (1) and (3) are the stock of firms that entered the market before the end of the sample period (ignoring exits), i.e., the increase in the stock equals entry. The dependent variables in columns (2) and (4) are the stock of firms that survived during the sample period, i.e., the change in this stock equals exits. Thus the coefficient on the interaction terms can be interpreted as the effect of the trademark law on the entry and exit of firms. *Post 1923* is a dummy denoting the period after the adoption of the trademark law in 1923. *Trademark intensity* is a product-specific measure of trademark dependence calculated using each product's share in total pre-1923 trademarks. Standard errors are two-way clustered by product category and region-year. *** p<0.01, ** p<0.05, * p<0.1.

Table 7: Comparing Alternative Institutions

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

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

ONLINE APPENDIX

A Additional Background and Analysis

A.1 How the Trademark Law Changed the Legal Situation for Trademark Protection

To examine the effectiveness of the trademark law in improving trademark protection, we digitized all the trademark disputes published in China's Trademark Gazette between 1924 and 1927. As discussed in Section 2.4 of the paper, the data show that while some Japanese counterfeiters attempted to register other businesses' trademarks, such registrations were soon disputed and revoked. The records show that 63.4% of the disputed trademarks were originally filed by Japanese firms and firms that filed complaints were mostly from Western countries. Further, Japanese firms lost 72% of the disputes filed against them by Western counterparts.

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

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

We also examine whether the legal provisions affected the verdicts by collecting the trademark cases reported in the *North China Herald*, the leading English-language newspaper in China at the time. While these case reports are not comprehensive, the case verdicts, as summarized in Figure 3 of the main paper, illustrate that the punishments for counterfeiters became more severe. For example, before 1923, 40% of the cases were dismissed, compared to less than 10% after 1923. Plaintiffs won 40% of cases before 1923, but instead of a punishment, the counterfeiter just had to promise not to counterfeit again. In contrast, after 1923, the cases in which the plaintiff won were never settled without a fine or prison sentence. Before the law, the maximum possible fine under the Provisional Criminal Code was $100, but the reported case only charged 3 defendants with fines between $50 and $75 (with an average of $58). The new trademark law raised fines up to $500, and the average fine across reported cases was $200. Notably, the trademark law also included prison sentences, imposed in 20% of the reported cases, with an average prison sentence of 5 weeks. The law allowed for 1 year maximum prison time, even though in one case the verdict

was $500 or 500 days of prison time; see Articles 39 and 40 of the Trademark Law, published in English in The China Weekly Review (1923a) and The China Weekly Review (1923b).

Prison time became a major punishment, especially when counterfeiters used intermediaries. Because counterfeiting was so profitable, Japanese producers had reimbursed their Chinese distributors for any court fines before the trademark law was introduced, which would not have worked with prison time. As the The North China Herald (1919) lamented: "But the very salutary effect of a few sentences of imprisonment would nullify all the guarantees that Japanese or any other manufacturer of goods under false trade marks might give."

A.2 The Construction of the Firm-Employee Panel Data

We digitized and assembled an annual business-employee-level panel dataset covering the universe of firms that operated in Shanghai's concession areas in 1872-1941 based on the *North-China Hong List*, an annual series 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.

For each company listed in a given year, our initial dataset recorded the following variables:

- *year:* the year of the issue of the *North-China Hong List*
- *firm name:* the name of the firm in English
- *Wade-Giles firm name:* the Wade-Giles romanization of the firm name
- *address:* the firm's street and street number
- *firm activity:* text description of the firm's activities
- *list of main employees:* For each employee, we recorded the employee name and their job title.

The original dataset consisted of 560,246 firm-employee-year observations covering 66 years (1872-1941, with 4 missing issues in 1873, 1885, 1898, and 1904). Note that we only collected data related to firms and did not digitize government organizations (e.g., municipal councils, embassies) or organizations (e.g., missions, churches, clubs), which were also listed in the Hong List.

Based on this data, we created several additional variables for each firm-year:

- *Broad industry.* We manually assigned each firm to eight industry categories (multiple assignments possible): agriculture/mining, construction, manufacturing, transportation, wholesale, retail, finance/ insurance/real estate, and other services. We then created 8 dummy variables indicating whether a firm belongs to one of these broad industries in a given year.
- *Employment.* We counted the list of the employees which we use as a proxy for employment. If a firm did not list any employee, we assigned them a count of 1, assuming that any firm needs to have at least one worker, who may be the owner. We dropped absent employees (indicated by "(abs.)" after their name) from the count.
- *Lawyers dummy.* Dummy variable that equals one if at least one of the listed employees has a job title related to legal activities (titles such as attorney, lawyer, etc.)
- *Sales staff dummy.* Dummy variable that equals one if at least one of the listed employees has a job title related to sales (e.g., titles such as sales, salesman, marketing, representative, advertising, and publicity)

- *Manufacturing staff dummy.* Dummy variable that equals one if at least one of the listed employees has a job title related to manufacturing (e.g., titles such as manufacturing, production, producing, factory)
- *Concession.* We assigned the addresses to either the International Settlement (also called the Public concession) or the French Concession. We dropped all firms that did not have an address, firms whose addresses we could not locate in a concession, and firms in areas outside the concessions (because the Hong Lists did not systematically cover those). We were able to assign the concession to 94.55% of our firm-employee-year observations.

We then used additional sources to create an indicator of the nationality for each firm:

- *nationality:* We assigned the nationality of the ownership nationality of the firm based on various sources. These 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. For the remaining unmatched businesses, we manually collected nationality information or assigned a nationality based on the country reference in the firm's name (if unambiguous). Our measure of a firm's nationality is time-invariant; we have no information about changes in the nationality of firms over time, but the nationality of ownership tended to be persistent in this period.

To construct the panel data, we matched the firms over time based on their names (in both English and traditional Chinese), industries, and employee names to produce a firm panel dataset. This was an iterative process and included a combination of automated processing (such as harmonizing common company abbreviations by replacing the word 'limited' with the abbreviation 'ltd', etc.), semi-automated processing (e.g., fuzzy matching firm names and then manually verifying potential matches), and manual matching (such as correcting spelling errors that occurred during data entry, or taking out industry information that appeared in the name in some years, such as harmonizing "ying cheong and co" and "ying cheong and co photographers" or "watson a s and co" and "watson a s and co ld (the shanghai pharmacy)"). In case of imperfect matches, we also used the information on industry, address, or the list of firm employees to decide whether two observations belonged to the same firm. We iterated these steps until we exhausted all the spelling variants or common mistakes in the process of manually checking data. In the case of takeovers or for deceased owners, the Hong List typically kept listing the old firm name in parenthesis after the new firm name, which we also used for matching (e.g., matching "milles walter jennings" with "milles walter jennings (henderson macleod and milles)" and "henderson macleod and milles"; or "bury a j (late wilkinson and co)" to match with "bury a j" and "wilkinson and co"). We also investigated the business history of many companies to better track companies over time despite their potential name changes (an example is "British American Tobacco", which we traced to consist of the firms "british american tobacco co", "american cigarette co", "american tobacco co depot", "british cigarette co", and the wade romanized firm names of "yungtahzeangienhong", "yungtahzeangienhung", "yuentaiyuenienhong", "yee tsoong tobacco co" and "yee tsoong tobacco

co"). If the same firm name appeared in both the Public and the French Concessions, we treated them as two separate firms, as they operated in slightly different legal environments.

We then restricted our dataset to the years 1920-1926 for our main analysis (and 1920-1930 for robustness checks) during which the *North-China Hong List* provided an appendix of products and services where firms selling a specific product or service were listed underneath the product or service. Using this appendix, we created an additional variable:

- *product list:* the list of products or services offered by the firm.
- *product Nice category:* We assigned each of the products or services mentioned to one of the Nice classification (NCL) categories used in the trademark data described in Section 4.4. We used this later to assign trademark intensities to each product the firm sells, as described in the main text.

Several stylized facts on the time trends and distributions of firms emerge from the data.[1] Consistent with historical accounts, the data reveal a significant transformation in both the volume and composition of businesses in Shanghai during the early decades of the 1900s. As Figure C.4 shows, the number of businesses grew rapidly beginning in the 1920s and rose from 771 to 1,624 in 1920-1930 alone, while employment increased from about 5,000 in 1920 to 13,000 in 1930.[2] Transformations were also evident in the industrial composition of Shanghai's economy. While wholesale constituted the dominant sector in Shanghai, the manufacturing sector grew from only 6.2% of the employment to 20% by 1930 as more foreign businesses set up factories (Figure C.5). The array of nationalities represented by Shanghai businesses also varied significantly over time. As Figure C.6 shows, Great Britain, initially accounting for half of the businesses, saw a significant fall in its share over time while the shares of American, Japanese, and Chinese companies grew.

A.3 Data Validation of the Firm-level Dataset

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 foreign employment of foreign firms with the size of the foreign population (including both adults and children) in Shanghai reported in the Census for the years in which there are overlapping data: 5-year intervals between 1900 and 1935. The comparison suggests that the employees in our data accounted for 26% to 41% of the foreign population in Shanghai (see Figure C.7 (a)) in the Online Appendix). The Census reported the population of the international concession separately for male adults, female adults, and children. Figure C.7 (b)) shows that aggregate (predominantly male) employment in the Hong List accounts for about 80% of the foreign adult male population in the Public Concession census; we believe this finding confirms the thoroughness of the Hong List's coverage.

[1] Summary statistics for the regression sample are given in Table B.1.

[2] Some notable examples of foreign corporations operating in Shanghai at the time include British American Tobacco (BAT), Standard Oil, Andersen, Meyer & Co, and Mitsui Trading Company. As Figure C.2 of the Online Appendix shows, BAT (formerly British Cigarettes), a Western company involved in numerous trademark disputes, consisted in 1906 of about 25 main employees and a relatively simple organizational structure; two decades later, BAT's operations in Shanghai had expanded to over 100 main employees and 9 departments.

A.4 The Construction of Product Trademark Intensity

To measure the pre-existing, product-specific demand for trademark protection, we compute the product-specific share of trademarks registered before 1923 in countries outside China. We obtained historical trademark data from the IP Portal of the World Intellectual Property Organization (WIPO).[3] 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.[4] The dataset lists the trademark name, the trademark ID, its holder, the application date, and the product group(s). Product groups are defined according to the international NICE classification (NCL) scheme, established by the NICE Agreement in 1957.[5]

For each country, we calculated the cumulative sum of all trademarks registered between 1872 when the trademark data started, and 1922, the year before the enactment of China's trademark law.[6] 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 $TrademarkInt_p$.[7]

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 the trademark. As anticipated, experience goods classified by Nelson (1970) exhibit significantly greater trademark intensity than search goods. Further, the trademark intensity is also highly correlated with the frequency of trademark infringements documented in court cases and newspapers which are concentrated in product categories such as medicines, cosmetics, food, and tobacco.

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

[3] https://www3.wipo.int/branddb/en/

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

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

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

[7] Services were generally not covered in trademark laws in this time period. Nevertheless, some service trademarks appeared in the data; we dropped them and assigned a value of 0 for services listed in the Hong List data. We also performed robustness checks by excluding services from the analysis, see Section A.8.

are, therefore, not our preferred measure, the results are robust.

A.6 Robustness to Other Firm or Product Attributes and Macroeconomic Shocks

We examine whether the positive effect of the trademark law on Western firms indeed reflects ex-ante variation in firms' dependence on trademark protection rather than other firm or product attributes. For example, trademark-intensive firms may have also been innovation-intensive. We hence interact the post-law dummy with a firm-specific measure of patent intensity in column (2) of Table B.5, by calculating the patent intensity of each product as the share of patents in each product category based on data on the stock of U.S. patents in 1922 from the historical U.S. PTO database. We find trademark and patent intensity to be weakly correlated, and the result is not explained by patent intensity. In columns (3)-(4), we examine whether the effect on trademark-intensive industries reflects an effect on large industries measured by the number of firms or total employment in the firm's most trademark-intensive product. In columns (5)-(6), we check whether the industry's competitiveness or average firm size may drive the result. Overall, none of these measures affect the estimated effect of the trademark law on trademark-intensive firms.

Finally, in addition to the country-year fixed effect, column (7) shows that the estimated effects of the trademark law are not due to potential differential effects of macroeconomic shocks, measured by home-country GDP, on trademark-intensive firms. An example of country-specific shocks is Japan's earthquake in 1923. While Japan's earthquake could perceivably cause supply shocks for Japanese firms' operations in China, our result on the interaction between trademark intensity and country GDP suggests the effect of Japan's earthquake, if present in China, did not vary significantly with firms' trademark dependence.

A.7 Controlling for Chinese Boycotts against Foreign Goods

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

In columns (1) to (3) of Table B.6, we, therefore, control for dummy variables indicating whether a foreign country experienced consumer boycotts in a specific year and the interactions between boycotts and trademark intensity. As historical sources are inconsistent concerning the number of boycotts reported, we use three alternative sources to date the boycotts (League of Nations, 1932; Orchard, 1930; Zumoto, 1932). However, not even the most comprehensive source for boycotts in column (3) explains away the trademark law's effect; our estimated effects are also not sensitive to the specific boycotts we control for.

Next, we refine this measure in two ways. First, it may be plausible that product categories dominated by a foreign country were more affected by the boycotts. In columns (4) to (6), we, therefore, interact the country-specific boycott indicator by the ratio of that country's trademarks over world trademarks (excluding the country) — this measure is larger than 1 if a country dom-

inates the product category. Again, this boycott measure does not impact the estimated effects of the trademark law.

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

A.8 Robustness for Different Subsamples

Our main analysis has included both goods and service industries. Here, we examine the robustness of our results for different subsamples, starting by restricting the analysis to goods alone. Because many of the firms in our sample sold both goods and services, this analysis includes only firms that sold goods exclusively during 1920-1922. The results are reported in Table B.7. We find the estimated effect of the trademark law to increase in magnitude and continue to be statistically significant when considering goods alone.

Next, we examine whether the estimated employment effects of the trademark law are attributable to a particular country or product. Figures C.9 and C.10 show that neither a specific country nor a specific product group drives the results. The results remain similar in magnitude and are almost always significant when we drop a single country or product group at a time.

In Table B.8, we drop distributors to check whether the reallocation results are also significant between Western and Japanese producers who produced domestically (we expect reallocation effects both across producers and across distributors and import sources, the latter of which is confirmed when we examine the effects of the trademark law on Chinese imports in Section A.13). We find that results are robust to dropping distributors.

A.9 Testing for the Role of Extraterritoriality

In Table B.9 of the Online Appendix we also check whether estimated effects differ depending on whether the Western firms had extraterritorial status in 1923. Ex ante, we would not expect this to matter, as only the extraterritorial status of defendants (i.e., the Japanese firms) should matter for trademark protection and Japanese firms had extraterritoriality throughout the study period. In line with this expectation, we find very similar results for both types of Western firms.

A.10 Inverse Propensity Score Reweighing

In Table B.10, we perform two types of inverse propensity score reweighing to ensure Western and Japanese firms are comparable based on pre-law characteristics such as firm size, exporter status, importer status, and employment growth. Our results are robust.

A.11 Identifying Individual Authentic Firms vs. Counterfeiters

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

In addition to the pre-1922 trademark data outside China, we collected data on Chinese trademark applications, registrations, and disputes after the 1923 Trademark Law by digitizing all issues of the Trademark Gazette published by the Chinese Bureau of Trademark from September 1923 to December 1927. For each trademark registration, we collected the trademark ID, name, issue date, trademark owner name, city and country, and trademark product code. Two types of trademarks were issued. Type I, labeled as "甲", consisted of trademarks that had been on the market for over 5 years and thus were granted directly based on Provision 4 of the 1923 Trademark Law without going through six months of public notice. Type II, labeled as "乙", included trademarks that had been on the market for less than 5 years and were granted after an application process and 6 months of public notice (and in case of a dispute, an investigation). The dataset recorded in total 5,491 type-I and 8,229 type-II trademark registrations by the end of 1927. As mentioned before, Figure 1 shows trademarks were most frequently registered in fabrics, paints, tobacco, cosmetics, pharmaceuticals, foodstuffs, and clothing, all of which also appeared in the top 15 most trademark-intensive products based on the pre-1922 foreign trademark data.

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

Column (1) of Table B.11 shows that authentic firms (as measured by group (i)) increased employment while counterfeiters (as defined in group (iii)) reduced employment (both relative to the excluded group (iv)). Column (2) uses an alternative definition of authentic firms by adding group (ii) to group (i). Employment effects are slightly larger. Columns (3) and (4) repeat this exercise but use employment shares as the dependent variable. This result echoes our findings in Section 5 and offers supplementary evidence on how firms from different sides of trademark conflicts responded to the trademark law.

A.12 The Effect of the Trademark Law on Quality and New-product Related Advertising

In Section 5.1, we have focused on anti-imitation ads to offer direct evidence on the role of trademark protection in reducing information friction and the need for such alternative communication channels. In this section, we explore other types of advertisements to gain some additional insights into firm responses to the trademark law. Note that for more general advertising activities, trade-

mark protection may exert various effects: on the one hand, authentic firms may exhibit a reduced need to signal quality as we show in Section 5.1 for anti-imitation ads; on the other hand, with a greater revenue return, authentic firms may become more motivated to upgrade quality, introduce new varieties, and promote brands accordingly.

To examine these potential effects, we first explore whether trademark protection affects firms' mention of quality in their advertising content. 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).

Column (1) of Table B.12 shows that after the trademark law, firms increased the share of regular advertising activities (as opposed to anti-imitation advertising intended to address counterfeiting), consistent with the findings in Section 5.1. Column (2) shows that despite the relative increase in regular ads, the effect of the trademark law on quality ads is insignificant.

In column (3), we separately identify advertisements with keywords related to "invention" (发明) or "new product" (新品) and find that while the incident of quality ads did not change significantly, ads highlighting new products rose significantly after the trademark law, consistent with hypothesis H4 and Section 5.4, suggesting an increase in the number of authentic varieties after the trademark law.

A.13 The Effect of the Trademark Law on Chinese Imports

While our main analysis has focused on 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.[8] The source of the data is the annual series "Foreign Trade of China," published by the *Statistical Department of the Inspectorate General of Customs*. For each source country and year, the data report the quantity and value of imports of a given product.

We harmonize countries and products over time, resulting in data for 40 countries and 246 harmonized product categories for the years 1920-1928. Harmonizing products over time is challenging; the product-classification system changed significantly in 1925. We verify our matches using a 1925 publication that applies the new classification system to data for the preceding two years. Overall, we match 91% of trade data (in terms of import value in 1924) either exactly (35%) or closely (56%), with deviations of less than 1% of trade value in either product classification in both 1923 and 1924).[9] Our analysis focuses on the products we can match exactly over time; robustness checks include the remaining product categories.

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

$$\begin{aligned} y_{pct} &= \beta \times Western_c \times TMInt_p * Post1923_t + \gamma \times TMInt_p \times Post1923_t \\ &\quad + FE_{pc} + FE_{ct} + FE_{jt} + \epsilon_{pct} \end{aligned} \tag{16}$$

[8] 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.

[9] 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.

where y_{pct} are different measures of China's imports in product category p from country c in year t, including logged imports, a country's import share in total imports of a product pt, an import dummy, and logged unit price. $TrademarkInt_p$ is the trademark share of product p as defined in Section 4.4, $Post1923_t$ is a dummy that equals 1 if the year is equal to or after 1923, FE_{pc} are product-country-specific fixed effects, FE_{ct} are country-year-specific fixed effects, and FE_{jt} are broad industry-year fixed effects (broad industries are 5 categories based on the NICE trademark categories and include chemicals, textiles, metal and automotive, non-metal, as well as food, beverages and tobacco). 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 exclude rice from the list of products because rice imports were unusually low in 1919 and 1920 due to poor harvests (Kratoska, 1990).[10]

Table B.13 presents the results. Column (1) shows that Chinese imports of trademark-intensive products from Western countries increased significantly relative to imports from Japan after the adoption of the trademark law. 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 1.4%; imports of the product category with mean trademark intensity (chinaware, with a trademark intensity of 0.026) increased by 0.5%. Column (2) shows that the result is similar when using the share of imports. Column (3) explores the extensive margin of imports by using the simple import dummy and confirms that the trademark law also led to new trade relationships with Western countries in trademark-intensive products. Finally, column (4) uses the unit prices as the dependent variable. Consistent with our result on Shanghai prices, we do not find significant effects of the trademark law on import prices.

We also check whether there were pre-trends in the trade data indicating that imports of trademark-intensive goods would have grown even in the absence of the trademark law. Figure C.11 shows the estimation results. There is no evidence of pre-trends: coefficients before 1923 are smaller by order of magnitude and insignificantly different from zero; coefficients after 1923 are consistently large and mostly significantly different from zero. However, the effect of the trademark law appears to decline slightly over time.

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

B Online Appendix — Tables

Table B.1: Summary Statistics

	(1) Observations	(2) Mean	(3) Std.dev.	(4) Min	(5) Max
Employee number	2088	11.95	23.195	1	387
Employment share	2088	0.203	0.272	0.002	1
Number of products	2088	1.746	1.391	1	11
Trademark intensity	2088	0.022	0.025	0	0.088
Western firm dummy	2088	0.892	0.311	0	1
Japanese firm dummy	2088	0.108	0.311	0	1

Notes: Summary statistics are provided for the sample used in Table 4's column (4), the baseline regression.

Table B.2: Effect of the Trademark Law on Anti-imitation Advertisements during 1920-1930

	(1) Dummy if > 1 anti-imitation ad	(2) anti-imitation ads/all ads	(3) $\sinh^{-1}$(anti-imitation ads)
Post May 1923 * trademark intensity	-1.397***	-0.205***	-2.818***
	(0.436)	(0.074)	(0.906)
Observations	4,411	4,411	4,411
R-squared	0.043	0.034	0.039
Number of NICE	45	45	45
Product FE	Yes	Yes	Yes
Month FE	Yes	Yes	Yes

Notes: This table reports the estimated effects of the trademark law on advertisements warning against imitations (anti-imitation ads) that were published in *Shen Bao* between 1920-1930. The dependent variables are a dummy variable indicating that there was at least one anti-imitation ad in the product-month, the share of anti-imitation ads in all ads in the product-month, and the inverse hyperbolic sine of the count of anti-imitation ads in the product-month. *Post May 1923* is a dummy denoting the period after adoption of the trademark law in May 1923. *Trademark intensity* is a product group-specific measure of trademark dependence, calculated using each product's share in total pre-1923 trademarks. All regressions include product group fixed effects and month fixed effects. Standard errors are clustered by product group. *** p<0.01, ** p<0.05, * p<0.1.

Table B.3: Effect of Trademark Registrations on Prices

	(1) ln(price)	(2) ln(price)
Post trademark registration	-0.002	0.007
	(0.009)	(0.007)
Observations	14,263	35,862
# products in TG	594	594
# products in CG		1,101
Control group	not yet treated	never treated

Notes: This table reports the estimated effect of trademark registrations on prices. All columns compute the average treatment effect based on the method of Callaway and Sant'Anna (2020) and Sant'Anna and Zhao (2020) and were implemented using their Stata command `csdid` which is appropriate for staggered differences-in-differences settings and includes product and time-fixed effects. Column (1) drops never treated products from the analysis. *** p<0.01, ** p<0.05, * p<0.1.

Table B.4: Robustness to Alternative Measures of Trademark Intensity

Dependent variable: employment share	(1)	(2)	(3)	(4)
TM intensity measure:	baseline	mean	excl. Japan	country-specific
Post 1923 * trademark intensity *Western firms	2.607***	1.136*	2.559***	1.450**
	(0.916)	(0.599)	(0.903)	(0.635)
Observations	2,088	2,088	2,088	2,088
R-squared	0.955	0.954	0.955	0.954
Firm FE	Yes	Yes	Yes	Yes
Ctry*Year FE	Yes	Yes	Yes	Yes
Region*broad ind*year FE	Yes	Yes	Yes	Yes
Product group*year FE	Yes	Yes	Yes	Yes

Notes: This table reports the estimated effect of the 1923 trademark law on Western firms' employment share, using alternative measures of trademark intensity described in section A.5, following the same specification as in column (4) of Table 4. Standard errors are clustered by product category and country-year. *** p<0.01, ** p<0.05, * p<0.1.

Table B.5: Controlling for Alternative Product and Country Attributes

	(1) employment share	(2) employment share	(3) employment share	(4) employment share	(5) employment share	(6) employment share	(7) employment share
Post 1923 * trademark intensity * Western firms	2.607***	2.513**	2.526**	2.499**	2.564***	2.572**	2.635***
	(0.916)	(0.949)	(0.936)	(0.970)	(0.858)	(0.943)	(0.897)
Post 1923 * patent intensity * Western firms		0.328**					
		(0.138)					
Post 1923 * ln(number of firms) * Western firms			-0.015***				
			(0.004)				
Post 1923 * ln(total employment) * Western firms				-0.010*			
				(0.005)			
Post 1923 * Herfindahl index * Western firms					0.076**		
					(0.036)		
Post 1923 * ln(avg empl 20-22) * Western firms						-0.010	
						(0.006)	
Trademark int. * ln(real GDP)							-0.611
							(1.263)
Observations	2,088	2,088	2,081	2,081	2,088	2,088	2,088
R-squared	0.955	0.955	0.954	0.954	0.955	0.955	0.955
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country*year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Region*broad ind*year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
NICE*year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Notes: This table reports the differential effect of the trademark law on the employment shares of Western firms relative to Japanese firms, controlling for other product, industry, or country attributes. *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 et al. (2018) and Fouquin and Hugot (2016). The sample includes the years 1920-1926 and Western and Japanese firms. Standard errors are two-way clustered by product category and country-year. *** p<0.01, ** p<0.05, * p<0.1.

Table B.6: Controlling for Chinese Consumer Boycotts against Foreign Products

	(1) employment share	(2) employment share	(3) employment share	(4) employment share	(5) employment share	(6) employment share	(7) employment share	(8) employment share	(9) employment share
Post 1923 * trademark intensity * Western firms	2.512**	2.515**	2.603***	2.529**	2.523**	2.606***	2.583***	2.802***	2.842***
	(0.906)	(0.938)	(0.910)	(0.913)	(0.908)	(0.920)	(0.877)	(0.986)	(0.997)
Boycotts (League of Nations, 1932)*TM intensity	-0.244								
	(0.308)								
Boycotts (Zumoto, 1932)*TM intensity		-0.152							
		(0.336)							
Boycotts (Orchard, 1930)*TM intensity			0.029						
			(0.263)						
Boycotts (League of Nations, 1932)*product dominance				-0.023					
				(0.020)					
Boycotts (Zumoto, 1932)*product dominance					-0.017				
					(0.023)				
Boycotts (Orchard, 1930)*product dominance						-0.004			
						(0.014)			
Japan*export ratio*trademark intensity							-2.853		-10.273*
							(6.464)		(5.491)
Country-specific export ratio*trademark intensity								13.325	
								(16.220)	
Western*export ratio*trademark intensity									54.373
									(40.190)
Observations	2,088	2,088	2,088	2,088	2,088	2,088	2,088	2,023	2,023
R-squared	0.955	0.955	0.955	0.955	0.955	0.955	0.955	0.955	0.955
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country*year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Region*broad ind*year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
NICE*year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

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

Table B.7: Effect of the Trademark Law on Employment at Western Firms: Goods only

VARIABLES	(1) ln(empl)	(2) emp share	(3) ln(empl)	(4) emp share	(5) ln(empl)	(6) emp share
Post 1923 * trademark intensity * Western firms	26.621***	3.656**	30.784***	4.550**	31.432***	4.526**
	(8.547)	(1.738)	(7.146)	(1.768)	(9.714)	(1.903)
Post 1923*trademark intensity	-24.132**	-3.500**				
	(9.181)	(1.696)				
Observations	889	889	840	840	1,241	1,241
R-squared	0.909	0.944	0.930	0.947	0.922	0.938
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Country*year FE	Yes	Yes	Yes	Yes	Yes	Yes
Region*broad ind*year FE	Yes	Yes	Yes	Yes	Yes	Yes
NICE*year FE	No	No	Yes	Yes	Yes	Yes
Sample years	1920-1926	1920-1926	1920-1926	1920-1926	1920-1930	1920-1930

Notes: The sample consists of all firms that sold only goods in one of the years 1920-1922. The regressions implemented are the same as in Table 4. Standard errors are clustered by product category. *** p<0.01, ** p<0.05, * p<0.1.

Table B.8: Effect of the Trademark Law on Employment at Western Firms: Dropping Distributors

VARIABLES	(1) ln(empl)	(2) emp share	(3) ln(empl)	(4) emp share	(5) ln(empl)	(6) emp share
Post 1923 * trademark intensity * Western firms	8.723*	2.068***	9.015**	2.407**	11.162*	2.644**
	(4.548)	(0.653)	(4.248)	(0.987)	(6.435)	(0.931)
Post 1923*trademark intensity	-5.093	-1.526***				
	(3.824)	(0.517)				
Observations	1,324	1,324	1,273	1,273	1,900	1,900
R-squared	0.923	0.944	0.930	0.949	0.918	0.948
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Country*year FE	Yes	Yes	Yes	Yes	Yes	Yes
Region*broad ind*year FE	Yes	Yes	Yes	Yes	Yes	Yes
NICE*year FE	No	No	Yes	Yes	Yes	Yes
Sample years	1920-1926	1920-1926	1920-1926	1920-1926	1920-1930	1920-1930

Notes: The sample drops all firms that are pure distributors, i.e., wholesellers or retailers. The regressions implemented are the same as in Table 4. Standard errors are clustered by product category. *** p<0.01, ** p<0.05, * p<0.1.

Table B.9: Effect of the Trademark Law on Employment: By Extraterritorial Status of Western firms

	(1) ln(empl)	(2) emp share	(3) ln(empl)	(4) emp share
Post 1923 * trademark intensity * Western firms * ET	10.361***	2.607***	14.215***	3.190***
	(3.651)	(0.912)	(3.575)	(0.866)
Post 1923 * trademark intensity * Western firms * non-ET	13.611***	2.671**	17.149***	2.893**
	(4.788)	(1.250)	(4.692)	(1.212)
Observations	2,088	2,088	3,143	3,143
R-squared	0.922	0.955	0.904	0.950
Firm FE	Yes	Yes	Yes	Yes
Country*year FE	Yes	Yes	Yes	Yes
Region*broad ind*year FE	Yes	Yes	Yes	Yes
NICE*year FE	Yes	Yes	Yes	Yes
Sample years	1920-1926	1920-1926	1920-1930	1920-1930

Notes: The regressions implemented are the same as in columns 3, 4, 7, and 8 of Table 4, but now we allow the effect on Western firms to vary depending on whether the specific Western country has extraterritorial rights in China ('ET') or not ('non-ET') in 1923. Standard errors are clustered by product category. *** p<0.01, ** p<0.05, * p<0.1.

Table B.10: Effect of the Trademark Law on Employment at Western Firms: Inverse propensity score reweighing

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
VARIABLES	ln(empl)	emp share	ln(empl)	emp share	ln(empl)	emp share	ln(empl)	emp share
Post 1923 * trademark intensity * Western firms	10.660***	2.784***	9.650**	2.542***	10.267**	2.593**	10.537**	2.529**
	(3.376)	(0.861)	(3.744)	(0.839)	(4.177)	(0.962)	(4.850)	(1.047)
Post 1923*trademark intensity	-8.552**	-2.419***			-8.206*	-2.285**		
	(3.568)	(0.855)			(4.529)	(0.970)		
Observations	2,088	2,088	2,084	2,084	1,791	1,791	1,786	1,786
R-squared	0.917	0.947	0.930	0.960	0.923	0.948	0.938	0.962
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country*year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Region*broad ind*year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
NICE*year FE	No	No	Yes	Yes	Yes	Yes	Yes	Yes
Sample years	1920-1926	1920-1926	1920-1926	1920-1926	1920-1926	1920-1926	1920-1926	1920-1926
Weights	IPW1	IPW1	IPW1	IPW1	IPW2	IPW2	IPW2	IPW2

Notes: The regressions implemented are the same as columns 1-4 in Table 4, but now we reweigh observations based on their inverse propensity score. Columns (1) to (4) create inverse propensity weights (IPW1) from a logistic regression of the Western dummy on firm size (average employment 1920-1922), an importer and an exporter dummy. Columns (5) to (8) create inverse propensity weights (IPW2) by adding also the employment growth between 1920-1922 to the logistic regression. Standard errors are clustered by product category. *** p<0.01, ** p<0.05, * p<0.1.

Table B.11: Effect of the Trademark Law on Authentic vs. Counterfeiting Firms

	(1)	(2)	(3)	(4)
	ln(empl)	ln(empl)	empl share	empl share
Post 1923 *				
– Authentic (all TM applications approved)	0.090*		0.014*	
	(0.024)		(0.004)	
– Authentic (TM appl approved plus type I TM registrations)		0.091**		0.013**
		(0.020)		(0.003)
– Counterfeiter (denied applicants)	-0.058*	-0.054**	0.008***	0.008***
	(0.015)	(0.013)	(0.000)	(0.001)
Observations	9,557	9,683	9,557	9,683
R-squared	0.893	0.894	0.953	0.953
Firm FE	Yes	Yes	Yes	Yes
Ind*Year FE	Yes	Yes	Yes	Yes
Ctry*Year FE	Yes	Yes	Yes	Yes

Notes: This table reports the estimated effects of the trademark law on the employment and employment share of identified authentic firms and counterfeiters. The sample consists of firms located in Shanghai's concessions, for which we have information on employment and activity for the period 1920-1922. The dependent variable is the natural log of a firm's employment or the firm's employment share in a product in a given year. *Post 1923* is a dummy denoting the period after adoption of the trademark law in 1923. The first measure of authentic firms includes all firms whose TM applications were approved. The second measure of authentic firms includes these firms and adds all firms that show up with trademark registrations of type I, i.e., whose applications were granted after checking that they had been on the market for more than 5 years. 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.12: Effect of the Trademark Law on Advertisements related to Quality and New Product innovation

	(1) regular ads/ all ads	(2) quality ad dummy	(3) new product ad dummy
Post May 1923 * trademark intensity	0.162**	0.657	1.182**
	(0.072)	(1.048)	(0.516)
Observations	2,856	2,856	2,856
R-squared	0.035	0.047	0.030
Number of NICE	45	45	45
Product FE	Yes	Yes	Yes
Month FE	Yes	Yes	Yes

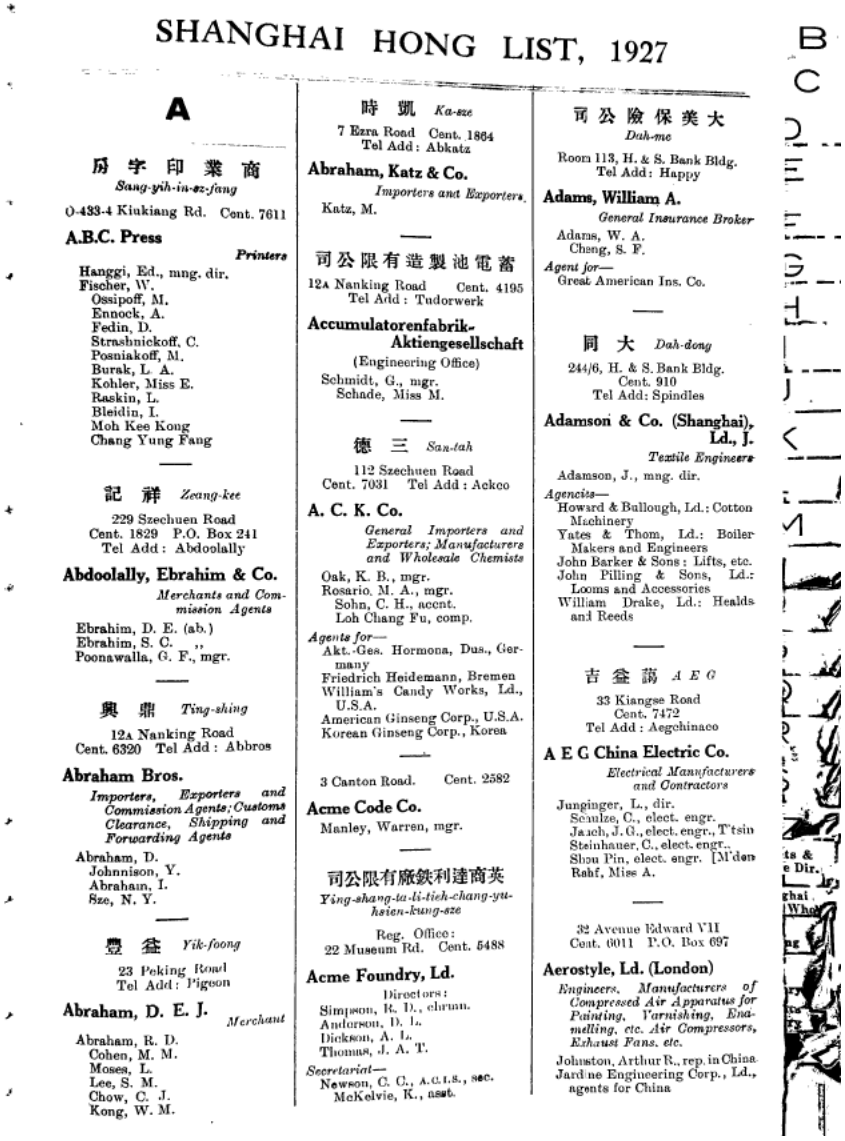
Notes: This table reports the estimated effects of the trademark law on regular advertisements (i.e., excluding those that are warning against imitations) that were published in *Shen Bao* between 1920 and 1930. The dependent variables are the share of regular ads in total ads (i.e., the sum of anti-imitation ads and regular ads), a dummy variable indicating whether the regular ad highlights the quality or innovativeness of a product, and a dummy variable indicating whether the regular ad is about a new product. *Post May 1923* is a dummy denoting the period after adoption of the trademark law in May 1923. *Trademark intensity* is a product group-specific measure of trademark dependence, calculated using each product's share in total pre-1923 trademarks. All regressions include product group fixed effects and month fixed effects. Standard errors are clustered by product group. *** $p<0.01$, ** $p<0.05$, * $p<0.1$.

Table B.13: Effect of the Trademark Law on Imports

	(1)	(2)	(3)	(4)
	ln(imports)	Country's import share in product	Import dummy	ln(unit price)
Trademark intensity * (Post $\geq$ 1923) * Western countries	19.270*	5.872**	1.381*	-0.782
(11.294)		(2.257)	(0.705)	(1.905)
Trademark intensity * (Post $\geq$ 1923)	-13.311	-3.271*	-1.297*	1.345
	(14.295)	(1.796)	(0.727)	(3.002)
Observations	11,071	14,958	14,958	6,192
R-squared	0.911	0.893	0.586	0.994
Country-year FEs	yes	yes	yes	yes
Country-prod FEs	yes	yes	yes	yes
Broad industry-year FEs	yes	yes	yes	yes

Notes: This table reports the differential effects of the trademark law on China's imports from Western countries relative to 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, a country's imports share in a product group, and a dummy for the existence of imports, respectively. Column (4) uses log of unit prices (import value divided by import quantity) for the subset of trade data for which units are reported. *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.

C Online Appendix — Figures



SHANGHAI HONG LIST, 1927

A

商印業宇房
Sang-yih-in-ez-fang
O-433-4 Kiukiang Rd. Cent. 7611
A.B.C. Press
Printers
Hanggi, Ed., mng. dir.
Fischer, W.
Ossipoff, M.
Ennock, A.
Fedin, D.
Strashnickoff, C.
Posniakoff, M.
Burak, L. A.
Kohler, Miss E.
Raskin, L.
Bleidin, I.
Moh Kee Kong
Chang Yung Fang

記祥 *Zeang-kee*
229 Szechuen Road
Cent. 1829 P.O. Box 241
Tel Add: Abdoolally
Abdoolally, Ebrahim & Co.
Merchants and Commission Agents
Ebrahim, D. E. (ab.)
Ebrahim, S. C. ,,
Poonawalla, G. F., mgr.

興鼎 *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.

豐益 *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.

時凱 *Ka-ze*
7 Ezra Road Cent. 1864
Tel Add: Abkatz
Abraham, Katz & Co.
Importers and Exporters
Katz, M.

司公限有造製池電蓄
12A Nanking Road Cent. 4195
Tel Add: Tudorwerk
Accumulatorenfabrik-Aktiengesellschaft
(Engineering Office)
Schmidt, G., mgr.
Schade, Miss M.

德三 *San-tah*
112 Szechuen Road
Cent. 7031 Tel Add: Ackco
A. C. K. Co.
General Importers and Exporters; Manufacturers and Wholesale Chemists
Oak, K. B., mgr.
Rosario, M. A., mgr.
Sohn, C. H., accnt.
Loh Chang Fu, comp.
Agents for—
Akt.-Ges. Hormona, Dus., Germany
Friedrich Heidemann, Bremen
William's Candy Works, Ld., U.S.A.
American Ginseng Corp., U.S.A.
Korean Ginseng Corp., Korea

3 Canton Road. Cent. 2582
Acme Code Co.
Manley, Warren, mgr.

司公限有廠鉄利達商英
Ying-shang-ta-li-tieh-chang-yu-hsien-kung-sze
Reg. Office:
22 Museum Rd. Cent. 5488
Acme Foundry, Ld.
Directors:
Simpson, R. D., chrmn.
Anderson, D. L.
Dickson, A. L.
Thomas, J. A. T.
Secretariat—
Newson, C. C., A.C.I.S., sec.
McKelvie, K., asst.

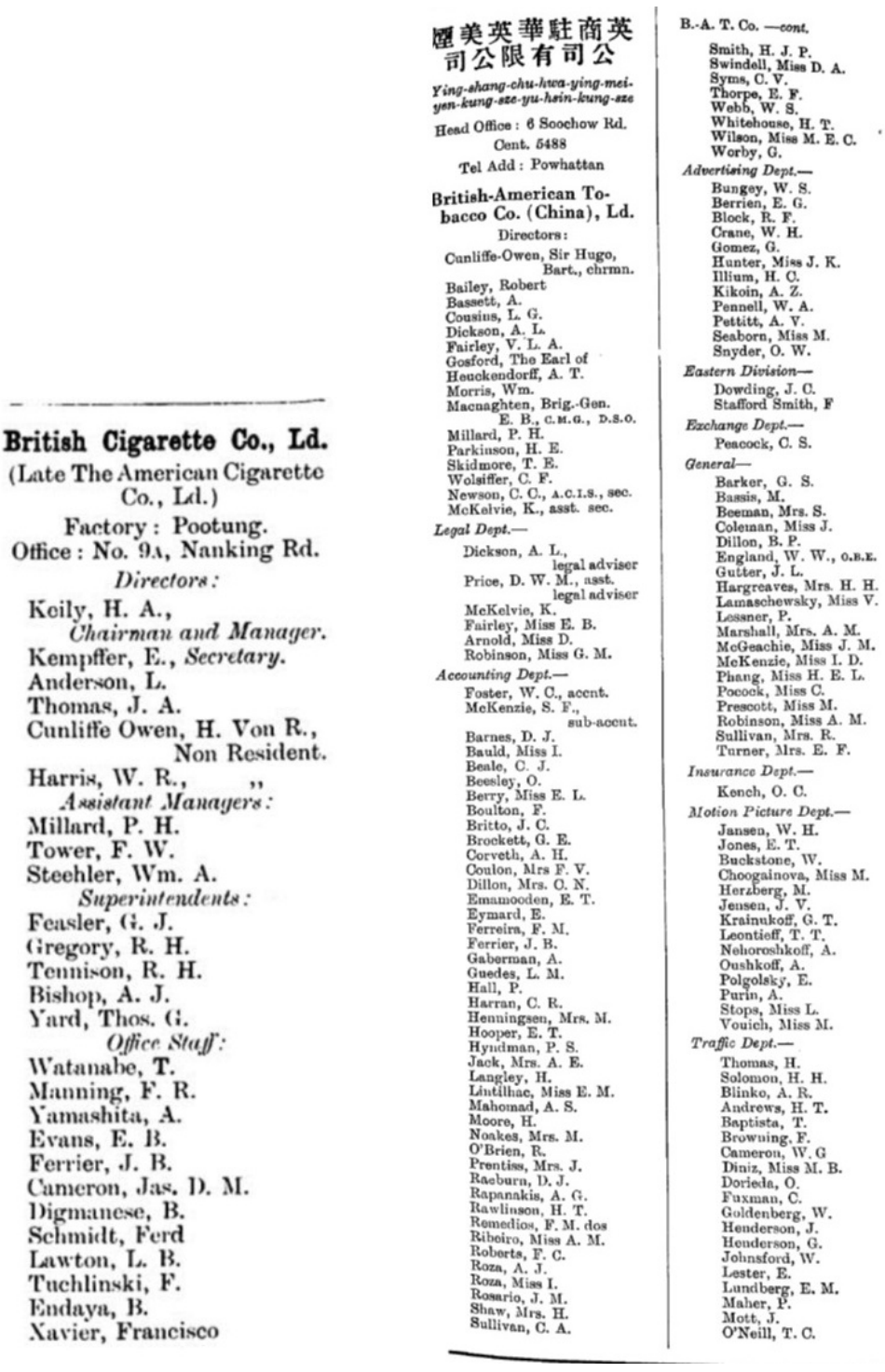
司公險保美大
Dah-me
Room 113, H. & S. Bank Bldg.
Tel Add: Happy
Adams, William A.
General Insurance Broker
Adams, W. A.
Cheng, S. F.
Agent for—
Great American Ins. Co.

同大 *Dah-dong*
244/6, H. & S. Bank Bldg.
Cent. 910
Tel Add: Spindles
Adamson & Co. (Shanghai), Ld., J.
Textile Engineers
Adamson, J., mng. dir.
Agencies—
Howard & Bullough, Ld.: Cotton Machinery
Yates & Thom, Ld.: Boiler Makers and Engineers
John Barker & Sons: Lifts, etc.
John Pilling & Sons, Ld.: Looms and Accessories
William Drake, Ld.: Healds and Reeds

吉益蔼 *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.
Jauch, J. G., elect. engr., Tsin
Steinhauer, C., elect. engr.
Shou Pin, elect. engr. [M'dan
Rahf, Miss A.

32 Avenue Edward VII
Cent. 6011 P.O. Box 697
Aerostyle, Ld. (London)
Engineers. Manufacturers of Compressed Air Apparatus for Painting, Varnishing, Enamelling, etc. Air Compressors, Exhaust Fans, etc.
Johnston, Arthur R., rep. in China
Jardine Engineering Corp., Ld., agents for China

Figure C.1: Representative page from the Hong List, 1927



British Cigarette Co., Ld.
(Late The American Cigarette Co., Ld.)
Factory: Pootung.
Office: No. 9A, Nanking Rd.

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

Assistant Managers:
Millard, P. H.
Tower, F. W.
Steehler, Wm. A.

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

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

英商駐華美英煙草公司
公司有限有限公司

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

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

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

Directors:
Cunliffe-Owen, Sir Hugo, Bart., chrmn.
Bailey, Robert
Bassett, A.
Cousins, L. G.
Dickson, A. L.
Fairley, V. L. A.
Gosford, The Earl of
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. C. 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
Ribeiro, 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.—
Kench, 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.2: Employment at British American Tobacco (BAT) and its predecessor in Shanghai, 1906 and 1926

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

(a) Lion: Japanese counterfeit

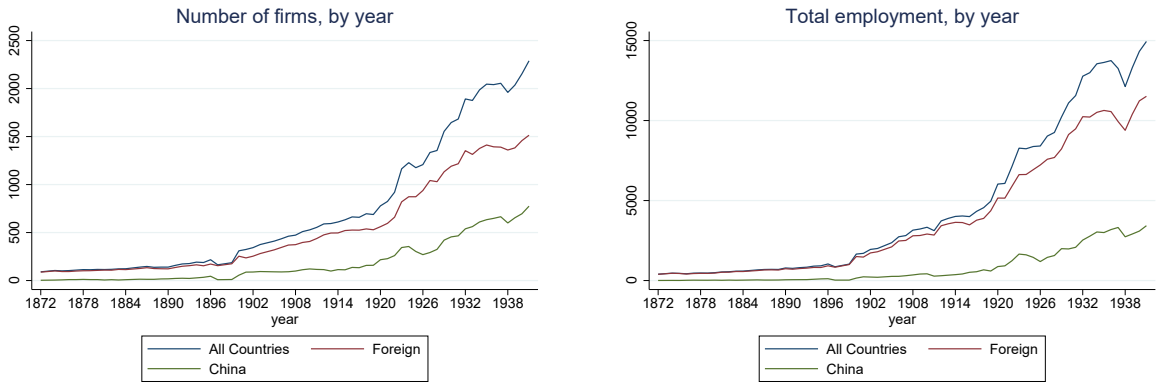
(b) Lion: German authentic producer

(c) Good luck: Japanese counterfeit

(d) Good luck: British authentic producer

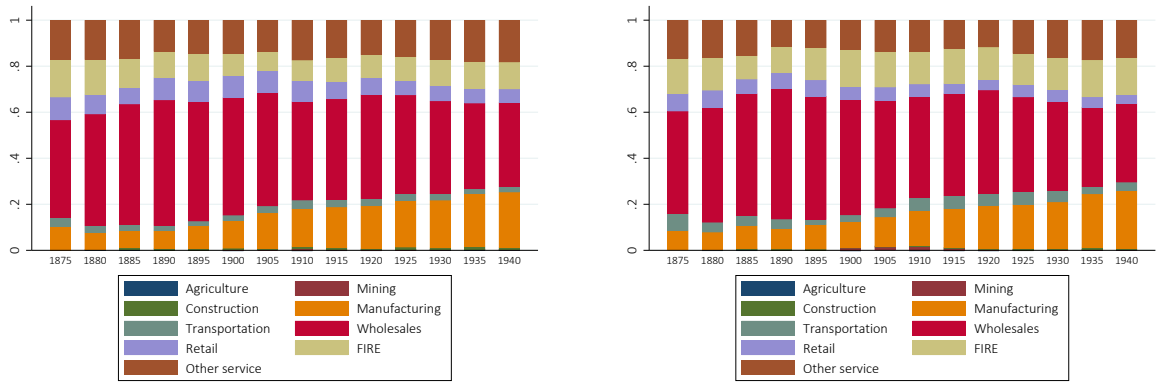
Figure C.3: Examples of Authentic and Counterfeit Trademarks

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



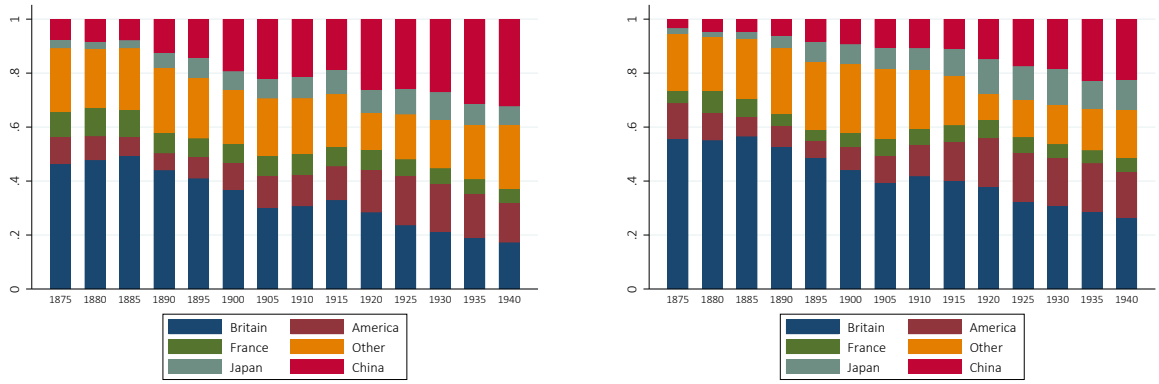
(a) Number of firms (b) Total employment

Figure C.4: Trends in Firms and Employment in the Shanghai Concessions, 1872-1938



(a) By number of firms (b) By employment

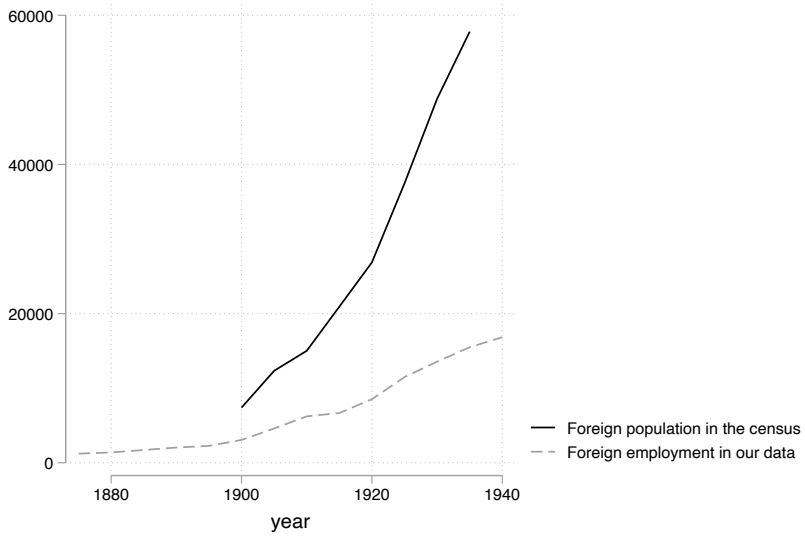
Figure C.5: Composition of Firms in Shanghai's Concessions by Industry, 1875-1941



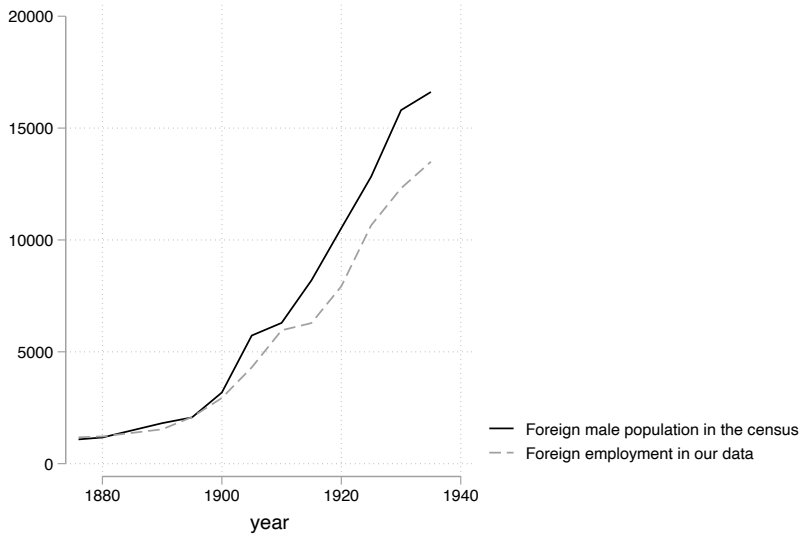
(a) By number of firms

(b) By employment

Figure C.6: Composition of Firms in Shanghai's Concessions by Nationality, 1875-1941



(a) All concessions



(b) International concession

Figure C.7: Data Validation

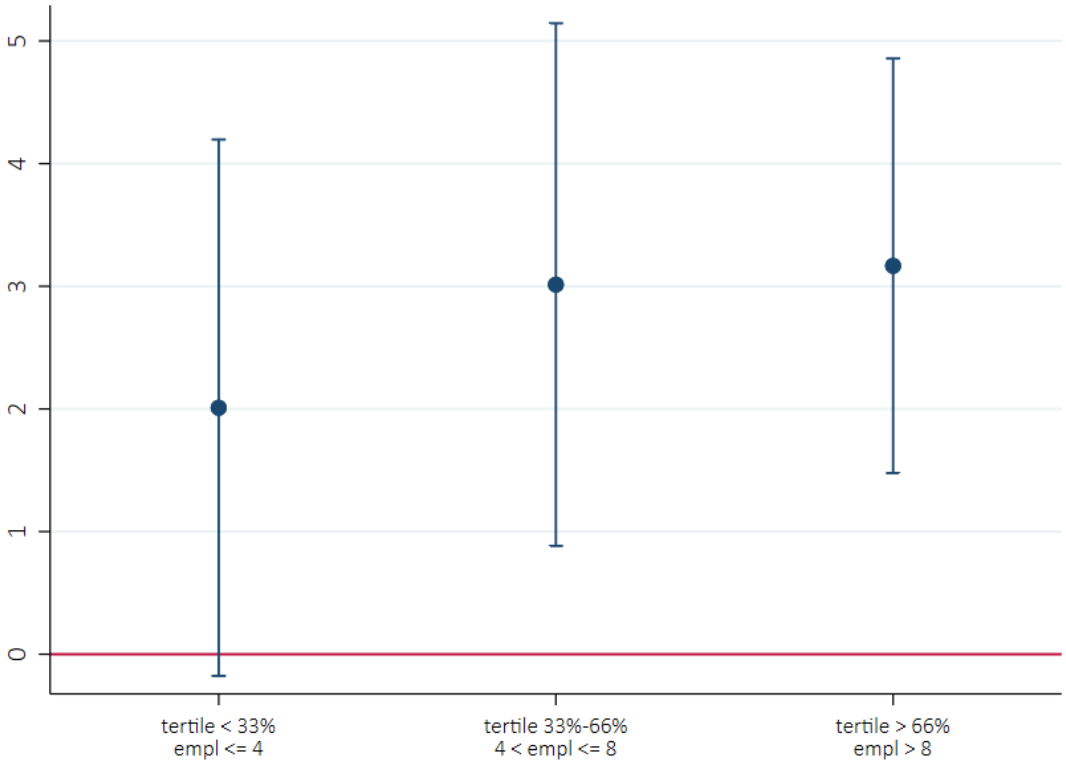


Figure C.8: Heterogeneous Effect of the Trademark Law on the Employment Share of Western Firms

Notes: For this graph we run the baseline estimation used in column (4) of Table 4 and allow the effect to vary by initial employment size tertile.

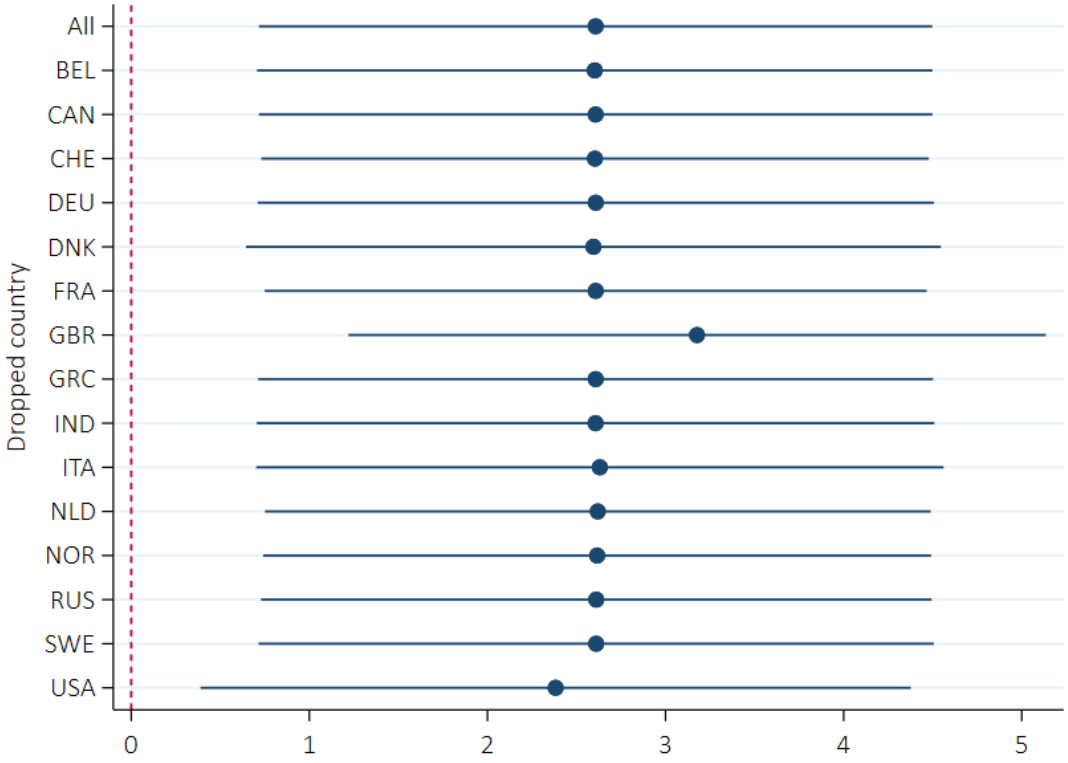


Figure C.9: Effect of the Trademark Law on Employment at Western Firms, dropping one home country at a time

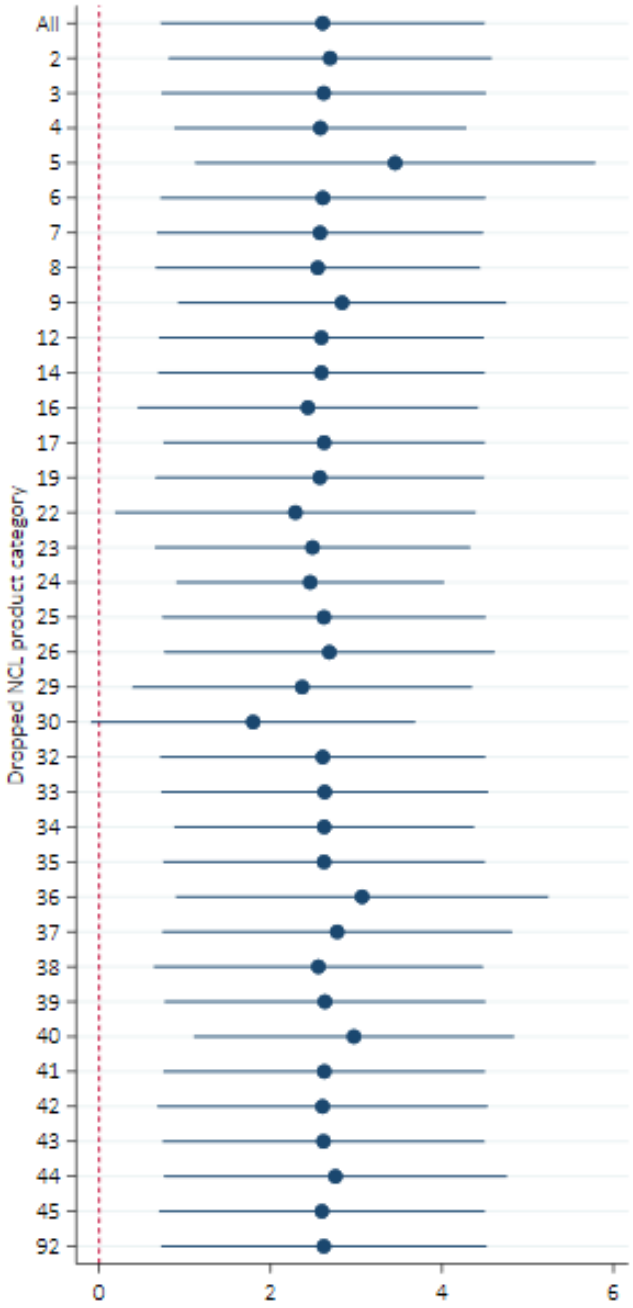


Figure C.10: Effect of the Trademark Law on Employment at Western Firms, dropping one NCL product category at a time

Notes: Only product categories that remain in the sample in the main specification (i.e., after singletons are dropped) are used here, which explains why product category 1 cannot be dropped, for example.

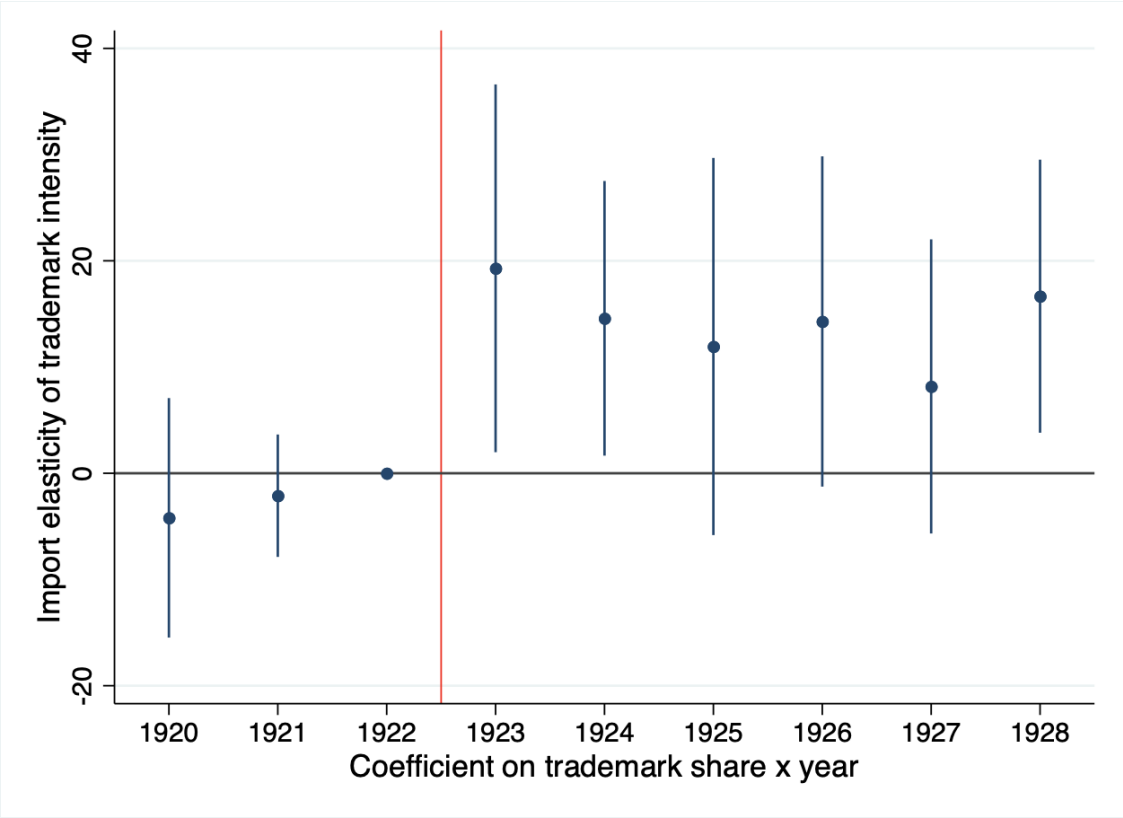


Figure C.11: Effect of the Trademark Law on Chinese Imports from Western countries: Event Study